CONCEPTUAL HYDROLOGY STUDY

FOR

The Neighborhoods at Lugonia Village

NEC West Lugonia Avenue & Karon Street

Redlands, CA 92374

Prepared for Owner/Developer

Redlands Summit, LLC

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Introduction

A preliminary drainage analysis has been prepared for the Lugonia Village project located in the City of Redlands, County of San Bernardino, State of California. The project site is located east of State Route 210, northwest of the intersection of Lugonia Avenue and Karon Street. The project site encompasses approximately 24.4 acres.

Discussion

This report and the associated analyses have been prepared to evaluate the drainage concept for the project site.

The project site is currently undeveloped with some scattered brush. The proposed project is a residential development with three distinct areas; apartments, town homes, and single family residences. The apartments are located on the southwest portion of the project site, adjacent to Lugonia Avenue and the west property boundary, and occupy approximately 14.5 acres. The town homes are located on the north portion of the project site, adjacent to proposed Pennsylvania Avenue, and occupy approximately 4.8 acres. The single family residences are located on the east portion of the project site, adjacent to Karon Street, and occupy approximately 3.9 acres. The remaining area is dedicated as right-of-way for Lugonia Avenue on the south and proposed Pennsylvania Avenue on the north.

In the existing condition, the project site generally drains in an east to west direction across the west property boundary. There are areas adjacent to both Lugonia Avenue and proposed Pennsylvania Avenue where storm flows leave the project site prior to reaching the west property boundary.

There is an existing 57" storm drain in Lugonia Avenue. This storm drain extends west to a concrete channel adjacent to State Route 210 that directs flows north to the Santa Ana River. There are no existing storm drain laterals that have been provided to the project site and it is unclear whether or not the site is tabled to the storm drain in Lugonia Avenue.

There is an existing concrete ditch that extends west then north from the Karon Street / Pennsylvania Avenue intersection to San Bernardino Avenue. This ditch conveys runoff from the residential development east of Karon Street, including runoff generated in Karon Street.

Relevant reference materials are contained in Technical Appendix A.

Drainage Concept

With no storm drain connection available, the general drainage concept is to reduce storm flows from the project site by using underground storage and discharge the reduced flows to the public streets.

The apartments area is designated as Drainage Area (DA) 1. Four separate StormTech MC-4500 chamber areas are proposed with a total storage volume in both the chambers and the surrounding stone of 94,800 cu-ft (2.176 ac-ft). The storm drain and underground storage system will ultimately "burp-out" flows to Lugonia Avenue through a sidewalk culvert.

The town homes area is designated as Drainage Area (DA) 2. Two separate StormTech MC-3500 chamber areas are proposed with a total storage volume in both the chambers and the surrounding stone of 23,760 cu-ft (0.545 ac-ft). The storm drain and underground storage system will ultimately "burp-out" flows to proposed Pennsylvania Avenue through a sidewalk culvert.

The single family residences area is designated as Drainage Area (DA) 3. There is a high point in Karon Street, so a portion of DA 3 drains north towards Pennsylvania Avenue and a portion drains south to Lugonia Avenue. For the portion draining north, the StormTech MC-3500 chamber area has a total storage volume in both the chambers and surrounding stone of 4,610 cu-ft (0.106 ac-ft). This storm drain and underground storage system will ultimately drain to the existing concrete ditch. For the portion draining south, the StormTech MC-3500 chamber area has a total storage volume in both the chambers and the surrounding stone of 11,530 cu-ft (0.265 ac-ft). This storm drain and underground storage system will ultimately "burp-out" flows to Lugonia Avenue through a sidewalk culvert.

Hydrologic Analysis

Both rational method and flood hydrograph analyses were prepared. The rational method analyses developed time-of-concentration and peak flow estimates. The flood hydrographs were developed for the underground storage analysis. Rational method analyses were prepared for the 2-, 10-, and 100-year return events and the flood hydrographs were prepared for the 10- and 100-year return events. The hydrologic analyses were completed in accordance with the 1986 San Bernardino County Hydrology Manual and 2010 Hydrology Manual Addendum, with the exception that the 2-year rational method analysis was prepared using AMC II as required by Water Quality Management Plan (WQMP) criteria. The hydrologic analyses were completed using Advanced Engineering Software (AES).

Rainfall intensities and depths were obtained from the National Weather Service – NOAA Atlas 14 – Point Precipitation Frequency Estimates.

The hydrologic soil type is "B" as shown on Figure C-16 of the Hydrology Manual.

For this conceptual analysis, the slope of all storm drains has been assumed to be 0.005. The downstream invert for all reaches was set at 0.00 and the upstream invert was calculated as the reach length multiplied by 0.005.

The rainfall and soil exhibits are contained in Technical Appendix B.

The existing condition rational method analysis is contained in Technical Appendix C.

The proposed condition rational method analysis is contained in Technical Appendix D.

Underground Storage Analysis

The underground storage systems are provided for both water quality and flood mitigation. As such, there is a Design Capture Volume (DCV) dead storage requirement whereby the corresponding storm runoff volume can only infiltrate.

Based on the soils report, the field percolation rates are very inconsistent, ranging from 0.9 in/hr to 15.9 in/hr. Although it is anticipated that for the final design percolation tests will be required at the exact locations of the underground storage systems, for the conceptual design an average of the P-2 and P-4 rates with a safety factor of 2, which yields a design percolation rate of 2.4 in/hr is assumed.

To further reduce storm discharge from the underground storage systems, orifice openings will be provided at the top of the chambers that will restrict the flows. The placement of the orifice openings at the top of the chambers provides for additional dead storage volume above the DCV.

The underground storage analysis is contained in Technical Appendix E.

Summary

A summary of the hydrologic and underground storage analyses is as follows:

Existing Condition

Location ()	Node (#)	Drainage Area (ac)	Rational Method Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
Lugonia Avenue	101	1.1	0.7	1.2	2.3
Proposed Pennsylvania Avenue	201	0.7	0.5	0.9	1.7
West Property Boundary	301	22.6	12.8	22.6	43.3
Total		24.4	14.0	24.7	47.2

Proposed Condition – Un-Mitigated

Location ()	Node (#)	Drainage Area (ac)	Rational Method Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
DA 1 Drainage System	136	14.1	14.5	23.5	38.9
Lugonia Avenue	141	0.4	0.7	1.1	1.8
DA 2 Drainage System	214	4.6	4.0	6.7	11.6
Proposed Pennsylvania Avenue	221	0.1	0.2	0.3	0.4
Proposed Pennsylvania Avenue	231	0.1	0.2	0.3	0.4
DA 3 Drainage System – North	304	1.2	0.9	1.6	2.9
DA 3 Drainage System – South	314	2.7	1.2	2.4	4.6
ROW – Pennsylvania Avenue	401	0.6	1.1	1.7	2.7
ROW – Lugonia Avenue	411	0.6	1.1	1.7	2.7
Total		24.4	23.9	39.3	66.0

Proposed Condition – Mitigated

Location ()	Node (#)	Drainage Area (ac)	Flood Hydrograph Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
DA 1 Drainage System	136	14.1	N/A	0.0	2.2
Lugonia Avenue	141	0.4	N/A	1.1	1.8
DA 2 Drainage System	214	4.6	N/A	0.0	0.9
Proposed Pennsylvania Avenue	221	0.1	N/A	0.3	0.4
Proposed Pennsylvania Avenue	231	0.1	N/A	0.3	0.4
DA 3 Drainage System – North	304	1.2	N/A	0.0	1.0
DA 3 Drainage System – South	314	2.7	N/A	0.0	0.9
ROW – Pennsylvania Avenue	401	0.6	N/A	1.7	2.7
ROW – Lugonia Avenue	411	0.6	N/A	1.7	2.7
Total		24.4	N/A	5.0	12.9

Technical Appendix A

References
Maps and Plans

Vicinity Map

STORM DRAIN IMPROVEMENT PLANS
LUGONIA AVENUE
CITY OF REDLANDS

GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK)", LATEST EDITION (INCLUDING THE LATEST SUPPLEMENTAL AMENDMENTS THERETO), THE "STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION", CURRENT EDITION, AND THE CITY OF REDLANDS STANDARD SPECIFICATIONS. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE PUBLIC WORKS DIRECTOR OR APPOINTED REPRESENTATIVE.
2. THE APPROXIMATE LOCATIONS OF KNOWN EXISTING UNDERGROUND UTILITIES ARE SHOWN ON THIS PLAN. THE UTILITIES ARE PLOTTED FROM RECORD AND FIELD DATA. THE ENGINEER ASSUMES NO LIABILITY AS TO THE EXACT LOCATION OF SAID LINES WHETHER SHOWN OR NOT SHOWN ON THE PLANS. THE CONTRACTOR IS TO NOTIFY ALL UTILITY COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATIONS OF UNDERGROUND LINES.
3. STREETS MAY BE REQUIRED TO HAVE A SEAL COAT APPLIED AT THE OPTION OF THE PUBLIC WORKS DIRECTOR OR APPOINTED REPRESENTATIVE. TYPE OF SEAL COAT IS TO BE DETERMINED BY THE PUBLIC WORKS DIRECTOR OR APPOINTED REPRESENTATIVE.
4. RESURFACE EXISTING ROADWAY, AS DIRECTED BY THE PUBLIC WORKS DIRECTOR OR APPOINTED REPRESENTATIVE, DUE TO UTILITY INSTALLATIONS AND CONSTRUCTION DAMAGE.
5. EXISTING STRIPING SHALL BE REMOVED AND REPLACED AS NECESSARY NEW STRIPING AND PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THE STRIPING PLAN APPROVED BY THE PUBLIC WORKS DIRECTOR OR APPOINTED REPRESENTATIVE.
6. CURB INSTALLATIONS AT LESS THAN 0.50 PERCENT GRADE SHALL HAVE CONSTRUCTION STAKES SET AT 3.8 M (12-1/2 FT.) MAXIMUM INTERVALS AND ALL CURB FORMS SHALL BE CHECKED FOR GRADE COMPLIANCE PRIOR TO CONCRETE POUR. MAXIMUM DEVIATION FROM DESIGN PROFILE GRADE AT ANY LOCATION SHALL BE 3MM (0.01 FT.).
7. SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE THE "ENCROACHMENT PERMIT" WILL BE VALID. FOR YOUR DIG ALERT ID NUMBER, CALL UNDERGROUND SERVICE ALERT (TOLL FREE) AT 1-800-422-4133, TWO WORKING DAYS BEFORE YOU DIG.
8. SOILS REPORT WITH LABORATORY TESTS OF THE "R" VALUE AND SOILS ENGINEER'S STREET STRUCTURAL SECTION RECOMMENDATION SHALL BE REVIEWED AND APPROVED BY THE CITY PRIOR TO ISSUANCE OF THE ENCROACHMENT PERMIT.
9. ASPHALT CONCRETE PAVEMENT SECTIONS ON NEW STREETS GREATER THAN 75 MM (3 IN.) THICK SHALL BE PLACED IN A MINIMUM TWO LIFTS WITH THE LAST LIFT BEING DELAYED UNTIL 95% OF ALL DEVELOPER CONSTRUCTION HAS BEEN COMPLETED.
10. THE FINAL PAVEMENT OR SURFACE LAYER OF ASPHALTIC CONCRETE ROADWAY PAVEMENT SHALL NOT BE PLACED UNTIL ALL UTILITIES AND UTILITY LATERALS WITHIN THE ROADWAY HAVE BEEN INSTALLED, COMPACTED, TESTED AND ACCEPTED BY THE CITY, ALL ON-SITE IMPROVEMENTS INCLUDING ALL GRADING HAVE BEEN COMPLETED AND ALL UNACCEPTABLE PARKWAY AND ROADWAY IMPROVEMENTS ARE REMOVED AND REPLACED TO THE SATISFACTION OF THE CITY.
10. PRIOR TO ROAD CONSTRUCTION, SURVEY MONUMENTS SHALL BE REFERENCED OUT AND CORNER RECORDS FILED WITH THE COUNTY SURVEYOR. SURVEY POINTS DESTROYED DURING CONSTRUCTION SHALL BE RESET, AND A SECOND CORNER RECORD FILED FOR THOSE POINTS PRIOR TO COMPLETION AND ACCEPTANCE OF THE PROJECT.
11. THE CONTRACTOR SHALL EXAMINE CAREFULLY THE SITE OF THE WORK CONTEMPLATED, THE PLANS AND THE SPECIFICATIONS. THE SUBMISSION OF A BID SHALL BE CONCLUSIVE EVIDENCE THAT THE CONTRACTOR HAS INVESTIGATED AND IS SATISFIED AS TO THE CONDITIONS TO BE ENCOUNTERED, TO THE CHARACTER, QUALITY AND SCOPE OF WORK TO BE PERFORMED, TO THE QUANTITIES OF MATERIALS TO BE FURNISHED, AND TO THE REQUIREMENTS OF THE BID PROPOSAL, PLANS AND SPECIFICATIONS.
12. ANY CONTRACTORS PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE THEMSELVES WITH THE SITE AND SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY OR INDIRECTLY FOR HIS OPERATION, WHETHER OR NOT SHOWN ON THESE PLANS.
13. ALL OBSTRUCTIONS WITHIN THE AREA TO BE IMPROVED ARE TO BE REMOVED OR RELOCATED BY THEIR RESPECTIVE OWNERS AT THE DIRECTION OF THE CITY ENGINEER. THE CONTRACTOR IS REFERRED TO SECTION 5 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
14. ALL TRENCHING AND/OR SHORING SHALL MEET REQUIREMENTS OF CALIFORNIA O.S.H.A.
15. CONTRACTOR SHALL SUBMIT COPIES OF HIS DEPARTMENT OF INDUSTRIAL SAFETY PERMIT TO THE CITY OF REDLANDS.
16. IN CASE OF ANY ACCIDENTS INVOLVING SAFETY MATTERS COVERED BY SECTION 6409-1(B) OF THE CALIFORNIA LABOR CODE, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE STATE DIVISION OF INDUSTRIAL SAFETY.
17. STATIONING IS ALONG CENTERLINE OF PIPE UNLESS OTHERWISE NOTED.
18. NEW MANHOLES SHALL BE INSTALLED TO SUBGRADE ELEVATIONS. AFTER PAVEMENT IS COMPLETED, MANHOLES SHALL BE RAISED TO GRADE BY THE PAVING CONTRACTOR.
19. WHERE UTILITIES NEED TO BE SUPPORTED, SAID SUPPORTS SHALL BE IN ACCORDANCE WITH L.A.C.F.C.D. STD. 2-D173.1, .2, OR .3 UNLESS OTHERWISE INDICATED.
20. THE DESIGN OF THE PIPE SHOWN HEREON IS BASED ON THE ASSUMPTION THAT THE PIPE WILL BE INSTALLED IN ACCORDANCE WITH CASE III BEDDING AS SHOWN ON L.A.C.F.C.D. STD. 2-D177 UNLESS OTHERWISE SHOWN. "W" VALUE SHALL BE AS SPECIFIED ON L.A.C.F.C.D. STD. 2-D177 FOR CASE III BEDDING NOTES 3(A), 3(B), AND 3(C). IF THE "W" VALUE AT THE TOP OF THE PIPE IS EXCEEDED, THE BEDDING SHALL BE MODIFIED AND\OR PIPE OF ADDITIONAL STRENGTH SHALL BE PROVIDED. THE PROPOSED MODIFICATION SHALL BE APPROVED BY THE ENGINEER.
21. THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN AND OBTAIN A LANE CLOSURE PERMIT 48 HOURS PRIOR TO THE TIME OF CONSTRUCTION OCCURRING WITHIN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR IS REFERRED TO SECTION 7-10.3 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
22. THE CONTRACTOR SHALL RENEW OR REPLACE ANY EXISTING STRIPING AND OR PAVEMENT MARKINGS, WHICH DURING HIS OPERATIONS HAVE BEEN EITHER REMOVED OR THE EFFECTIVENESS OF WHICH HAS BEEN REDUCED. RENEWAL OF PAVEMENT STRIPING AND MARKINGS SHALL BE DONE IN CONFORMANCE WITH SECTION 310-5.6 OF THE STANDARD SPECIFICATIONS.
23. THE CONTRACTOR SHALL CHIP OR STAMP A 2" "SD" IN THE CURB FACE OR TOP OF CURB TO IDENTIFY THE STORM DRAIN SERVICE LOCATION.
24. THE CONTRACTOR SHALL PROVIDE TO THE OWNER, ENGINEER AND THE CITY OF REDLANDS, A COMPLETE COPY OF "AS BUILT" DRAWINGS WITH LOCATIONS AND ELEVATIONS OF ALL UTILITIES.
25. THE LAND SURVEYORS ACT, SECTION 8771 OF THE BUSINESS & PROFESSIONAL CODE, AND SECTIONS 732.5, 1492-5 OF THE STREETS AND HIGHWAY CODE REQUIRE THAT SURVEY MONUMENTS SHALL BE PROTECTED AND PERPETUATED.
THE DEVELOPER'S ENGINEER SHALL BE RESPONSIBLE PRIOR TO THE START OF CONSTRUCTION FOR LOCATING, REFERENCING AND FILING OF THE CORNER RECORDS WITH THE COUNTY SURVEYOR'S OFFICE FOR SURVEY CONTROL POINTS/MONUMENTS THAT EXIST AS SHOWN ON RECORDED MAPS, PARCEL MAPS, RECORDS OF SURVEY AND HIGHWAY MAPS, AND ARE GOING TO BE AFFECTED OR DISTURBED BY THE PROPOSED CONSTRUCTION.
AFTER THE COMPLETION OF THE PROPOSED CONSTRUCTION, SAID MONUMENTS AND/OR CONTROL SURVEY POINTS SHALL BE RESET TO THE NEW SURFACE IN ACCORDANCE WITH THE CURRENT PROFESSIONAL LAND SURVEYING PRACTICES. CORNER RECORDS SHALL BE FILED WITH THE COUNTY SURVEYOR FOR ALL THE NEW MONUMENTS SET.
26. ALL UNDERGROUND WORK SHALL BE COMPLETED PRIOR TO PAVING OF STREET AND DRIVEWAYS.
27. THE CITY SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ALL STREET LANE CLOSURES.
28. PROTECT DURING CONSTRUCTION ALL OVERHEAD UTILITY LINES. NOTIFY O/H UTILITY COMPANIES PRIOR TO ANY WORK NEAR THEIR RESPECTIVE LINES.

STRUCTURAL NOTES

1. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED, SHALL BE PLACED AT THE END OF EACH POUR. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB AND AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
2. ALL LONGITUDINAL BARS SHALL BE NO. 4 @ 18" UNLESS OTHERWISE NOTED. PLACE BARS IN BOTTOM SLAB SYMMETRICALLY ABOUT THE CENTERLINE. PLACE BARS IN WALLS STARTING AT THE TOP WITH 1 1/2" OF CLEAR COVER UNLESS OTHERWISE SPECIFIED.
3. STEEL IS DIMENSIONED TO BACK OF BAR END.
4. ALL TRANSVERSE CONSTRUCTION JOINTS SHALL BE IN A VERTICAL PLANE NORMAL TO THE CENTERLINE AND THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR LESS THAN 10 FEET.
5. EXPOSED EDGES OF CONCRETE SHALL BE ROUNDED OR BEVELED.
6. CHANNEL INVERT SHALL BE GIVEN A STEEL TROWEL FINISH.
7. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES SHALL BE 3,250 PSI IN 28 DAYS.
8. DIMENSIONS FROM FACE OF CONCRETE TO STEEL SHALL BE 1-1/2" UNLESS OTHERWISE NOTED.
9. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (RADIALLY) TO THE CENTERLINE OF THE CONDUIT ON THE PLAN EXCEPT AS OTHERWISE NOTED.
10. LONGITUDINAL STEEL SHALL BE LAPPED 45 BAR DIAMETERS (24" MIN.). AT SPLICES TRANSVERSE STEEL SHALL BE LAPPED AS SHOWN.
11. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30" OF MANHOLE.
12. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE 1-1/2" FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
13. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
14. ALL MATERIAL TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE CONTRACTOR OR DEVELOPER IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE INSPECTOR.
16. LENGTHS OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT THE OPTION OF THE CONTRACTOR AS LONG AS THE REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
15. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO-WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.

CONSTRUCTION NOTES & QUANTITY ESTIMATES

QUANTITIES SHOWN HEREON ARE ESTIMATES ONLY. THE CONTRACTORS MUST PREPARE THEIR OWN QUANTITIES AND BID A COMPLETE JOB.

NOTES: 1. ALL STORM DRAIN QUANTITIES SHOWN ON PLANS ARE BASED ON HORIZONTAL PROJECTION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE TRUE LENGTHS OF PIPE.
2. CONTRACTOR TO ADJUST ALL MANHOLE RIMS AND VALVE COVERS TO GRADE AFTER FINAL PAVING HAS BEEN INSTALLED.

(D7)	INSTALL 18" RCP (D-LOAD AND PROFILE AS SHOWN ON PROFILE)	20 LF
(D9)	INSTALL 24" RCP (D-LOAD AND PROFILE AS SHOWN ON PROFILE)	18 LF
(D12)	INSTALL 42" RCP (D-LOAD AND PROFILE AS SHOWN ON PROFILE)	88 LF
(D31)	CONSTRUCT 6'x3' (1850 mm x 975 mm) RCB PER CALTRANS STD. PLAN D80	111 LF
(D48)	CONSTRUCT SLOTTED CMP INLET PER DETAIL ON SHEET 1	2 EA
(D50)	CONSTRUCT CURB OPENING CATCH BASIN PER APWA STD. PLAN 300	2 EA
(D57)	CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. PLAN 320	2 EA
(D59)	CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. PLAN 322	2 EA
(D62)	CONSTRUCT JUNCTION PIPE TO PIPE PER APWA STD. PLAN 332	1 EA
(D63)	CONSTRUCT JUNCTION PIPE TO RCB PER APWA STD. PLAN 333	1 EA
(D65)	CONSTRUCT TRANSITION STRUCTURE RCB TO PIPE PER APWA STD. PLAN 342	1 EA
(D68)	CONSTRUCT CONCRETE COLLAR FOR RCP PER APWA STD. PLAN 380-2	1 EA
(D70)	CONSTRUCT BRICK AND MORTAR PLUG PER DETAIL ON SHEET 1	2 EA
(D117)	INSTALL 57" RCP (D-LOAD AS SHOWN ON PROFILE)	1217 LF
(D122)	REMOVE EXISTING 30" RCP (LIMITS OF REMOVAL AS INDICATED ON PLAN)	356 LF
(D123)	CONSTRUCT JUNCTION RCB TO RCB PER DETAILS ON SHEET 2	1 EA
(D126)	ADJUST EXISTING MANHOLE RIM TO GRADE AFTER FINAL PAVING HAS BEEN INSTALLED	4 EA
(D127)	RAISE EXISTING ELECTRICAL CONDUITS TO CLEAR PROPOSED STORM DRAIN	5 EA
(D128)	RAISE EXISTING WATER LINE TO CLEAR PROPOSED STORM DRAIN	2 EA
(D129)	PROTECT EXISTING UTILITY IN PLACE (TYPE AS INDICATED ON PLANS)	
(D154)	INSTALL 24" CORRUGATED METAL PIPE	7 LF

NOTES

CITY ACCEPTANCE OF PLANS DOES NOT RELIEVE THE DEVELOPER FROM RESPONSIBILITY FOR THE CORRECTION OF ERRORS AND OMISSIONS DISCOVERED DURING CONSTRUCTION. UPON REQUEST OF THE CITY INSPECTOR, THE REQUIRED PLAN REVISIONS SHALL BE PROMPTLY SUBMITTED TO THE CITY ENGINEER FOR REVIEW.

California Council of Civil Engineers & Land Surveyors

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL AND THE CITY HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS.

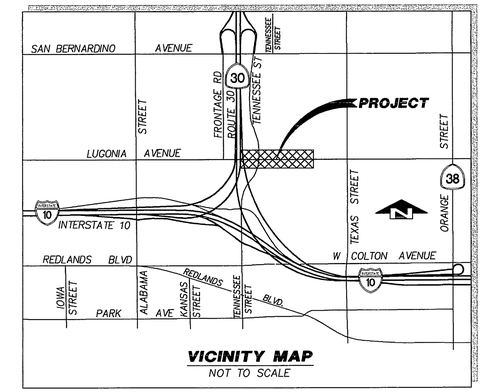
ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS"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

THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS' AND SUBCONTRACTORS' COMPLIANCE WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPARTMENT OF LABOR OR WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS' "CONSTRUCTION SAFETY ORDERS".

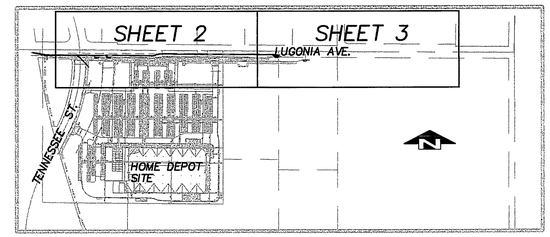
CONTRACTOR FURTHER AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT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

UNAUTHORIZED CHANGES AND USES

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS.



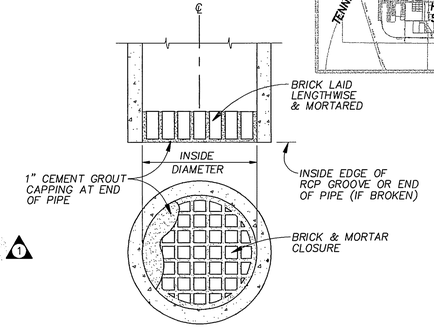
VICINITY MAP
NOT TO SCALE



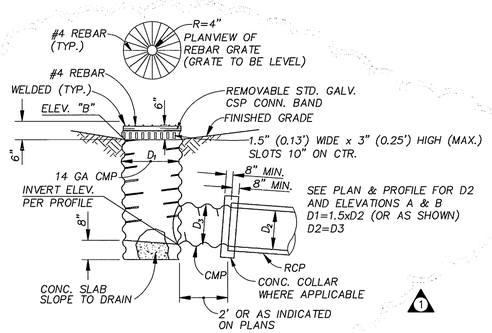
SHEET INDEX MAP
NOT TO SCALE

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2-3	STORM DRAIN PLAN & PROFILE SHEETS



D70 BRICK AND MORTAR PLUG
NOT TO SCALE



D48 SLOTTED CMP INLET
NOT TO SCALE

LEGEND

VC	VERTICAL CURVE
TP	TOP OF PAVEMENT
TC	TOP OF CURB
EL	ELEVATION
FL	FLOWLINE
FG	FINISH GRADE
FS	FINISH SURFACE
CF	CURB FACE
GB	GRADE BREAK
HP	HIGH POINT
INV	INVERT ELEVATION
TG	TOP OF GRATE
CB	CATCH BASIN
1000	EXISTING CONTOUR
RD	ROOF DRAIN
POC	POINT OF CONNECTION
COTG	CLEANOUT TO GRADE
SMH	SEWER MANHOLE
R	RIDGE LINE
CMP	CORRUGATED METAL PIPE
RCP	REINFORCED CONCRETE PIPE
TP	TOP OF PAVEMENT
GA	GAUGE
GALV.	GALVANIZED
CONN.	CONNECT
CSP	CORRUGATED STEEL PIPE
RCP	REINFORCED CONCRETE PIPE
EL	ELEVATION
GA	GAUGE
GALV.	GALVANIZED
CONN.	CONNECT
CL ℄	CENTERLINE
TS	TRANSITION STRUCTURE

PREPARED BY:
HUITT-ZOLLARS
CIVIL ENGINEERS AND LAND SURVEYORS
1101 SOUTH MILLIKEN AVENUE, SUITE G
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FAX: (909) 390-8406

REGISTERED PROFESSIONAL ENGINEER MAURICE H. MURAD NO. 33366 EXPIRATION 6-30-2002 CIVIL STATE OF CALIFORNIA

Approved by: Maurice Murad Date: 4-24-01
MAURICE H. MURAD R.C.E. 33366 Exp. Date 6-30-2002

B.M. NO. 01698 ELEV. 1276.582
LOCATION: 3.5 MI N/W FROM THE CITY OR TOWN OF REDLANDS -- COUNTY OF SAN BERNARDINO. AT S/W CORNER OF 3 FT. X 3.3 FT. SQUARE DIAMOND PLATE LID OVER W END OF CATCH BASIN, 94 FT. E OF FENCE E OF STATE HWY. 30 FREEWAY OVERPASS, 17 FT. E OF CONC. TRAP. CHANNEL THAT PARALLELS FREEWAY.

Letter	Description	Date	Initial	Initial
1	ADDED TEMPORARY DRAINAGE FACILITY	4/24/01		RCM
	REVISIONS	Approved by:		

CITY OF REDLANDS
PUBLIC WORKS DEPARTMENT

CRA 725
PLAN & PROFILE
STORM DRAIN IMPROVEMENTS

LUGONIA AVENUE STORM DRAIN & BEGINNING OF LINE A

Designed by M.H.M. Date 3-2000
Checked by
Drawn by H-Z STAFF Date 6-2000
Checked by
Date

Approved by: Date 4-25-01
Public Works Director R.C.E. 28129

Sheet 1 of 3 Sheets

F1582-4

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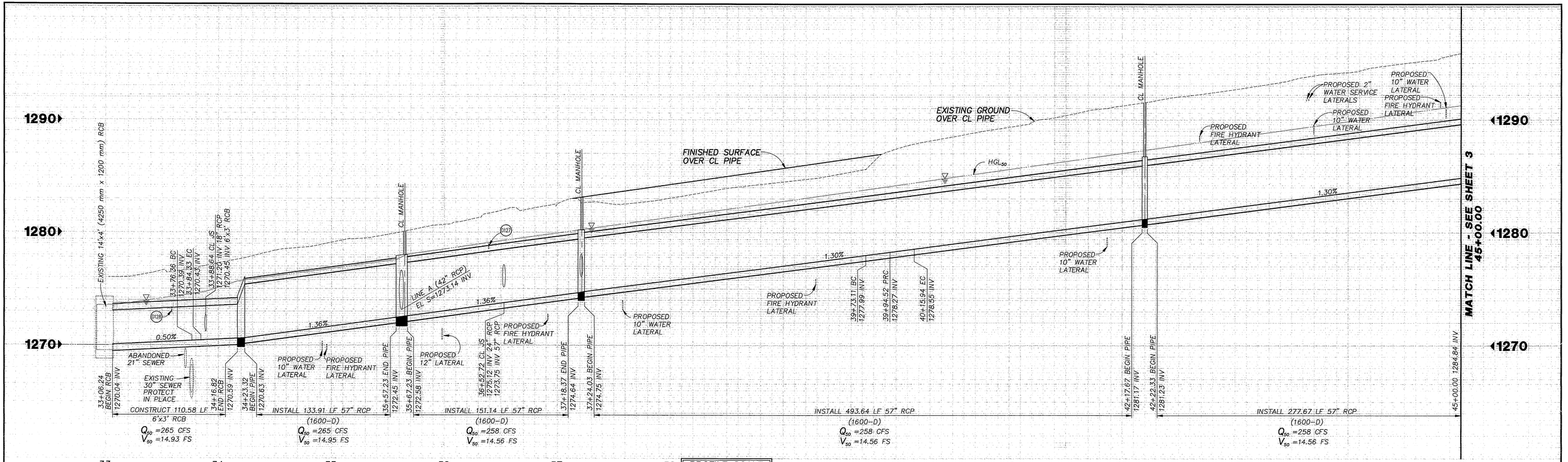

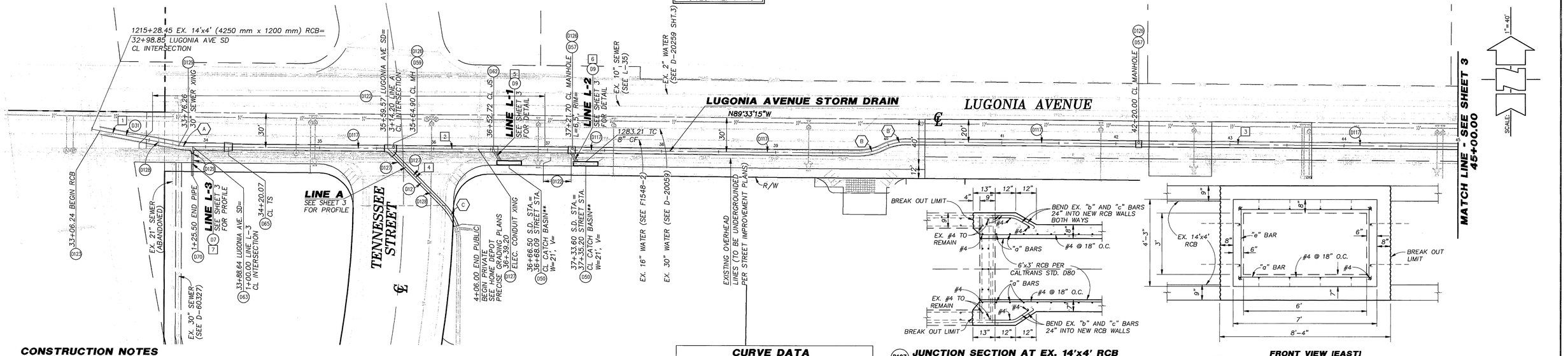

D123 **JUNCTION SECTION AT EX. 14'x4' RCB**
NOT TO SCALE

D123 **FRONT VIEW (EAST) JUNCTION DETAIL AT EX. 14'x4' RCB**
NOT TO SCALE

CONSTRUCTION NOTES

(D7) INSTALL 18" RCP (D-LOAD AND PROFILE AS SHOWN ON SHEET 3)
(D9) INSTALL 24" RCP (D-LOAD AND PROFILE AS SHOWN ON SHEET 3)
(D12) INSTALL 42" RCP (D-LOAD AND PROFILE AS SHOWN ON SHEET 3)
(D31) CONSTRUCT 6'x3' (1850 mm x 975 mm) RCB PER CALTRANS STD. PLAN D80
(D50) CONSTRUCT CURB OPENING CATCH BASIN PER APWA STD. PLAN 300
(D57) CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. PLAN 320
(D59) CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. PLAN 322
(D62) CONSTRUCT JUNCTION PIPE TO PIPE PER APWA STD. PLAN 332
(D63) CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB PER APWA STD. PLAN 333
(D65) CONSTRUCT TRANSITION STRUCTURE RCB TO PIPE PER APWA STD. PLAN 342
(D70) CONSTRUCT BRICK & MORTAR PLUG PER DETAIL ON SHEET 1
(D117) INSTALL 57" RCP (D-LOAD AS SHOWN ON PROFILE)
(D122) REMOVE EXISTING 30" RCP (LIMITS OF REMOVAL AS INDICATED ON PLAN)
(D123) CONSTRUCT JUNCTION RCB TO RCB PER DETAILS ON SHEET 2
(D126) ADJUST EXISTING MANHOLE RIM TO GRADE AFTER FINAL PAVING HAS BEEN INSTALLED
(D127) RAISE EXISTING ELECTRICAL CONDUITS TO CLEAR PROPOSED STORM DRAIN
(D128) RAISE EXISTING WATER LINE TO CLEAR PROPOSED STORM DRAIN
(D129) PROTECT EXISTING UTILITY IN PLACE (TYPE AS INDICATED ON PLANS)

CURVE DATA

	Δ	R	L	T
A	10°09'29"	45.00'	7.98'	4.00'
B	27°15'58"	45.00'	21.41'	10.91'
C	26°35'43"	45.00'	20.89'	10.64'

COURSE DATA

	BEARING	DISTANCE
1	N79°23'46"W	77.50'
2	N89°33'15"W	588.77'
3	N89°33'15"W	1736.06'
4	N44°33'15"W	70.91'
5	N29°33'15"W	11.64'
6	N29°33'15"W	11.64'
7	N00°26'45"E	25.50'

PROFILE SCALE
VERTICAL: 1"=4'
HORIZONTAL: 1"=40'

** ALL LOCAL DEPRESSIONS TO BE CONSTRUCTED PER PUBLIC STREET IMPROVEMENT PLANS.

* NOTE:
HORIZONTAL AND VERTICAL LOCATIONS TO BE VERIFIED IN THE FIELD AND ENGINEER NOTIFIED OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

B.M. NO. 01698 ELEV. 1276.582
LOCATION: 3.5 MI N/W FROM THE CITY OR TOWN OF REDLANDS – COUNTY OF SAN BERNARDINO. AT S/W CORNER OF 3 FT. X 3.3 FT. SQUARE DIAMOND PLATE LID OVER W END OF CATCH BASIN, 94 FT. E OF FENCE E OF STATE HWY. 30 FREEWAY OVERPASS, 17 FT. E OF CONC. TRAP. CHANNEL THAT PARALLELS FREEWAY.

Letter	Description	Date	Initial	Initial
	REVISIONS		Approved by:	

PREPARED BY:
HUITT-ZOLLARS
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PHONE: (909) 390-8400
FAX: (909) 390-8406

REGISTERED PROFESSIONAL ENGINEER MAURICE H. MURAD NO. 33366 EXPIRATION 6-30-2002 CIVIL STATE OF CALIFORNIA

Approved by: Maurice Murad Date 12-12-00
MAURICE H. MURAD R.C.E. 33366 Exp. Date 6-30-2002

CITY OF REDLANDS
PUBLIC WORKS DEPARTMENT

CRA 725
PLAN & PROFILE
STORM DRAIN IMPROVEMENTS
LUGONIA AVENUE STORM DRAIN
32+98.85 TO 45+00.00

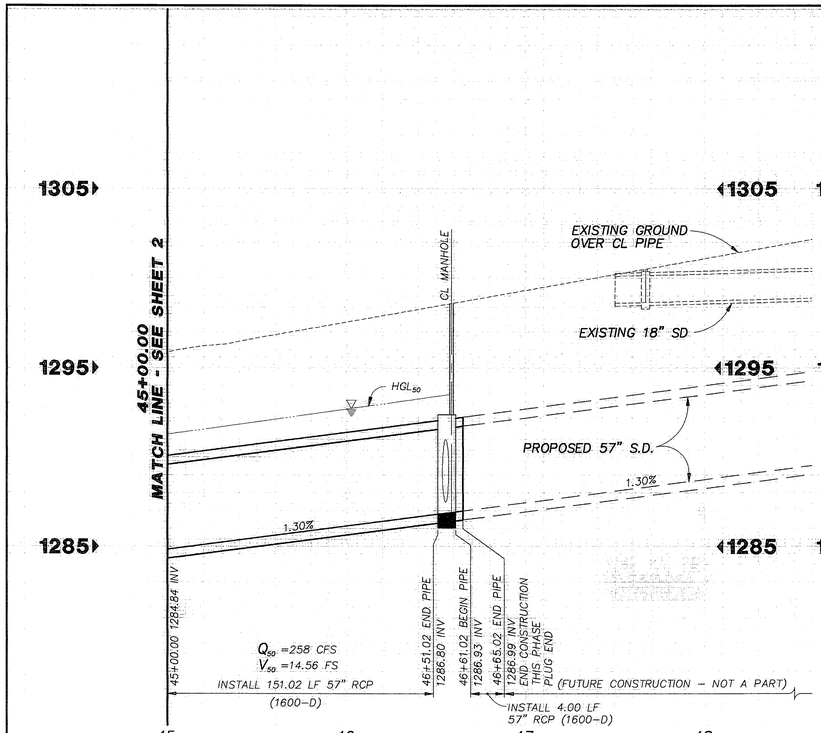
F1582-5

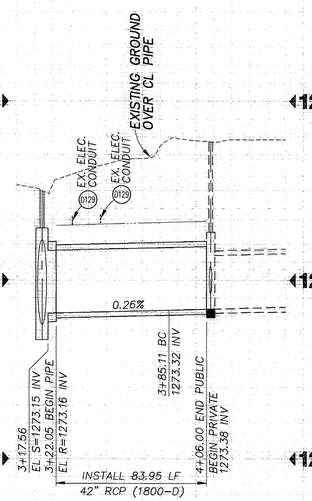
Designed by M.H.M. Date 3-2000
Checked by Date
Drawn by H-Z STAFF Date 6-2000
Checked by Date

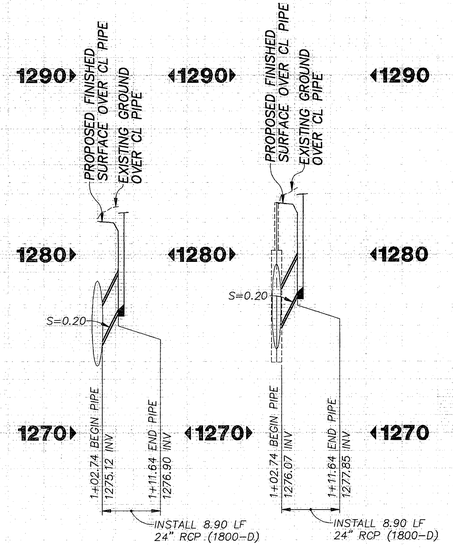
Approved by: Date 12/13/00
Public Works Director R.C.E. 28129

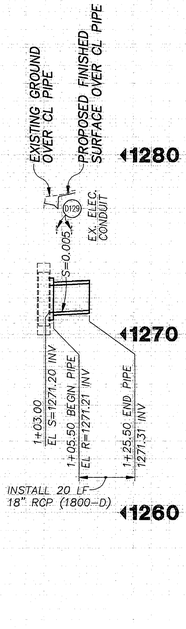
Sheet 2 of 3 Sheets

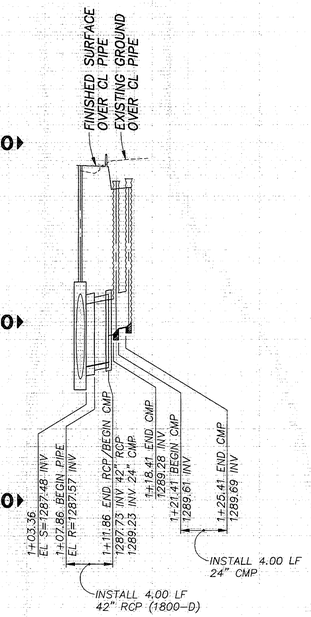
DGN: 12, 2000 14:55 I:\PROJ\110\470\LUGN02.DWG

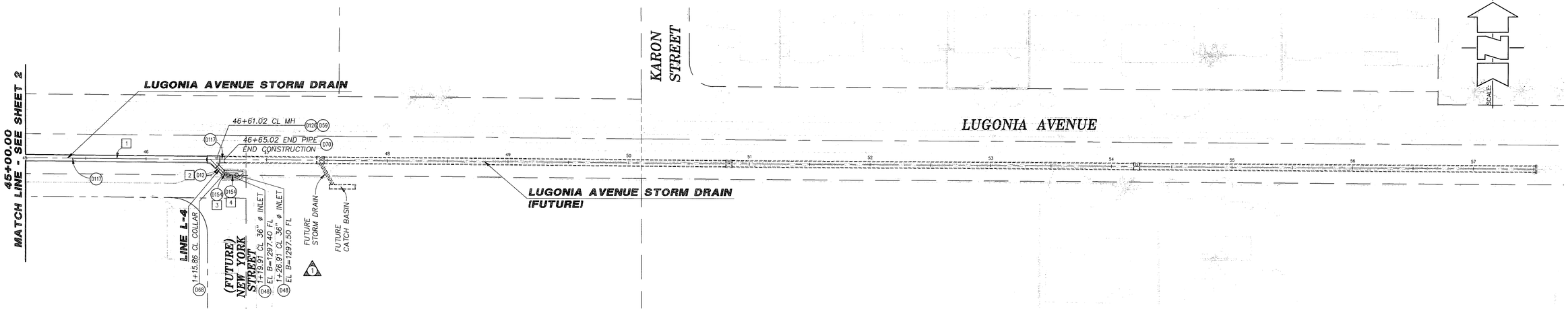












CONSTRUCTION NOTES

(D12) INSTALL 42" RCP (D-LOAD AS SHOWN ON PROFILE)

(D48) CONSTRUCT SLOTTED CMP INLET PER DETAIL ON SHEET 1 (1)

(D59) CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. PLAN 322

(D68) CONSTRUCT CONCRETE COLLAR FOR RCP PER APWA STD. PLAN 380-2

(D70) CONSTRUCT BRICK & MORTAR PLUG PER DETAIL ON SHEET 1

(D117) INSTALL 57" RCP (D-LOAD AS SHOWN ON PROFILE)

(D126) ADJUST EXISTING MANHOLE RIM TO GRADE AFTER FINAL PAVING HAS BEEN INSTALLED

(D129) PROTECT EXISTING UTILITY IN PLACE (TYPE AS INDICATED ON PLAN)

(D154) INSTALL 24" CORRUGATED METAL PIPE

COURSE DATA		
	BEARING	DISTANCE
1	N89°33'15"W	649.08'
2	N44°33'15"W	15.86'
3	N68°27'36"W	2.55'
4	N89°33'15"W	4.00'

PROFILE SCALE
VERTICAL: 1"=4'
HORIZONTAL: 1"=40'

* NOTE:
HORIZONTAL AND VERTICAL LOCATIONS TO BE VERIFIED IN THE FIELD AND ENGINEER NOTIFIED OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

B.M. NO. 01698 ELEV. 1276.582
LOCATION: 3.5 MI N/W FROM THE CITY OR TOWN OF REDLANDS - COUNTY OF SAN BERNARDINO. AT S/W CORNER OF 3 FT. X 3.3 FT. SQUARE DIAMOND PLATE LID OVER W END OF CATCH BASIN, 94 FT. E OF FENCE E OF STATE HWY. 30 FREEWAY OVERPASS, 17 FT. E OF CONC. TRAP. CHANNEL THAT PARALLELS FREEWAY.

Letter	Description	Date	Initial	Initial
	REVISIONS		Approved by:	
1	ADDED TEMPORARY DRAINAGE FACILITY	4/24/01		

PREPARED BY:
HUITT-ZOLLARS
CIVIL ENGINEERS AND LAND SURVEYORS
1101 SOUTH MILLIKEN AVENUE, SUITE G
ONTARIO, CALIFORNIA 91761
PHONE: (909) 390-8400
FAX: (909) 390-8406

REGISTERED PROFESSIONAL ENGINEER — MAURICE H. MURAD — NO. 33366 — EXPIRATION 6-30-2002 — CIVIL — STATE OF CALIFORNIA

Approved by: Maurice Murad Date 4-24-01
MAURICE H. MURAD R.C.E. 33366 Exp. Date 6-30-2002

CITY OF REDLANDS
PUBLIC WORKS DEPARTMENT

CRA 725
PLAN & PROFILE
STORM DRAIN IMPROVEMENTS
LUGONIA AVENUE STORM DRAIN
45+00.00 TO 46+65.02

Designed by M.H.M. Date 3-2000
Checked by Date
Drawn by H-Z STAFF Date 6-2000
Checked by Date

Approved by: Date 4-25-01
Public Works Director R.C.E. 28129

Sheet 3 of 3 Sheets

F1582-6

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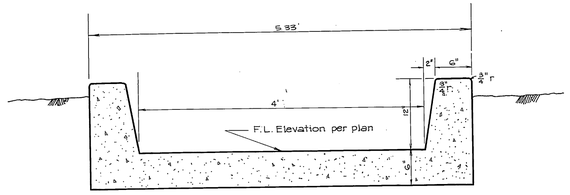

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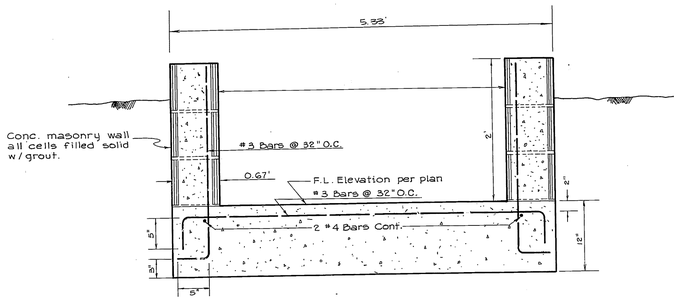

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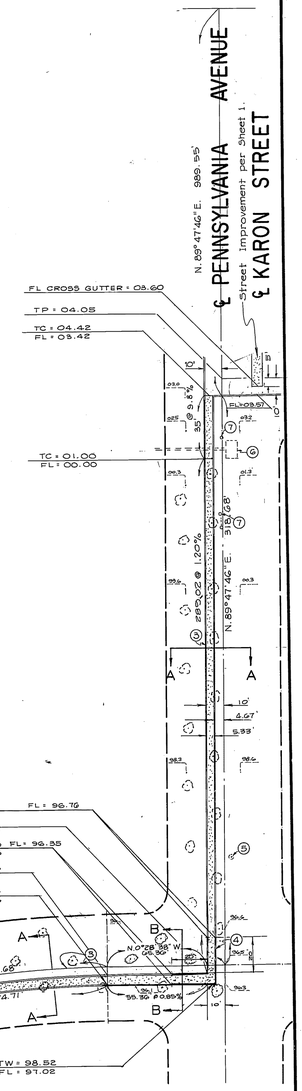
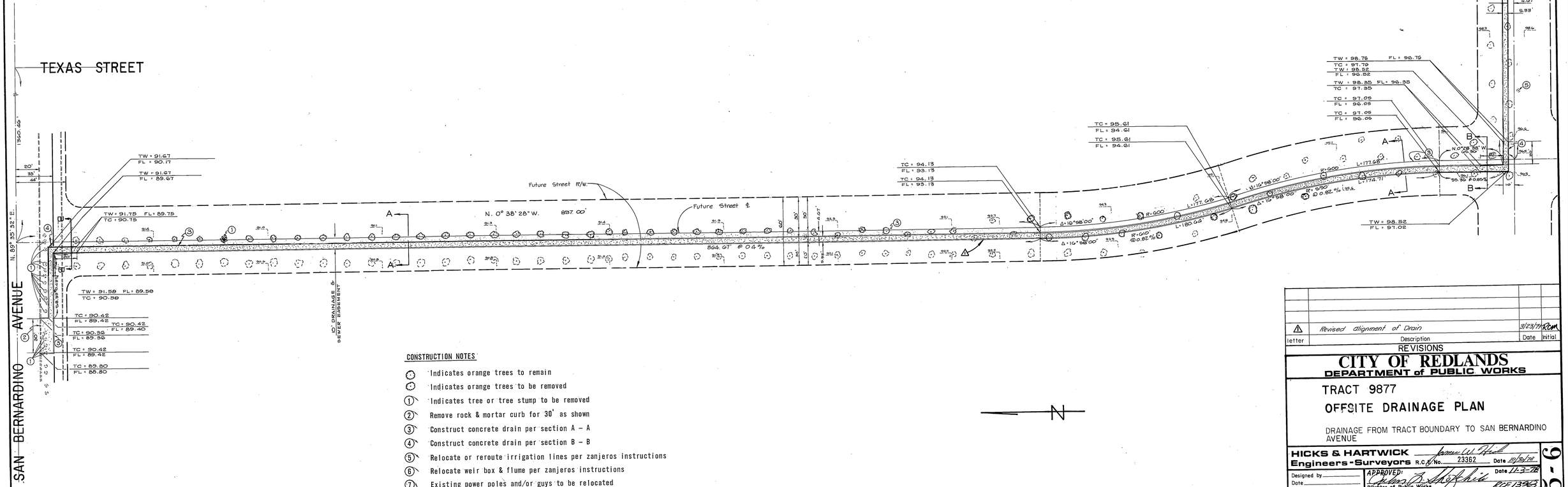




CONSTRUCTION NOTES

- Indicates orange trees to remain
- Indicates orange trees to be removed
- (1) Indicates tree or tree stump to be removed
- (2) Remove rock & mortar curb for 30' as shown
- (3) Construct concrete drain per section A – A
- (4) Construct concrete drain per section B – B
- (5) Relocate or reroute irrigation lines per zanjeros instructions
- (6) Relocate weir box & flume per zanjeros instructions
- (7) Existing power poles and/or guys to be relocated

N

letter	Description	Date	Initial
	REVISIONS		
⚠	Revised alignment of Drain	3/23/71	RCM

CITY OF REDLANDS
DEPARTMENT of PUBLIC WORKS

TRACT 9877

OFFSITE DRAINAGE PLAN

DRAINAGE FROM TRACT BOUNDARY TO SAN BERNARDINO AVENUE

HICKS & HARTWICK Engineers-Surveyors R.C.E. No. 23362 Date 10/8/70

Designed by _____ Date _____
Checked by _____ Date _____
Drawn by _____ Date _____
Checked by _____ Date _____

APPROVED: _____ Director of Public Works Date 11-3-70

FIELD BOOK REFERENCES

HORIZ. SCALE : 1" = 40'
VERT. SCALE : 1" = _____

SHEET 6 OF 13 SHEETS

9-576 F

7544

VU-COLOR REORDER #115

Technical Appendix B

Hydrologic Analysis
Rainfall and Soils

NOAA Atlas 14, Volume 6, Version 2
Location name: Redlands, California, USA*
Latitude: 34.0704°, Longitude: -117.1939°
Elevation: 1309.09 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.16 (0.972-1.42)	1.50 (1.25-1.82)	1.94 (1.61-2.36)	2.30 (1.90-2.83)	2.81 (2.23-3.56)	3.19 (2.48-4.15)	3.60 (2.72-4.80)	4.02 (2.96-5.51)	4.60 (3.25-6.58)	5.05 (3.44-7.49)
10-min	0.834 (0.696-1.01)	1.07 (0.894-1.30)	1.39 (1.15-1.69)	1.65 (1.36-2.03)	2.01 (1.60-2.56)	2.29 (1.78-2.98)	2.58 (1.96-3.44)	2.88 (2.12-3.95)	3.29 (2.33-4.72)	3.62 (2.47-5.37)
15-min	0.672 (0.560-0.816)	0.864 (0.720-1.05)	1.12 (0.928-1.36)	1.33 (1.09-1.64)	1.62 (1.29-2.06)	1.85 (1.44-2.40)	2.08 (1.58-2.77)	2.32 (1.71-3.18)	2.66 (1.88-3.80)	2.92 (1.99-4.33)
30-min	0.498 (0.416-0.606)	0.642 (0.534-0.780)	0.830 (0.688-1.01)	0.986 (0.812-1.21)	1.20 (0.954-1.53)	1.37 (1.06-1.78)	1.54 (1.17-2.06)	1.72 (1.27-2.36)	1.97 (1.39-2.82)	2.17 (1.48-3.21)
60-min	0.362 (0.302-0.440)	0.466 (0.387-0.566)	0.603 (0.500-0.735)	0.717 (0.589-0.881)	0.873 (0.694-1.11)	0.995 (0.773-1.29)	1.12 (0.849-1.49)	1.25 (0.922-1.72)	1.43 (1.01-2.05)	1.57 (1.07-2.33)
2-hr	0.256 (0.214-0.312)	0.329 (0.274-0.400)	0.425 (0.352-0.518)	0.504 (0.414-0.620)	0.612 (0.486-0.779)	0.697 (0.542-0.906)	0.784 (0.594-1.04)	0.874 (0.644-1.20)	0.997 (0.704-1.43)	1.09 (0.746-1.62)
3-hr	0.210 (0.175-0.255)	0.270 (0.224-0.328)	0.348 (0.288-0.424)	0.412 (0.339-0.507)	0.500 (0.398-0.637)	0.569 (0.442-0.739)	0.639 (0.485-0.851)	0.712 (0.524-0.976)	0.811 (0.573-1.16)	0.889 (0.606-1.32)
6-hr	0.148 (0.123-0.180)	0.190 (0.158-0.231)	0.245 (0.203-0.299)	0.290 (0.238-0.356)	0.352 (0.279-0.447)	0.399 (0.310-0.518)	0.447 (0.339-0.596)	0.498 (0.367-0.682)	0.566 (0.399-0.810)	0.619 (0.422-0.918)
12-hr	0.099 (0.082-0.120)	0.127 (0.105-0.154)	0.164 (0.136-0.199)	0.194 (0.159-0.238)	0.234 (0.186-0.298)	0.265 (0.206-0.345)	0.297 (0.225-0.396)	0.330 (0.243-0.452)	0.374 (0.264-0.535)	0.408 (0.278-0.605)
24-hr	0.066 (0.059-0.077)	0.086 (0.076-0.099)	0.111 (0.098-0.128)	0.131 (0.115-0.153)	0.159 (0.135-0.191)	0.180 (0.149-0.221)	0.201 (0.163-0.253)	0.223 (0.176-0.289)	0.252 (0.191-0.340)	0.275 (0.201-0.383)
2-day	0.041 (0.037-0.048)	0.054 (0.048-0.062)	0.071 (0.062-0.082)	0.084 (0.074-0.098)	0.103 (0.087-0.124)	0.117 (0.097-0.144)	0.132 (0.107-0.166)	0.147 (0.116-0.190)	0.167 (0.127-0.225)	0.183 (0.134-0.255)
3-day	0.030 (0.026-0.034)	0.040 (0.035-0.046)	0.053 (0.046-0.061)	0.063 (0.055-0.074)	0.078 (0.066-0.094)	0.090 (0.075-0.111)	0.102 (0.083-0.128)	0.114 (0.090-0.148)	0.132 (0.100-0.178)	0.145 (0.106-0.203)
4-day	0.024 (0.021-0.028)	0.032 (0.029-0.037)	0.043 (0.038-0.050)	0.052 (0.046-0.061)	0.065 (0.055-0.079)	0.075 (0.062-0.093)	0.086 (0.069-0.108)	0.097 (0.076-0.125)	0.112 (0.085-0.151)	0.124 (0.091-0.173)
7-day	0.016 (0.014-0.018)	0.022 (0.019-0.025)	0.029 (0.026-0.034)	0.035 (0.031-0.041)	0.044 (0.037-0.053)	0.051 (0.042-0.062)	0.058 (0.047-0.073)	0.065 (0.052-0.085)	0.076 (0.057-0.102)	0.084 (0.062-0.117)
10-day	0.012 (0.011-0.014)	0.016 (0.014-0.019)	0.022 (0.019-0.026)	0.027 (0.024-0.031)	0.034 (0.028-0.040)	0.039 (0.032-0.048)	0.044 (0.036-0.056)	0.050 (0.040-0.065)	0.058 (0.044-0.079)	0.065 (0.047-0.090)
20-day	0.008 (0.007-0.009)	0.010 (0.009-0.012)	0.014 (0.012-0.016)	0.017 (0.015-0.020)	0.021 (0.018-0.026)	0.025 (0.020-0.030)	0.028 (0.023-0.036)	0.032 (0.025-0.041)	0.037 (0.028-0.050)	0.042 (0.030-0.058)
30-day	0.006 (0.005-0.007)	0.008 (0.007-0.009)	0.011 (0.010-0.013)	0.013 (0.012-0.016)	0.017 (0.014-0.020)	0.020 (0.016-0.024)	0.022 (0.018-0.028)	0.025 (0.020-0.033)	0.030 (0.023-0.040)	0.033 (0.024-0.046)
45-day	0.005 (0.004-0.005)	0.006 (0.006-0.007)	0.009 (0.008-0.010)	0.011 (0.009-0.012)	0.013 (0.011-0.016)	0.016 (0.013-0.019)	0.018 (0.015-0.023)	0.020 (0.016-0.026)	0.024 (0.018-0.032)	0.027 (0.020-0.037)
60-day	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.008 (0.007-0.009)	0.009 (0.008-0.011)	0.012 (0.010-0.014)	0.014 (0.011-0.017)	0.016 (0.013-0.020)	0.018 (0.014-0.023)	0.021 (0.016-0.028)	0.023 (0.017-0.033)

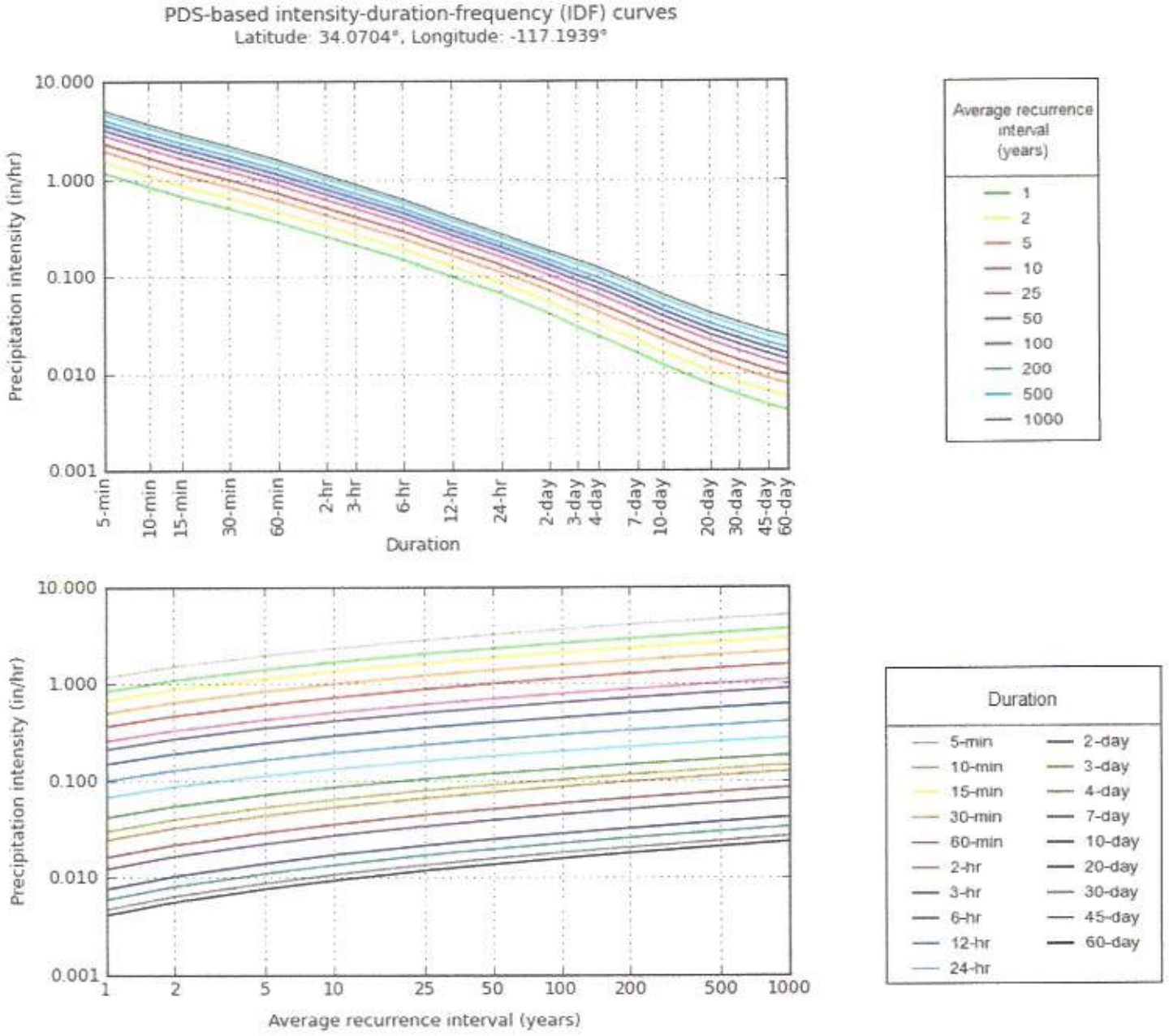
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu May 19 19:55:37 2022

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Maps & aerials

Small scale terrain

NOAA Atlas 14, Volume 6, Version 2
Location name: Redlands, California, USA*
Latitude: 34.0704°, Longitude: -117.1939°
Elevation: 1309.09 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.097 (0.081-0.118)	0.125 (0.104-0.152)	0.162 (0.134-0.197)	0.192 (0.158-0.236)	0.234 (0.186-0.297)	0.266 (0.207-0.346)	0.300 (0.227-0.400)	0.335 (0.247-0.459)	0.383 (0.271-0.548)	0.421 (0.287-0.624)
10-min	0.139 (0.116-0.169)	0.179 (0.149-0.217)	0.231 (0.192-0.282)	0.275 (0.226-0.338)	0.335 (0.266-0.426)	0.382 (0.297-0.496)	0.430 (0.326-0.573)	0.480 (0.354-0.658)	0.549 (0.388-0.786)	0.604 (0.411-0.895)
15-min	0.168 (0.140-0.204)	0.216 (0.180-0.263)	0.280 (0.232-0.341)	0.333 (0.273-0.409)	0.405 (0.322-0.515)	0.462 (0.359-0.600)	0.520 (0.394-0.693)	0.581 (0.428-0.796)	0.664 (0.469-0.951)	0.730 (0.498-1.08)
30-min	0.249 (0.208-0.303)	0.321 (0.267-0.390)	0.415 (0.344-0.506)	0.493 (0.406-0.606)	0.601 (0.477-0.764)	0.685 (0.532-0.890)	0.771 (0.585-1.03)	0.861 (0.634-1.18)	0.985 (0.696-1.41)	1.08 (0.738-1.61)
60-min	0.362 (0.302-0.440)	0.466 (0.387-0.566)	0.603 (0.500-0.735)	0.717 (0.589-0.881)	0.873 (0.694-1.11)	0.995 (0.773-1.29)	1.12 (0.849-1.49)	1.25 (0.922-1.72)	1.43 (1.01-2.05)	1.57 (1.07-2.33)
2-hr	0.513 (0.427-0.623)	0.658 (0.547-0.800)	0.850 (0.705-1.04)	1.01 (0.829-1.24)	1.23 (0.973-1.56)	1.39 (1.08-1.81)	1.57 (1.19-2.09)	1.75 (1.29-2.40)	1.99 (1.41-2.85)	2.19 (1.49-3.24)
3-hr	0.632 (0.526-0.767)	0.810 (0.673-0.984)	1.05 (0.866-1.27)	1.24 (1.02-1.52)	1.50 (1.19-1.91)	1.71 (1.33-2.22)	1.92 (1.46-2.56)	2.14 (1.58-2.93)	2.44 (1.72-3.49)	2.67 (1.82-3.96)
6-hr	0.888 (0.739-1.08)	1.14 (0.946-1.38)	1.47 (1.22-1.79)	1.74 (1.43-2.13)	2.11 (1.67-2.68)	2.39 (1.86-3.10)	2.68 (2.03-3.57)	2.98 (2.19-4.09)	3.39 (2.39-4.85)	3.71 (2.53-5.50)
12-hr	1.19 (0.990-1.44)	1.53 (1.27-1.86)	1.97 (1.63-2.40)	2.33 (1.92-2.87)	2.82 (2.24-3.59)	3.20 (2.49-4.15)	3.58 (2.71-4.77)	3.97 (2.93-5.45)	4.50 (3.18-6.44)	4.91 (3.35-7.28)
24-hr	1.59 (1.41-1.84)	2.06 (1.82-2.38)	2.66 (2.35-3.08)	3.15 (2.76-3.68)	3.81 (3.23-4.59)	4.32 (3.58-5.31)	4.83 (3.91-6.08)	5.35 (4.22-6.92)	6.05 (4.58-8.16)	6.59 (4.82-9.19)
2-day	1.98 (1.76-2.29)	2.59 (2.29-2.99)	3.40 (3.00-3.93)	4.05 (3.55-4.72)	4.94 (4.19-5.95)	5.63 (4.67-6.92)	6.33 (5.13-7.97)	7.05 (5.56-9.12)	8.03 (6.08-10.8)	8.79 (6.43-12.3)
3-day	2.15 (1.90-2.47)	2.85 (2.52-3.29)	3.79 (3.34-4.38)	4.56 (3.99-5.32)	5.63 (4.77-6.79)	6.47 (5.37-7.96)	7.34 (5.94-9.24)	8.24 (6.49-10.7)	9.48 (7.18-12.8)	10.5 (7.66-14.6)
4-day	2.32 (2.05-2.67)	3.10 (2.74-3.58)	4.15 (3.66-4.81)	5.03 (4.40-5.87)	6.26 (5.30-7.54)	7.22 (5.99-8.88)	8.23 (6.67-10.4)	9.29 (7.32-12.0)	10.8 (8.14-14.5)	11.9 (8.73-16.6)
7-day	2.69 (2.38-3.10)	3.62 (3.20-4.18)	4.87 (4.29-5.63)	5.91 (5.17-6.89)	7.37 (6.24-8.88)	8.52 (7.07-10.5)	9.72 (7.87-12.2)	11.0 (8.65-14.2)	12.7 (9.64-17.2)	14.1 (10.3-19.7)
10-day	2.92 (2.58-3.36)	3.93 (3.48-4.54)	5.31 (4.68-6.14)	6.45 (5.65-7.53)	8.06 (6.83-9.71)	9.33 (7.74-11.5)	10.7 (8.63-13.4)	12.1 (9.50-15.6)	14.0 (10.6-18.9)	15.6 (11.4-21.7)
20-day	3.61 (3.20-4.16)	4.91 (4.34-5.66)	6.66 (5.87-7.70)	8.13 (7.11-9.48)	10.2 (8.64-12.3)	11.8 (9.83-14.6)	13.6 (11.0-17.1)	15.4 (12.1-19.9)	17.9 (13.6-24.2)	20.0 (14.6-27.8)
30-day	4.24 (3.76-4.89)	5.78 (5.12-6.67)	7.88 (6.95-9.11)	9.64 (8.43-11.2)	12.1 (10.3-14.6)	14.1 (11.7-17.3)	16.2 (13.1-20.4)	18.4 (14.5-23.8)	21.5 (16.2-28.9)	23.9 (17.5-33.4)
45-day	5.06 (4.48-5.83)	6.91 (6.11-7.97)	9.42 (8.31-10.9)	11.5 (10.1-13.5)	14.5 (12.3-17.5)	16.9 (14.0-20.8)	19.4 (15.7-24.5)	22.1 (17.4-28.6)	25.8 (19.6-34.8)	28.9 (21.1-40.2)
60-day	5.91 (5.23-6.81)	8.05 (7.12-9.29)	11.0 (9.67-12.7)	13.4 (11.8-15.7)	16.9 (14.3-20.4)	19.7 (16.3-24.2)	22.6 (18.3-28.5)	25.7 (20.3-33.3)	30.1 (22.8-40.6)	33.6 (24.6-46.9)

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

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

Please refer to NOAA Atlas 14 document for more information.

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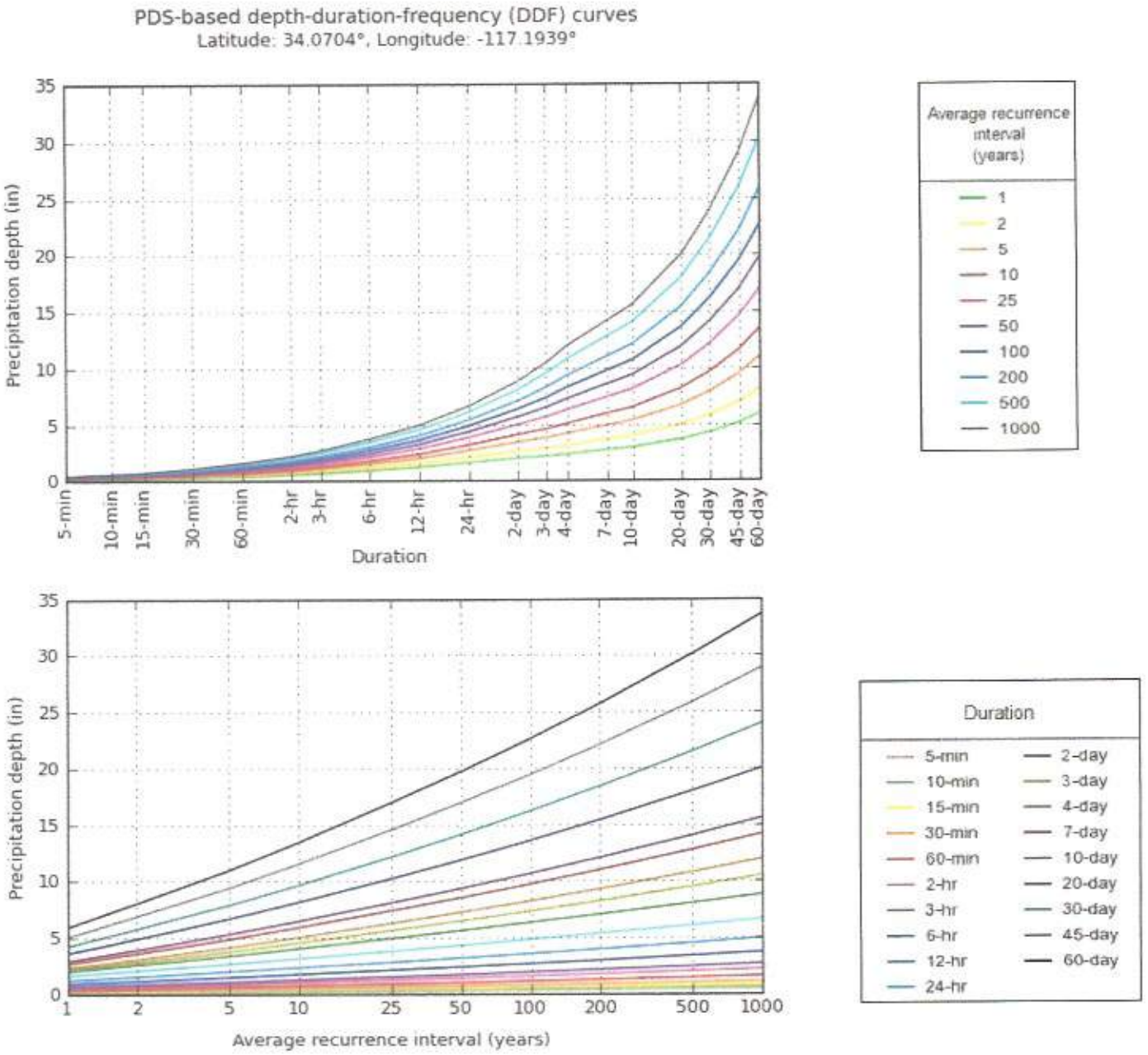
PF graphical



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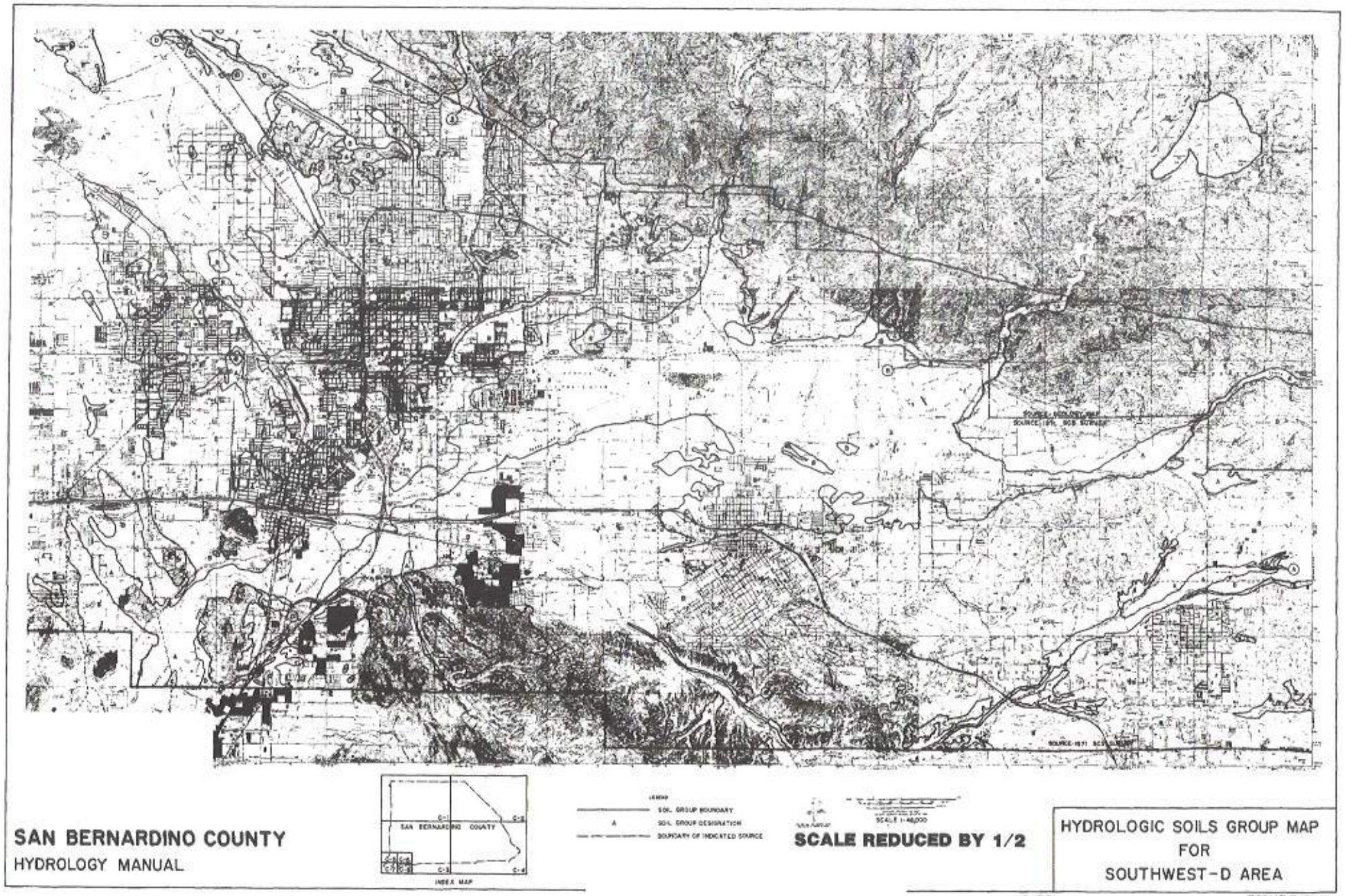
Maps & aerials

Small scale terrain



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

SCALE REDUCED BY 1/2

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-D AREA

FIGURE C-1A

It should be recognized, however, that groundwater elevations fluctuate with time, since they are dependent upon seasonal precipitation, irrigation, land use, and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered both during the construction phase and the design life of the project. The evaluation of such factors was beyond the scope of this investigation and report.

5.4 Percolation Test Results: The results of the percolation tests are summarized in Table No. 1 below. For the proposed infiltration systems, the percolation tests were conducted at a depth of about 10 and 15 feet BSG within silty sand and poorly graded sand with silt layers. The results of the percolation tests are presented in Appendix D.

It should be noted that the field tests do not take into account the long term effects of subgrade saturation, silt accumulation, groundwater influence, nor vegetation. In general, the infiltration rate of the soils will decrease when the soils are saturated and the reduction in the infiltration rate increases the longer the soils are saturated. Published studies indicate field infiltration rates can significantly overestimate the saturated permeability. In addition, soil bed consolidation, sediment, suspended soils, etc. in the discharge water can result in clogging of the pore spaces in the soil. This clogging effect can also reduce the long term infiltration rate. Numerous other factors, such as variations in soil type and soil density across the entire area of the system can influence the infiltration rate, both short and long term.

It should also be noted that the unfactored infiltration rates shown in Table No. 1 below should be considered preliminary data. When the locations of the underground infiltration systems are known, additional testing will need to be conducted. Based on other projects that we have conducted in the City of Redlands, “Double ring infiltrometer infiltration testing will be required to determine the design infiltration rate. This has been indicated to be a requirement of the final SQMP and is mandatory for all underground storage systems. The tests must be at the same depth as the basin bottom and as near the center of the basin as possible. A minimum of two tests will be required for the basin unless the soils engineer determines that the soils on the site are uniform and homogeneous and then 1 test per basin will be required. Percolation testing is allowed for preliminary purposes, but the values used for final design must come from a double ring infiltrometer infiltration test.”

Table No. 1
Results of Percolation Testing

Location and Depth	Percolate Rate (Minutes per Inch)[1]	Unfactored Infiltration Rate (Inches per Hour)[1]	Subgrade Soil Type
P-1 at 15 feet BSG	2.1	15.9	Silty Sand
P-2 at 10 feet BSG	4.8	7.1	Poorly Graded Sand with Silt
P-3 at 10 BSG	4.1	0.9	Poorly Graded Sand with Silt
P-4 at 15 feet BSG	3.2	2.6	Silty Sand

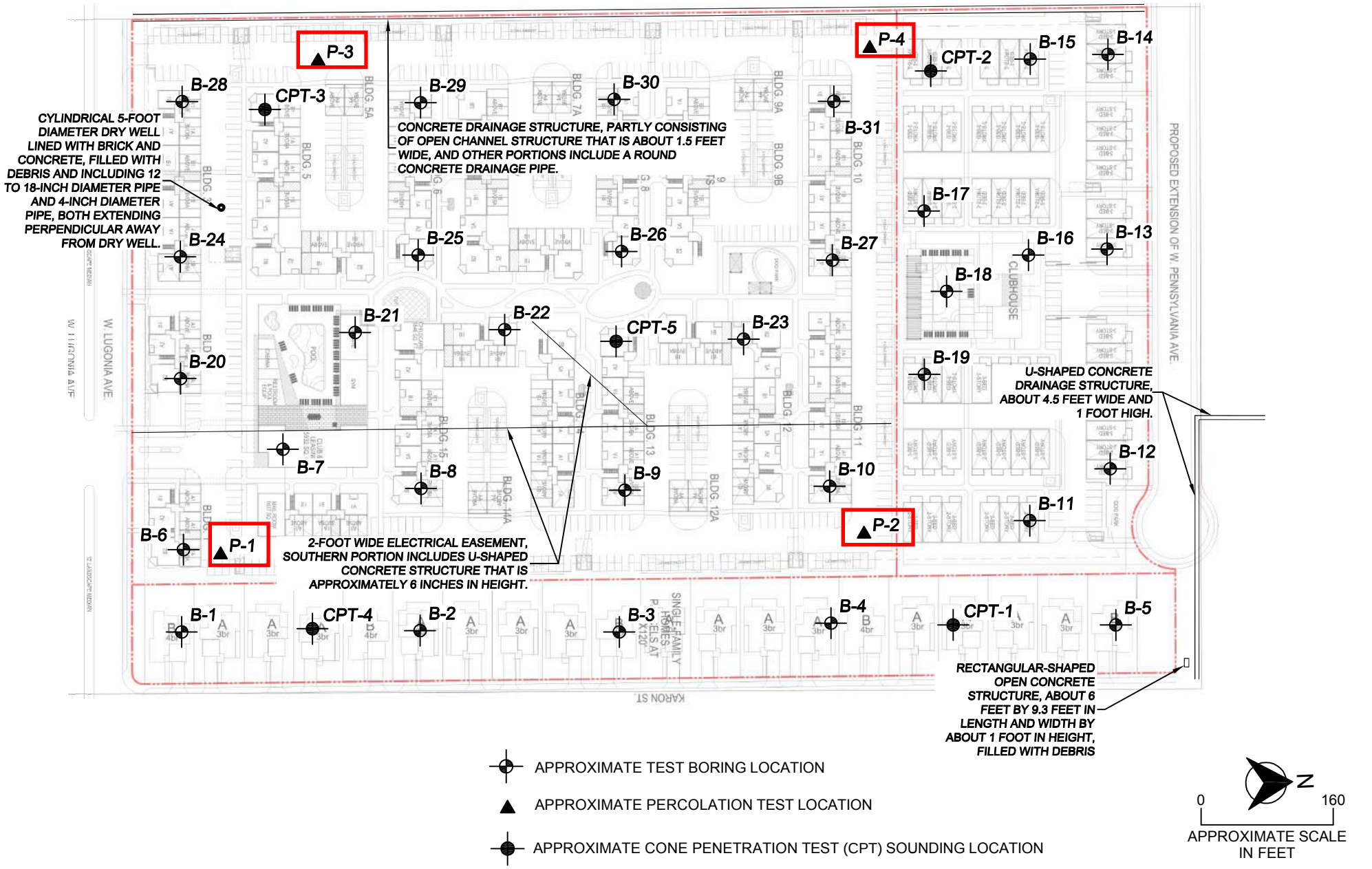
Notes:
BSG - Below site grade
[1] - Includes no factor of safety

6.0 EVALUATION

The data and methodology used to develop conclusions and recommendations for project design and preparation of construction specifications are summarized in the following subsections. The evaluation was based upon the subsurface soil conditions determined from this investigation and our understanding of the proposed construction. The conclusions obtained from the results of our evaluations are described in the Conclusions section of this report.

6.1 Existing Surface and Subsurface Improvements: At the time of our investigation, the site was generally vacant land covered by scattered dead grasses and weeds. Some scattered concrete debris was also noted throughout the site. Where existing vegetation and landscaping is present, these areas should be stripped of all vegetation and top soil, and removal of vegetation should remove all roots greater than ¼ inch in diameter. Over sized debris such as large chunks of concrete or bricks should be removed from the site and not mixed with on-site soils.

Remnant elements of past structures and irrigation improvements were noted during the field investigation, and there may be additional buried and subsurface structures not noted during this investigation. These elements and any associated fill soils will not provide uniform support of the proposed building and pavement improvements, and should be entirely removed and backfilled as engineered fill as part of demolition and earthwork for site preparation.



TEST BORING, CPT AND PERCOLATION TEST BORING LOCATION MAP
THE NEIGHBORHOODS AT LUGONIA VILLAGE
NORTHWEST CORNER OF WEST LUGONIA AVENUE AND KARON STREET
REDLANDS, CALIFORNIA

FILE NO. 02901-01-02	DATE DRAWN: 01/06/2022
DRAWN BY: RM	APPROVED BY:
PROJECT NO. H02901.01	DRAWING NO. 2

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Since 1898

Technical Appendix C

Hydrologic Analysis
Rational Method – Existing Condition

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2003 Advanced Engineering Software (aes)
            Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                              Analysis prepared by:

                              DRC Engineering, Inc.
                        160 South Old Springs Road, Suite 210
                           Anaheim Hills, California 92808
                        Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                             *
* EXISTING CONDITION                                                     *
* HYDROLOGIC ANALYSIS - 2-YEAR                                           *
 ************************************************************************

  FILE NAME: 2211E002.DAT
  TIME/DATE OF STUDY: 16:00 05/18/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.4660

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

******************************************************************************
  FLOW PROCESS FROM NODE    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) =   794.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.20  DOWNSTREAM(FEET) =   1292.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.377
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.980
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        1.10      0.27       1.00    86   17.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =      0.70
```

```
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      0.70

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
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----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   550.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =   1294.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.325
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.101
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.70      0.27      1.00    86   14.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    201.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1101.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.30  DOWNSTREAM(FEET) =   1289.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.081
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.899
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B       22.60      0.27      1.00    86   20.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =     12.75
  TOTAL AREA(ACRES) =     22.60   PEAK FLOW RATE(CFS) =     12.75

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2003 Advanced Engineering Software (aes)
            Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                          Analysis prepared by:

                          DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* EXISTING CONDITION                                                    *
* HYDROLOGIC ANALYSIS - 10-YEAR                                         *
 ************************************************************************

  FILE NAME: 2211E010.DAT
  TIME/DATE OF STUDY: 16:00 05/18/2022
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  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7170

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    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) =   794.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.20  DOWNSTREAM(FEET) =   1292.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.377
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.508
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        1.10      0.27       1.00    86   17.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =      1.22
```

```
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      1.22

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  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) =   550.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =   1294.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.325
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.693
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.70      0.27      1.00    86   14.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =      0.90
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.90

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    201.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1101.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.30  DOWNSTREAM(FEET) =   1289.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.081
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.383
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B       22.60      0.27      1.00    86   20.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =     22.59
  TOTAL AREA(ACRES) =     22.60   PEAK FLOW RATE(CFS) =     22.59

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                          DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* EXISTING CONDITION                                                    *
* HYDROLOGIC ANALYSIS - 100-YEAR                                        *
 ************************************************************************

  FILE NAME: 2211E100.DAT
  TIME/DATE OF STUDY: 16:00 05/18/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  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) =   794.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.20  DOWNSTREAM(FEET) =   1292.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.377
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.356
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        1.10      0.03       1.00    97   17.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.03
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =      2.30
```

```
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.30

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  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) =   550.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =   1294.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.325
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.645
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.70      0.03      1.00    97   14.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.03
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =      1.65
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.65

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    201.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1101.00
  ELEVATION DATA: UPSTREAM(FEET) =   1305.30  DOWNSTREAM(FEET) =   1289.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.081
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.160
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B       22.60      0.03      1.00    97   20.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.03
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =     43.25
  TOTAL AREA(ACRES) =     22.60   PEAK FLOW RATE(CFS) =     43.25

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Technical Appendix D

Hydrologic Analysis
Rational Method – Proposed Condition

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                              Analysis prepared by:

                              DRC Engineering, Inc.
                        160 South Old Springs Road, Suite 210
                           Anaheim Hills, California 92808
                        Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 1                                             *
* HYDROLOGIC ANALYSIS - 2-YEAR                                          *
 ************************************************************************

  FILE NAME: 22111002.DAT
  TIME/DATE OF STUDY: 16:00 08/08/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.4660

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    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) =   572.00
  ELEVATION DATA: UPSTREAM(FEET) =   1299.00  DOWNSTREAM(FEET) =   1292.28

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.989
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.366
  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       1.50      0.75       0.20     56    9.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      1.64
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      1.64
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.23  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.49
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.64
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =  10.21
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.349
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.11
  EFFECTIVE AREA(ACRES) =      1.60   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      1.60       PEAK FLOW RATE(CFS) =       1.73

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.38  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.50
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.73
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =  10.57
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =   695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.57
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.42
  EFFECTIVE AREA(ACRES) =      2.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.00       PEAK FLOW RATE(CFS) =       2.11

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.28  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.67
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.11
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =  10.83
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =   751.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  10.83
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.302
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.10
  EFFECTIVE AREA(ACRES) =      2.10   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.10       PEAK FLOW RATE(CFS) =       2.18

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.36  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.68
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.18
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =  11.16
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =   824.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  11.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.278
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.10
  EFFECTIVE AREA(ACRES) =      2.20   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.20       PEAK FLOW RATE(CFS) =       2.24

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  11.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.278
  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      0.75       0.20    56
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.22
  EFFECTIVE AREA(ACRES) =      3.40   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.40       PEAK FLOW RATE(CFS) =       3.45

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.74  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.19
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.45
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =  11.75
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   972.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.75
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.240
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.10
  EFFECTIVE AREA(ACRES) =      3.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.50       PEAK FLOW RATE(CFS) =       3.45
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.75
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.240
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.80       PEAK FLOW RATE(CFS) =       3.73

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.75
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.240
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.90      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
```

```
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    0.88
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      4.70       PEAK FLOW RATE(CFS) =       4.61

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     1.73  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   347.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.61
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =  13.08
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =  1319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.08
  RAINFALL INTENSITY(INCH/HR) =   1.16
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     4.70
  TOTAL STREAM AREA(ACRES) =     4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.61

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   343.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.20  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.57
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.52
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   5.26
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    112.00 =   383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 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.) =   5.26
  RAINFALL INTENSITY(INCH/HR) =   2.01
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     0.30
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.52

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      4.61  13.08    1.162  0.75( 0.15) 0.20     4.7     100.00
      2      0.52   5.26    2.008  0.75( 0.15) 0.20     0.3     111.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      3.92   5.26    2.008  0.75( 0.15) 0.20     2.2     111.00
      2      4.89  13.08    1.162  0.75( 0.15) 0.20     5.0     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      4.89    Tc(MIN.) =    13.08
  EFFECTIVE AREA(ACRES) =     5.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =  1319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.47  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.89
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =  13.43
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    113.00 =  1414.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  13.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.144
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.09
  EFFECTIVE AREA(ACRES) =      5.10   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.10       PEAK FLOW RATE(CFS) =       4.89
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.43
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.144
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        0.30      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.27
 EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      5.40       PEAK FLOW RATE(CFS) =       4.89
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.43
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.144
 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      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.07
 EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      6.60       PEAK FLOW RATE(CFS) =       5.91

 ** PEAK FLOW RATE TABLE **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1      6.06   5.63    1.927  0.75( 0.15) 0.20     3.8     111.00
     2      5.91  13.43    1.144  0.75( 0.15) 0.20     6.6     100.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      6.06  Tc(MIN.) =   5.63
 AREA-AVERAGED Fm(INCH/HR) =  0.15  AREA-AVERAGED Fp(INCH/HR) =  0.75
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =      3.79

****************************************************************************
 FLOW PROCESS FROM NODE    114.00 TO NODE    134.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     1.88  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =   376.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.79
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.06
 PIPE TRAVEL TIME(MIN.) =   1.31    Tc(MIN.) =   6.94
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   178.00
  ELEVATION DATA: UPSTREAM(FEET) =   1299.39  DOWNSTREAM(FEET) =   1297.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.149
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.828
  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      0.75       0.20    56    6.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.45

**************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.56  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.47
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.45
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   6.91
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =   291.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =   6.91
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.704
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.20      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.28
  EFFECTIVE AREA(ACRES) =      0.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      0.50       PEAK FLOW RATE(CFS) =       0.70

**************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.65  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.79
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.70
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   7.69
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =   421.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =   7.69
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.599
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =      0.80   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      0.80       PEAK FLOW RATE(CFS) =       1.04

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   7.69
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.599
  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      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.57
  EFFECTIVE AREA(ACRES) =      2.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.00       PEAK FLOW RATE(CFS) =       2.61

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.61  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.91
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.61
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   8.21
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    124.00 =   544.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   8.21
  *   2 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
  APARTMENTS                 B        0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.40       PEAK FLOW RATE(CFS) =       3.00

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.47  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.7 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.04
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.00
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   8.60
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    125.00 =   639.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   8.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.495
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.50      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.61
  EFFECTIVE AREA(ACRES) =      2.90   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.90       PEAK FLOW RATE(CFS) =       3.51

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   8.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.495
  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      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.45
  EFFECTIVE AREA(ACRES) =      4.10   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      4.10       PEAK FLOW RATE(CFS) =       4.96

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     1.65  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.96
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =   9.80
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    132.00 =   969.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.80
  RAINFALL INTENSITY(INCH/HR) =   1.38
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     4.10
  TOTAL STREAM AREA(ACRES) =     4.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.96
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    131.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      0.69
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.69

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.17  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.78
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.69
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   5.20
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    132.00 =   356.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.20
  RAINFALL INTENSITY(INCH/HR) =   2.02
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     0.40
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.69

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      4.96   9.80    1.382  0.75( 0.15) 0.20     4.1     120.00
      2      0.69   5.20    2.021  0.75( 0.15) 0.20     0.4     131.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      4.69   5.20    2.021  0.75( 0.15) 0.20     2.6     131.00
      2      5.42   9.80    1.382  0.75( 0.15) 0.20     4.5     120.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      5.42    Tc(MIN.) =     9.80
  EFFECTIVE AREA(ACRES) =     4.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      4.50
```

```
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    132.00 =   969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     0.45  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.67
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.42
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =  10.12
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    133.00 =  1060.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  10.12
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.355
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        0.50      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.54
 EFFECTIVE AREA(ACRES) =      5.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      5.00       PEAK FLOW RATE(CFS) =       5.43

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     0.71  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =   142.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.69
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.43
 PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =  10.63
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    134.00 =  1202.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  10.63
 *   2 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
 APARTMENTS                 B        0.40      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.42
 EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      5.40       PEAK FLOW RATE(CFS) =       5.67

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN) =  10.63
  *   2 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
  APARTMENTS                 B        0.60      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    0.63
  EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      6.00       PEAK FLOW RATE(CFS) =       6.30

**************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  10.63
  *   2 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
  APARTMENTS                 B        1.30      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    1.37
  EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      7.30       PEAK FLOW RATE(CFS) =       7.67

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      8.21   6.05    1.845  0.75( 0.15) 0.20     5.4     131.00
      2      7.67  10.63    1.316  0.75( 0.15) 0.20     7.3     120.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      8.21  Tc(MIN.) =   6.05
  AREA-AVERAGED Fm(INCH/HR) =  0.15  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =      5.38

**************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =   6.05
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.845
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.20      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =      5.58   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      7.50       PEAK FLOW RATE(CFS) =       8.51

**************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 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      8.51   6.05    1.845  0.75( 0.15) 0.20     5.6     131.00
      2      7.88  10.63    1.316  0.75( 0.15) 0.20     7.5     120.00
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    134.00 =  1202.00 FEET.
```

```
  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      6.06   6.94    1.700  0.75( 0.15) 0.20     3.8     111.00
      2      5.91  14.74    1.082  0.75( 0.15) 0.20     6.6     100.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     14.30   6.05    1.845  0.75( 0.15) 0.20     8.9     131.00
      2     14.45   6.94    1.700  0.75( 0.15) 0.20     9.7     111.00
      3     13.87  10.63    1.316  0.75( 0.15) 0.20    12.6     120.00
      4     12.20  14.74    1.082  0.75( 0.15) 0.20    14.1     100.00
    TOTAL AREA(ACRES) =     14.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       14.45  Tc(MIN.) =    6.938
  EFFECTIVE AREA(ACRES) =      9.74  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =     14.10
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  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) =     0.72  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.45
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   7.34
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    136.00 =  1933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    136.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   851.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      0.69
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.69

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  13
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                              Analysis prepared by:

                              DRC Engineering, Inc.
                      160 South Old Springs Road, Suite 210
                         Anaheim Hills, California 92808
                      Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 2                                             *
* HYDROLOGIC ANALYSIS - 2-YEAR                                          *
 ************************************************************************

  FILE NAME: 22112002.DAT
  TIME/DATE OF STUDY: 10:00 06/26/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.4660

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    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) =   495.00
  ELEVATION DATA: UPSTREAM(FEET) =   1297.20  DOWNSTREAM(FEET) =   1294.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.879
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.231
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               B        2.20      0.75       0.35    56   11.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      2.20   PEAK FLOW RATE(CFS) =      1.92
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.04  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.44
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.92
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  11.92
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =   504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.66  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.61
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.92
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  12.53
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.53
  RAINFALL INTENSITY(INCH/HR) =   1.19
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     2.20
  TOTAL STREAM AREA(ACRES) =     2.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.92

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
  ELEVATION DATA: UPSTREAM(FEET) =   1297.50  DOWNSTREAM(FEET) =   1294.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.676
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.244
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               B        2.40      0.75       0.35    56   11.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
  SUBAREA RUNOFF(CFS) =      2.12
  TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      2.12

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.04  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.51
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.12
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  11.72
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    212.00 =   505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.72
  RAINFALL INTENSITY(INCH/HR) =   1.24
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     2.40
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.12

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      1.92  12.53    1.192  0.75( 0.26) 0.35     2.2     200.00
      2      2.12  11.72    1.242  0.75( 0.26) 0.35     2.4     210.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      4.01  11.72    1.242  0.75( 0.26) 0.35     4.5     210.00
      2      3.94  12.53    1.192  0.75( 0.26) 0.35     4.6     200.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      4.01    Tc(MIN.) =    11.72
  EFFECTIVE AREA(ACRES) =     4.46   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =      4.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 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) =     0.56  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   111.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.01
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =  12.15
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    214.00 =   747.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE    221.00 TO NODE    221.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
 USER SPECIFIED Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               B        0.10      0.75       0.35    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE    221.00 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) =     0.08  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   1.84
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.16
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   5.14
 LONGEST FLOWPATH FROM NODE    221.00 TO NODE    222.00 =   511.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    222.00 TO NODE    222.00 IS CODE =  13
----------------------------------------------------------------------------
 >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    231.00 TO NODE    231.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    15.00
 USER SPECIFIED Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               B        0.10      0.75       0.35    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     0.08  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   1.84
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.16
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   5.14
 LONGEST FLOWPATH FROM NODE    231.00 TO NODE    232.00 =    30.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    232.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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                          Analysis prepared by:

                          DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 3                                             *
* HYDROLOGIC ANALYSIS - 2-YEAR                                          *
 ************************************************************************

  FILE NAME: 22113002.DAT
  TIME/DATE OF STUDY: 10:00 06/26/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.4660

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   492.00
  ELEVATION DATA: UPSTREAM(FEET) =   1309.00  DOWNSTREAM(FEET) =   1304.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.979
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.225
  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      0.75       0.50    56   11.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      0.92
```

```
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.09  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.02
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.92
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  12.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =   510.00 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) =     0.39  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.02
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.92
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =  12.51
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =   588.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  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) =   957.00
  ELEVATION DATA: UPSTREAM(FEET) =   1306.20  DOWNSTREAM(FEET) =   1304.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.609
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.885
  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        2.70      0.75       0.50    56   20.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      2.70   PEAK FLOW RATE(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.09  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.20
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.24
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  20.71
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    312.00 =   976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.19  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.29
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.24
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =  20.90
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    314.00 =  1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
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         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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                          Analysis prepared by:

                          DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                             *
* PROPOSED CONDITION - RIGHT-OF-WAY                                      *
* HYDROLOGIC ANALYSIS - 2-YEAR                                           *
 ************************************************************************

  FILE NAME: 22114002.DAT
  TIME/DATE OF STUDY: 16:00 08/08/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.4660

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

******************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =  22
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.60      0.75       0.10    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.08

******************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =  13
```

```
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    411.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) = 49600.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.60      0.75       0.10    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.08

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    411.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                          DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 1                                             *
* HYDROLOGIC ANALYSIS - 10-YEAR                                         *
 ************************************************************************

  FILE NAME: 22111010.DAT
  TIME/DATE OF STUDY: 16:00 08/08/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7170

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    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) =   572.00
  ELEVATION DATA: UPSTREAM(FEET) =   1299.00  DOWNSTREAM(FEET) =   1292.28

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.989
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.102
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                B       1.50      0.75       0.20     56    9.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      2.64
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.64
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.23  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.94
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.64
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =  10.18
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.18
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.078
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.17
  EFFECTIVE AREA(ACRES) =      1.60   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      1.60       PEAK FLOW RATE(CFS) =       2.78

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.38  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.96
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.78
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =  10.51
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =   695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.51
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =      2.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.00       PEAK FLOW RATE(CFS) =       3.40

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.28  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.40
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =  10.73
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =   751.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  10.73
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.014
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.17
  EFFECTIVE AREA(ACRES) =      2.10   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.10       PEAK FLOW RATE(CFS) =       3.52

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.36  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.52
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =  11.02
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =   824.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  11.02
  *  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
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.16
  EFFECTIVE AREA(ACRES) =      2.20   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.20       PEAK FLOW RATE(CFS) =       3.63

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  11.02
  *  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
  APARTMENTS                 B        1.20      0.75       0.20    56
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.98
  EFFECTIVE AREA(ACRES) =      3.40   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.40       PEAK FLOW RATE(CFS) =       5.61

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.74  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.72
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.61
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =  11.55
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   972.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.16
  EFFECTIVE AREA(ACRES) =      3.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.50       PEAK FLOW RATE(CFS) =       5.61
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.48
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.80       PEAK FLOW RATE(CFS) =       6.08

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.90      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
```

```
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    1.44
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      4.70       PEAK FLOW RATE(CFS) =       7.52

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     1.73  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   347.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.92
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.52
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =  12.72
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =  1319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.72
  RAINFALL INTENSITY(INCH/HR) =   1.82
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     4.70
  TOTAL STREAM AREA(ACRES) =     4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.52

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   343.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      0.82
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.82

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.20  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.91
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.82
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   5.23
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    112.00 =   383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 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.) =   5.23
  RAINFALL INTENSITY(INCH/HR) =   3.10
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     0.30
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.82

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      7.52  12.72    1.818  0.75( 0.15) 0.20     4.7     100.00
      2      0.82   5.23    3.100  0.75( 0.15) 0.20     0.3     111.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      6.28   5.23    3.100  0.75( 0.15) 0.20     2.2     111.00
      2      7.98  12.72    1.818  0.75( 0.15) 0.20     5.0     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      7.98    Tc(MIN.) =    12.72
  EFFECTIVE AREA(ACRES) =     5.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =  1319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.47  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.15
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.98
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =  13.03
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    113.00 =  1414.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  13.03
  *  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
  APARTMENTS                 B        0.10      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.15
  EFFECTIVE AREA(ACRES) =      5.10   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.10       PEAK FLOW RATE(CFS) =       7.98
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.03
 *  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
 APARTMENTS                 B        0.30      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.44
 EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      5.40       PEAK FLOW RATE(CFS) =       7.98

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.03
 *  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
 APARTMENTS                 B        1.20      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.77
 EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      6.60       PEAK FLOW RATE(CFS) =       9.76

 ** PEAK FLOW RATE TABLE **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1      9.79   5.56    2.988  0.75( 0.15) 0.20     3.8     111.00
     2      9.76  13.03    1.793  0.75( 0.15) 0.20     6.6     100.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      9.79  Tc(MIN.) =   5.56
 AREA-AVERAGED Fm(INCH/HR) =  0.15  AREA-AVERAGED Fp(INCH/HR) =  0.75
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =      3.83

****************************************************************************
 FLOW PROCESS FROM NODE    114.00 TO NODE    134.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     1.88  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =   376.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.37
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      9.79
 PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =   6.73
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   178.00
  ELEVATION DATA: UPSTREAM(FEET) =   1299.39  DOWNSTREAM(FEET) =   1297.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.149
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.813
  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      0.75       0.20    56    6.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.72

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.56  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.80
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.72
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   6.82
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =   291.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   6.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.643
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.20      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.45
  EFFECTIVE AREA(ACRES) =      0.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      0.50       PEAK FLOW RATE(CFS) =       1.12

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.65  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.18
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.12
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   7.50
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =   421.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   7.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.496
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.63
  EFFECTIVE AREA(ACRES) =      0.80   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      0.80       PEAK FLOW RATE(CFS) =       1.69

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   7.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.496
  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      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.53
  EFFECTIVE AREA(ACRES) =      2.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.00       PEAK FLOW RATE(CFS) =       4.22

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.61  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.22
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   7.98
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    124.00 =   544.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   7.98
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.81
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.40       PEAK FLOW RATE(CFS) =       4.87

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.47  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.57
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      4.87
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   8.32
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    125.00 =   639.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =   8.32
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.345
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        0.50      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.99
 EFFECTIVE AREA(ACRES) =      2.90   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      2.90       PEAK FLOW RATE(CFS) =       5.73

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =   8.32
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.345
 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      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.37
 EFFECTIVE AREA(ACRES) =      4.10   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      4.10       PEAK FLOW RATE(CFS) =       8.10

****************************************************************************
 FLOW PROCESS FROM NODE    126.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     1.65  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.19
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      8.10
 PIPE TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =   9.38
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    132.00 =   969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.38
 RAINFALL INTENSITY(INCH/HR) =   2.18
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =     4.10
 TOTAL STREAM AREA(ACRES) =     4.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.10
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    131.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B       0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      1.09
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.09

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.17  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.16
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.09
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   5.18
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    132.00 =   356.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.18
  RAINFALL INTENSITY(INCH/HR) =   3.12
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     0.40
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.09

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      8.10   9.38    2.183  0.75( 0.15) 0.20     4.1     120.00
      2      1.09   5.18    3.118  0.75( 0.15) 0.20     0.4     131.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      7.62   5.18    3.118  0.75( 0.15) 0.20     2.7     131.00
      2      8.85   9.38    2.183  0.75( 0.15) 0.20     4.5     120.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      8.85    Tc(MIN.) =     9.38
  EFFECTIVE AREA(ACRES) =     4.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      4.50
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    132.00 =   969.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.45  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.26
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.85
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   9.67
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    133.00 =  1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   9.67
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.143
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.50      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.90
  EFFECTIVE AREA(ACRES) =      5.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.00       PEAK FLOW RATE(CFS) =       8.97

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.71  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   142.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.30
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.97
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  10.12
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    134.00 =  1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.12
  *  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
  APARTMENTS                 B        0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.70
  EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.40       PEAK FLOW RATE(CFS) =       9.41

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 MAINLINE Tc(MIN) =  10.12
 *  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
 APARTMENTS                 B        0.60      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.05
 EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      6.00       PEAK FLOW RATE(CFS) =      10.46

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  10.12
 *  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
 APARTMENTS                 B        1.30      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    2.27
 EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      7.30       PEAK FLOW RATE(CFS) =      12.72

 ** PEAK FLOW RATE TABLE **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     13.39   5.93    2.874  0.75( 0.15) 0.20     5.5     131.00
     2     12.72  10.12    2.086  0.75( 0.15) 0.20     7.3     120.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     13.39  Tc(MIN.) =   5.93
 AREA-AVERAGED Fm(INCH/HR) =  0.15  AREA-AVERAGED Fp(INCH/HR) =  0.75
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =      5.46

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =   5.93
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.874
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        0.20      0.75       0.20    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.49
 EFFECTIVE AREA(ACRES) =      5.66   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      7.50       PEAK FLOW RATE(CFS) =      13.88

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 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     13.88   5.93    2.874  0.75( 0.15) 0.20     5.7     131.00
     2     13.07  10.12    2.086  0.75( 0.15) 0.20     7.5     120.00
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    134.00 =  1202.00 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      9.79   6.73    2.666  0.75( 0.15) 0.20     3.8     111.00
      2      9.76  14.20    1.703  0.75( 0.15) 0.20     6.6     100.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     23.24   5.93    2.874  0.75( 0.15) 0.20     9.0     131.00
      2     23.52   6.73    2.666  0.75( 0.15) 0.20     9.8     111.00
      3     22.85  10.12    2.086  0.75( 0.15) 0.20    12.6     120.00
      4     20.24  14.20    1.703  0.75( 0.15) 0.20    14.1     100.00
    TOTAL AREA(ACRES) =     14.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       23.52  Tc(MIN.) =    6.725
  EFFECTIVE AREA(ACRES) =      9.84  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =     14.10
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  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) =     0.72  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.52
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   7.08
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    136.00 =  1933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    136.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   851.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.75       0.20    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      1.09
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.09

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
```

```
==============================================================================
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                              Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 2                                             *
* HYDROLOGIC ANALYSIS - 10-YEAR                                         *
 ************************************************************************

  FILE NAME: 22112010.DAT
  TIME/DATE OF STUDY: 10:00 06/26/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7170

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    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) =   495.00
  ELEVATION DATA: UPSTREAM(FEET) =   1297.20  DOWNSTREAM(FEET) =   1294.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.879
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.895
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               B        2.20      0.75       0.35    56   11.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
  SUBAREA RUNOFF(CFS) =      3.23
  TOTAL AREA(ACRES) =      2.20   PEAK FLOW RATE(CFS) =      3.23
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.04  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.93
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.23
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  11.92
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =   504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.66  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.13
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.23
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =  12.45
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.45
  RAINFALL INTENSITY(INCH/HR) =   1.84
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     2.20
  TOTAL STREAM AREA(ACRES) =     2.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.23

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
  ELEVATION DATA: UPSTREAM(FEET) =   1297.50  DOWNSTREAM(FEET) =   1294.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.676
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.914
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               B        2.40      0.75       0.35    56   11.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
  SUBAREA RUNOFF(CFS) =      3.57
  TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      3.57

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.04  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.01
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.57
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  11.71
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    212.00 =   505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.71
  RAINFALL INTENSITY(INCH/HR) =   1.91
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     2.40
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.57

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      3.23  12.45    1.842  0.75( 0.26) 0.35     2.2     200.00
      2      3.57  11.71    1.911  0.75( 0.26) 0.35     2.4     210.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      6.74  11.71    1.911  0.75( 0.26) 0.35     4.5     210.00
      2      6.65  12.45    1.842  0.75( 0.26) 0.35     4.6     200.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      6.74    Tc(MIN.) =    11.71
  EFFECTIVE AREA(ACRES) =     4.47   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =      4.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 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) =     0.56  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   111.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.90
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.74
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  12.09
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    214.00 =   747.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE    221.00 TO NODE    221.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
 USER SPECIFIED Tc(MIN.) =    5.000
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               B        0.10      0.75       0.35    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
 SUBAREA RUNOFF(CFS) =      0.26
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
 FLOW PROCESS FROM NODE    221.00 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) =     0.08  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.17
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.26
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   5.11
 LONGEST FLOWPATH FROM NODE    221.00 TO NODE    222.00 =   511.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    222.00 TO NODE    222.00 IS CODE =  13
----------------------------------------------------------------------------
 >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    231.00 TO NODE    231.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    15.00
 USER SPECIFIED Tc(MIN.) =    5.000
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               B        0.10      0.75       0.35    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
 SUBAREA RUNOFF(CFS) =      0.26
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
 FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     0.08  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.17
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.26
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   5.11
 LONGEST FLOWPATH FROM NODE    231.00 TO NODE    232.00 =    30.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    232.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                          DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 3                                             *
* HYDROLOGIC ANALYSIS - 10-YEAR                                         *
 ************************************************************************

  FILE NAME: 22113010.DAT
  TIME/DATE OF STUDY: 10:00 06/26/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7170

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   492.00
  ELEVATION DATA: UPSTREAM(FEET) =   1309.00  DOWNSTREAM(FEET) =   1304.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.979
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.885
  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      0.75       0.50    56   11.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      1.63
```

```
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      1.63

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.09  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.48
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.63
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  12.07
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =   510.00 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) =     0.39  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.48
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.63
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =  12.44
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =   588.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  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) =   957.00
  ELEVATION DATA: UPSTREAM(FEET) =   1306.20  DOWNSTREAM(FEET) =   1304.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.609
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.361
  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        2.70      0.75       0.50    56   20.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      2.40
  TOTAL AREA(ACRES) =      2.70   PEAK FLOW RATE(CFS) =      2.40

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.09  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.65
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.40
```

```
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  20.70
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    312.00 =   976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.19  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.79
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.40
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  20.86
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    314.00 =  1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                             *
* PROPOSED CONDITION - RIGHT-OF-WAY                                      *
* HYDROLOGIC ANALYSIS - 10-YEAR                                          *
 ************************************************************************

  FILE NAME: 22114010.DAT
  TIME/DATE OF STUDY: 16:00 08/08/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7170

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

******************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =  22
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.60      0.75       0.10    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      1.68
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.68

******************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =  13
```

```
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    411.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) = 49600.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.60      0.75       0.10    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      1.68
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.68

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    411.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
*****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                              Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 1                                             *
* HYDROLOGIC ANALYSIS - 100-YEAR                                        *
 *************************************************************************

  FILE NAME: 22111100.DAT
  TIME/DATE OF STUDY: 16:00 08/08/2022
=============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

*****************************************************************************
  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) =   572.00
  ELEVATION DATA: UPSTREAM(FEET) =   1299.00  DOWNSTREAM(FEET) =   1292.28

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.989
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.284
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 B        1.50      0.45       0.20    76    9.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      4.31
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      4.31
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.23  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.34
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.31
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =  10.17
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.28
  EFFECTIVE AREA(ACRES) =      1.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      1.60       PEAK FLOW RATE(CFS) =       4.55

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.38  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.33
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.55
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =  10.46
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =   695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.194
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      2.00   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.00       PEAK FLOW RATE(CFS) =       5.59

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.28  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.72
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.59
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =  10.66
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =   751.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.158
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.28
  EFFECTIVE AREA(ACRES) =      2.10   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.10       PEAK FLOW RATE(CFS) =       5.80

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.36  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.73
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.80
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  10.92
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =   824.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.113
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.27
  EFFECTIVE AREA(ACRES) =      2.20   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.20       PEAK FLOW RATE(CFS) =       5.99

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.113
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.20      0.45       0.20    76
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.26
  EFFECTIVE AREA(ACRES) =      3.40   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.40       PEAK FLOW RATE(CFS) =       9.25

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.74  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.32
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.25
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =  11.38
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   972.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.037
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.27
  EFFECTIVE AREA(ACRES) =      3.50   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.50       PEAK FLOW RATE(CFS) =       9.28

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.037
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.80
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      3.80       PEAK FLOW RATE(CFS) =      10.08

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.037
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.90      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.39
```

```
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      4.70       PEAK FLOW RATE(CFS) =      12.46

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     1.73  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   347.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.75
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.46
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =  12.39
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =  1319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.39
  RAINFALL INTENSITY(INCH/HR) =   2.89
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     4.70
  TOTAL STREAM AREA(ACRES) =     4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.46

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   343.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.974
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      1.32
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.32

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.20  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.31
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.32
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   5.20
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    112.00 =   383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 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.) =   5.20
  RAINFALL INTENSITY(INCH/HR) =   4.86
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     0.30
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.32

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     12.46  12.39    2.886  0.45( 0.09) 0.20     4.7     100.00
      2      1.32   5.20    4.858  0.45( 0.09) 0.20     0.3     111.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     10.24   5.20    4.858  0.45( 0.09) 0.20     2.3     111.00
      2     13.24  12.39    2.886  0.45( 0.09) 0.20     5.0     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     13.24    Tc(MIN.) =    12.39
  EFFECTIVE AREA(ACRES) =     5.00   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =  1319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.47  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.80
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     13.24
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =  12.66
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    113.00 =  1414.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  12.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.849
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.10      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      5.10   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.10       PEAK FLOW RATE(CFS) =      13.24
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN) =  12.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.849
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.74
  EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      5.40       PEAK FLOW RATE(CFS) =      13.41

********************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN) =  12.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.849
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.20      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.98
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      6.60       PEAK FLOW RATE(CFS) =      16.38

********************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    134.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     1.88  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   376.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.38
  PIPE TRAVEL TIME(MIN.) =   1.05    Tc(MIN.) =  13.71
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  10
--------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   178.00
  ELEVATION DATA: UPSTREAM(FEET) =   1299.39  DOWNSTREAM(FEET) =   1297.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.149
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.394
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 B        0.30      0.45       0.20    76    6.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
```

```
  SUBAREA RUNOFF(CFS) =      1.16
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.16

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.56  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.20
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.16
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   6.74
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =   291.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   6.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.159
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.20      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.73
  EFFECTIVE AREA(ACRES) =      0.50   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      0.50       PEAK FLOW RATE(CFS) =       1.83

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.65  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.58
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.83
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   7.34
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =   421.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   7.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.950
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.30      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.04
  EFFECTIVE AREA(ACRES) =      0.80   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      0.80       PEAK FLOW RATE(CFS) =       2.78

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   7.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.950
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.20      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    4.17
  EFFECTIVE AREA(ACRES) =      2.00   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.00       PEAK FLOW RATE(CFS) =       6.95

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.61  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.95
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   7.76
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    124.00 =   544.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   7.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.34
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.40       PEAK FLOW RATE(CFS) =       8.06

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.47  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.16
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.06
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   8.07
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    125.00 =   639.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   8.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.732
  SUBAREA LOSS RATE DATA(AMC III):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.50      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      2.90   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      2.90       PEAK FLOW RATE(CFS) =       9.50

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   8.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.732
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.20      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.93
  EFFECTIVE AREA(ACRES) =      4.10   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      4.10       PEAK FLOW RATE(CFS) =      13.44

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     1.65  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.84
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     13.44
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   9.01
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    132.00 =   969.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.01
  RAINFALL INTENSITY(INCH/HR) =   3.49
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     4.10
  TOTAL STREAM AREA(ACRES) =     4.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.44

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    131.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.974
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.45       0.20    76
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      1.76
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.76

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.17  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.54
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.76
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   5.16
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    132.00 =   356.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.16
  RAINFALL INTENSITY(INCH/HR) =   4.88
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =     0.40
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.76

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     13.44   9.01    3.493  0.45( 0.09) 0.20     4.1     120.00
      2      1.76   5.16    4.881  0.45( 0.09) 0.20     0.4     131.00

  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     12.59   5.16    4.881  0.45( 0.09) 0.20     2.7     131.00
      2     14.69   9.01    3.493  0.45( 0.09) 0.20     4.5     120.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     14.69    Tc(MIN.) =     9.01
  EFFECTIVE AREA(ACRES) =     4.50   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =      4.50
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    132.00 =   969.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.45  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.89
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.69
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   9.27
```

```
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    133.00 =  1060.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =   9.27
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.434
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        0.50      0.45       0.20    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.50
 EFFECTIVE AREA(ACRES) =      5.00   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      5.00       PEAK FLOW RATE(CFS) =      15.05

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     0.71  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =   142.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.94
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     15.05
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   9.67
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    134.00 =  1202.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =   9.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.349
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        0.40      0.45       0.20    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.17
 EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      5.40       PEAK FLOW RATE(CFS) =      15.83

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =   9.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.349
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        0.60      0.45       0.20    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.76
 EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      6.00       PEAK FLOW RATE(CFS) =      17.59

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

```
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =   9.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.349
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        1.30      0.45       0.20    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    3.81
 EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      7.30       PEAK FLOW RATE(CFS) =      21.41

 ** PEAK FLOW RATE TABLE **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     22.20   5.83    4.537  0.45( 0.09) 0.20     5.5     131.00
     2     21.41   9.67    3.349  0.45( 0.09) 0.20     7.3     120.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     22.20  Tc(MIN.) =   5.83
 AREA-AVERAGED Fm(INCH/HR) =  0.09  AREA-AVERAGED Fp(INCH/HR) =  0.45
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =      5.55

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =   5.83
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.537
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 B        0.20      0.45       0.20    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.80
 EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =      7.50       PEAK FLOW RATE(CFS) =      23.00

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 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     23.00   5.83    4.537  0.45( 0.09) 0.20     5.7     131.00
     2     21.99   9.67    3.349  0.45( 0.09) 0.20     7.5     120.00
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    134.00 =  1202.00 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     16.07   6.55    4.232  0.45( 0.09) 0.20     3.9     111.00
     2     16.38  13.71    2.716  0.45( 0.09) 0.20     6.6     100.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     38.36   5.83    4.537  0.45( 0.09) 0.20     9.2     131.00
     2     38.88   6.55    4.232  0.45( 0.09) 0.20     9.9     111.00
     3     38.20   9.67    3.349  0.45( 0.09) 0.20    12.6     120.00
     4     34.11  13.71    2.716  0.45( 0.09) 0.20    14.1     100.00
```

```
    TOTAL AREA(ACRES) =     14.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       38.88  Tc(MIN.) =    6.547
  EFFECTIVE AREA(ACRES) =      9.95  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =     14.10
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  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) =     0.72  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.64
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     38.88
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   6.86
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    136.00 =  1933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    136.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   851.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.974
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        0.40      0.45       0.20    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.20
  SUBAREA RUNOFF(CFS) =      1.76
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.76

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                              Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 2                                             *
* HYDROLOGIC ANALYSIS - 100-YEAR                                        *
 ************************************************************************

  FILE NAME: 22112100.DAT
  TIME/DATE OF STUDY: 10:00 06/26/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  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) =   495.00
  ELEVATION DATA: UPSTREAM(FEET) =   1297.20  DOWNSTREAM(FEET) =   1294.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.879
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.960
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               B        2.20      0.45       0.35    76   11.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
  SUBAREA RUNOFF(CFS) =      5.55
  TOTAL AREA(ACRES) =      2.20   PEAK FLOW RATE(CFS) =      5.55
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.04  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.50
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.55
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  11.91
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =   504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.66  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.71
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.55
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =  12.38
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.38
  RAINFALL INTENSITY(INCH/HR) =   2.89
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.45
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     2.20
  TOTAL STREAM AREA(ACRES) =     2.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.55

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
  ELEVATION DATA: UPSTREAM(FEET) =   1297.50  DOWNSTREAM(FEET) =   1294.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.676
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.990
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               B        2.40      0.45       0.35    76   11.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
  SUBAREA RUNOFF(CFS) =      6.12
  TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      6.12

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.04  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.57
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.12
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  11.71
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    212.00 =   505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.71
  RAINFALL INTENSITY(INCH/HR) =   2.99
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.45
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     2.40
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.12

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      5.55  12.38    2.887  0.45( 0.16) 0.35     2.2     200.00
      2      6.12  11.71    2.985  0.45( 0.16) 0.35     2.4     210.00

  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     11.55  11.71    2.985  0.45( 0.16) 0.35     4.5     210.00
      2     11.45  12.38    2.887  0.45( 0.16) 0.35     4.6     200.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     11.55    Tc(MIN.) =    11.71
  EFFECTIVE AREA(ACRES) =     4.48   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =      4.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 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) =     0.56  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =   111.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.48
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.55
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =  12.05
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    214.00 =   747.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE    221.00 TO NODE    221.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
 USER SPECIFIED Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.974
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               B        0.10      0.45       0.35    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
 SUBAREA RUNOFF(CFS) =      0.43
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.43

****************************************************************************
 FLOW PROCESS FROM NODE    221.00 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) =     0.08  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.51
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.43
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   5.10
 LONGEST FLOWPATH FROM NODE    221.00 TO NODE    222.00 =   511.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    222.00 TO NODE    222.00 IS CODE =  13
----------------------------------------------------------------------------
 >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    231.00 TO NODE    231.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    15.00
 USER SPECIFIED Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.974
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               B        0.10      0.45       0.35    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.35
 SUBAREA RUNOFF(CFS) =      0.43
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.43

****************************************************************************
 FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     0.08  DOWNSTREAM(FEET) =     0.00
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.51
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.43
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   5.10
 LONGEST FLOWPATH FROM NODE    231.00 TO NODE    232.00 =    30.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    232.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                          DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 3                                             *
* HYDROLOGIC ANALYSIS - 100-YEAR                                        *
 ************************************************************************

  FILE NAME: 22113100.DAT
  TIME/DATE OF STUDY: 10:00 06/26/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   492.00
  ELEVATION DATA: UPSTREAM(FEET) =   1309.00  DOWNSTREAM(FEET) =   1304.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.979
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.945
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.45       0.50    76   11.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      2.94
```

```
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.94

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.09  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.03
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.94
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  12.05
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =   510.00 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) =     0.39  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.03
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.94
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =  12.38
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =   588.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  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) =   957.00
  ELEVATION DATA: UPSTREAM(FEET) =   1306.20  DOWNSTREAM(FEET) =   1304.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.609
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.127
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.70      0.45       0.50    76   20.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      4.62
  TOTAL AREA(ACRES) =      2.70   PEAK FLOW RATE(CFS) =      4.62

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.09  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.62
```

```
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  20.68
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    312.00 =   976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     0.19  DOWNSTREAM(FEET) =     0.00
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.62
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  20.82
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    314.00 =  1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                              DRC Engineering, Inc.
                        160 South Old Springs Road, Suite 210
                           Anaheim Hills, California 92808
                        Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                             *
* PROPOSED CONDITION - RIGHT-OF-WAY                                      *
* HYDROLOGIC ANALYSIS - 100-YEAR                                         *
 ************************************************************************

  FILE NAME: 22114100.DAT
  TIME/DATE OF STUDY: 16:00 08/08/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

******************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =  22
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   496.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.974
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.60      0.45       0.10    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      2.66
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      2.66

******************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =  13
```

```
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    411.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) = 49600.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.974
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.60      0.45       0.10    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      2.66
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      2.66

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    411.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.01  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      0.01  AREA-AVERAGED Fm(INCH/HR)=  0.00
  AREA-AVERAGED Fp(INCH/HR) =  0.00  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Technical Appendix E

Underground Storage Analysis
Flood Hydrograph / Routing

Lugonia Village - Redlands
Underground Storage Analysis

DA 1 - 106-107

MC-4500

Total Units (#)	Total Endcaps (#)	Surface Area per Unit Length (in)	Surface Area per Unit Width (in)
172	8	48.3	88.0

Infiltration

Surface Area Unit (sq ft)	Surface Area Total (sq ft)	Infiltration Rate (in/hr)	Infiltration Rate (cfs)
29.52	5,077	2.40	0.282

Discharge

Orifice C ()	Number Outlets (#)	Outlet Diameter (in)	Outlet Invert (ft)
0.60	1	6.00	5.50

Dead Storage

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
5.50	25,435	0.584	0.000

Rating Curve (above stone bottom) / **Rating Curve (above dead storage)**

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)	Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
0.00	0	0.000	0.000				
0.25	655	0.015	0.000				
0.50	1,309	0.030	0.000				
0.75	1,964	0.045	0.000				
1.00	2,619	0.060	0.000				
1.25	4,067	0.093	0.000				
1.50	5,506	0.126	0.000				
1.75	6,936	0.159	0.000				
2.00	8,353	0.192	0.000				
2.25	9,756	0.224	0.000				
2.50	11,143	0.256	0.000				
2.75	12,512	0.287	0.000				
3.00	13,860	0.318	0.000				
3.25	15,186	0.349	0.000				
3.50	16,486	0.378	0.000				
3.75	17,758	0.408	0.000				
4.00	18,997	0.436	0.000				
4.25	20,201	0.464	0.000				
4.50	21,363	0.490	0.000				
4.75	22,479	0.516	0.000				
5.00	23,540	0.540	0.000				
5.25	24,534	0.563	0.000				
5.50	25,435	0.584	0.000	0.00	0	0.000	0.000
5.75	26,187	0.601	0.236	0.25	752	0.017	0.236
6.00	26,875	0.617	0.669	0.50	1,440	0.033	0.669
6.25	27,530	0.632	0.819	0.75	2,094	0.048	0.819
6.50	28,184	0.647	0.945	1.00	2,749	0.063	0.945
6.75	28,839	0.662	1.057	1.25	3,404	0.078	1.057
7.00	29,494	0.677	1.158	1.50	4,058	0.093	1.158

Lugonia Village - Redlands
Underground Storage Analysis

DA 1 - 113-114

MC-4500

Total Units (#)	Total Endcaps (#)	Surface Area per Unit Length (in)	Surface Area per Unit Width (in)
102	6	48.3	88.0

Infiltration

Surface Area Unit (sq ft)	Surface Area Total (sq ft)	Infiltration Rate (in/hr)	Infiltration Rate (cfs)
29.52	3,011	2.40	0.167

Discharge

Orifice C ()	Number Outlets (#)	Outlet Diameter (in)	Outlet Invert (ft)
0.60	1	6.00	5.50

Dead Storage

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
5.50	15,200	0.349	0.000

Rating Curve (above stone bottom)				Rating Curve (above dead storage)			
Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)	Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
0.00	0	0.000	0.000				
0.25	392	0.009	0.000				
0.50	785	0.018	0.000				
0.75	1,177	0.027	0.000				
1.00	1,569	0.036	0.000				
1.25	2,434	0.056	0.000				
1.50	3,294	0.076	0.000				
1.75	4,148	0.095	0.000				
2.00	4,995	0.115	0.000				
2.25	5,833	0.134	0.000				
2.50	6,661	0.153	0.000				
2.75	7,479	0.172	0.000				
3.00	8,285	0.190	0.000				
3.25	9,076	0.208	0.000				
3.50	9,853	0.226	0.000				
3.75	10,613	0.244	0.000				
4.00	11,353	0.261	0.000				
4.25	12,072	0.277	0.000				
4.50	12,766	0.293	0.000				
4.75	13,433	0.308	0.000				
5.00	14,067	0.323	0.000				
5.25	14,661	0.337	0.000				
5.50	15,200	0.349	0.000	0.00	0	0.000	0.000
5.75	15,650	0.359	0.236	0.25	450	0.010	0.236
6.00	16,062	0.369	0.669	0.50	862	0.020	0.669
6.25	16,454	0.378	0.819	0.75	1,254	0.029	0.819
6.50	16,846	0.387	0.945	1.00	1,647	0.038	0.945
6.75	17,239	0.396	1.057	1.25	2,039	0.047	1.057
7.00	17,631	0.405	1.158	1.50	2,431	0.056	1.158

Lugonia Village - Redlands
Underground Storage Analysis

DA 1 - 125-126

MC-4500

Total Units (#)	Total Endcaps (#)	Surface Area per Unit Length (in)	Surface Area per Unit Width (in)
152	8	48.3	88.0

Infiltration

Surface Area Unit (sq ft)	Surface Area Total (sq ft)	Infiltration Rate (in/hr)	Infiltration Rate (cfs)
29.52	4,487	2.40	0.249

Discharge

Orifice C ()	Number Outlets (#)	Outlet Diameter (in)	Outlet Invert (ft)
0.60	1	6.00	5.50

Dead Storage

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
5.50	22,564	0.518	0.000

Rating Curve (above stone bottom)				Rating Curve (above dead storage)			
Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)	Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
0.00	0	0.000	0.000				
0.25	582	0.013	0.000				
0.50	1,163	0.027	0.000				
0.75	1,745	0.040	0.000				
1.00	2,326	0.053	0.000				
1.25	3,611	0.083	0.000				
1.50	4,888	0.112	0.000				
1.75	6,155	0.141	0.000				
2.00	7,412	0.170	0.000				
2.25	8,656	0.199	0.000				
2.50	9,887	0.227	0.000				
2.75	11,101	0.255	0.000				
3.00	12,297	0.282	0.000				
3.25	13,473	0.309	0.000				
3.50	14,626	0.336	0.000				
3.75	15,753	0.362	0.000				
4.00	16,853	0.387	0.000				
4.25	17,920	0.411	0.000				
4.50	18,952	0.435	0.000				
4.75	19,941	0.458	0.000				
5.00	20,882	0.479	0.000				
5.25	21,764	0.500	0.000				
5.50	22,564	0.518	0.000	0.00	0	0.000	0.000
5.75	23,231	0.533	0.236	0.25	667	0.015	0.236
6.00	23,842	0.547	0.669	0.50	1,278	0.029	0.669
6.25	24,424	0.561	0.819	0.75	1,860	0.043	0.819
6.50	25,005	0.574	0.945	1.00	2,442	0.056	0.945
6.75	25,587	0.587	1.057	1.25	3,023	0.069	1.057
7.00	26,168	0.601	1.158	1.50	3,605	0.083	1.158

Lugonia Village - Redlands
Underground Storage Analysis

DA 1 - 134-135

MC-4500

Total Units (#)	Total Endcaps (#)	Surface Area per Unit Length (in)	Surface Area per Unit Width (in)
128	2	48.3	88.0

Infiltration

Surface Area Unit (sq ft)	Surface Area Total (sq ft)	Infiltration Rate (in/hr)	Infiltration Rate (cfs)
29.52	3,778	2.40	0.210

Discharge

Orifice C ()	Number Outlets (#)	Outlet Diameter (in)	Outlet Invert (ft)
0.60	1	15.00	4.75

Dead Storage

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
4.75	16,407	0.377	0.000

Rating Curve (above stone bottom)				Rating Curve (above dead storage)			
Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)	Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
0.00	0	0.000	0.000				
0.25	474	0.011	0.000				
0.50	949	0.022	0.000				
0.75	1,423	0.033	0.000				
1.00	1,898	0.044	0.000				
1.25	2,955	0.068	0.000				
1.50	4,007	0.092	0.000				
1.75	5,051	0.116	0.000				
2.00	6,086	0.140	0.000				
2.25	7,111	0.163	0.000				
2.50	8,124	0.187	0.000				
2.75	9,124	0.209	0.000				
3.00	10,110	0.232	0.000				
3.25	11,078	0.254	0.000				
3.50	12,028	0.276	0.000				
3.75	12,957	0.297	0.000				
4.00	13,863	0.318	0.000				
4.25	14,742	0.338	0.000				
4.50	15,592	0.358	0.000				
4.75	16,407	0.377	0.000	0.00	0	0.000	0.000
5.00	17,181	0.394	0.421	0.25	775	0.018	0.421
5.25	17,906	0.411	1.561	0.50	1,500	0.034	1.561
5.50	18,563	0.426	3.206	0.75	2,157	0.050	3.206
5.75	19,109	0.439	5.068	1.00	2,703	0.062	5.068
6.00	19,609	0.450	6.606	1.25	3,202	0.074	6.606
6.25	20,083	0.461	7.237	1.50	3,676	0.084	7.237
6.50	20,557	0.472	7.817	1.75	4,151	0.095	7.817
6.75	21,032	0.483	8.356	2.00	4,625	0.106	8.356
7.00	21,506	0.494	8.863	2.25	5,100	0.117	8.863

Lugonia Village - Redlands
Underground Storage Analysis

DA 2 - 202-203

MC-3500

Total Units (#)	Total Endcaps (#)	Surface Area per Unit Length (in)	Surface Area per Unit Width (in)
64	2	86.0	65.0

Infiltration

Surface Area Unit (sq ft)	Surface Area Total (sq ft)	Infiltration Rate (in/hr)	Infiltration Rate (cfs)
38.82	2,484	2.40	0.138

Discharge

Orifice C ()	Number Outlets (#)	Outlet Diameter (in)	Outlet Invert (ft)
0.60	1	6.00	4.25

Dead Storage

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
4.25	9,784	0.225	0.000

Rating Curve (above stone bottom)				Rating Curve (above dead storage)			
Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)	Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
0.00	0	0.000	0.000				
0.25	332	0.008	0.000				
0.50	664	0.015	0.000				
0.75	996	0.023	0.000				
1.00	1,328	0.030	0.000				
1.25	2,064	0.047	0.000				
1.50	2,791	0.064	0.000				
1.75	3,511	0.081	0.000				
2.00	4,221	0.097	0.000				
2.25	4,919	0.113	0.000				
2.50	5,605	0.129	0.000				
2.75	6,275	0.144	0.000				
3.00	6,928	0.159	0.000				
3.25	7,560	0.174	0.000				
3.50	8,167	0.187	0.000				
3.75	8,746	0.201	0.000				
4.00	9,289	0.213	0.000				
4.25	9,784	0.225	0.000	0.00	0	0.000	0.000
4.50	10,198	0.234	0.236	0.25	414	0.009	0.236
4.75	10,551	0.242	0.669	0.50	767	0.018	0.669
5.00	10,883	0.250	0.819	0.75	1,099	0.025	0.819
5.25	11,215	0.257	0.945	1.00	1,431	0.033	0.945
5.50	11,547	0.265	1.057	1.25	1,763	0.040	1.057
5.75	11,879	0.273	1.158	1.50	2,095	0.048	1.158

Lugonia Village - Redlands
Underground Storage Analysis

DA 2 - 212-213

MC-3500

Total Units (#)	Total Endcaps (#)	Surface Area per Unit Length (in)	Surface Area per Unit Width (in)
64	2	86.0	65.0

Infiltration

Surface Area Unit (sq ft)	Surface Area Total (sq ft)	Infiltration Rate (in/hr)	Infiltration Rate (cfs)
38.82	2,484	2.40	0.138

Discharge

Orifice C ()	Number Outlets (#)	Outlet Diameter (in)	Outlet Invert (ft)
0.60	1	6.00	4.25

Dead Storage

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
4.25	9,784	0.225	0.000

Rating Curve (above stone bottom)				Rating Curve (above dead storage)			
Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)	Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
0.00	0	0.000	0.000				
0.25	332	0.008	0.000				
0.50	664	0.015	0.000				
0.75	996	0.023	0.000				
1.00	1,328	0.030	0.000				
1.25	2,064	0.047	0.000				
1.50	2,791	0.064	0.000				
1.75	3,511	0.081	0.000				
2.00	4,221	0.097	0.000				
2.25	4,919	0.113	0.000				
2.50	5,605	0.129	0.000				
2.75	6,275	0.144	0.000				
3.00	6,928	0.159	0.000				
3.25	7,560	0.174	0.000				
3.50	8,167	0.187	0.000				
3.75	8,746	0.201	0.000				
4.00	9,289	0.213	0.000				
4.25	9,784	0.225	0.000	0.00	0	0.000	0.000
4.50	10,198	0.234	0.236	0.25	414	0.009	0.236
4.75	10,551	0.242	0.669	0.50	767	0.018	0.669
5.00	10,883	0.250	0.819	0.75	1,099	0.025	0.819
5.25	11,215	0.257	0.945	1.00	1,431	0.033	0.945
5.50	11,547	0.265	1.057	1.25	1,763	0.040	1.057
5.75	11,879	0.273	1.158	1.50	2,095	0.048	1.158

Lugonia Village - Redlands
Underground Storage Analysis

DA 3 - 302-303

MC-3500

Total Units (#)	Total Endcaps (#)	Surface Area per Unit Length (in)	Surface Area per Unit Width (in)
24	4	86.0	65.0

Infiltration

Surface Area Unit (sq ft)	Surface Area Total (sq ft)	Infiltration Rate (in/hr)	Infiltration Rate (cfs)
38.82	932	2.40	0.052

Discharge

Orifice C ()	Number Outlets (#)	Outlet Diameter (in)	Outlet Invert (ft)
0.60	1	6.00	4.25

Dead Storage

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
4.25	3,794	0.087	0.000

Rating Curve (above stone bottom)				Rating Curve (above dead storage)			
Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)	Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
0.00	0	0.000	0.000				
0.25	130	0.003	0.000				
0.50	260	0.006	0.000				
0.75	390	0.009	0.000				
1.00	520	0.012	0.000				
1.25	805	0.018	0.000				
1.50	1,087	0.025	0.000				
1.75	1,366	0.031	0.000				
2.00	1,641	0.038	0.000				
2.25	1,912	0.044	0.000				
2.50	2,177	0.050	0.000				
2.75	2,437	0.056	0.000				
3.00	2,689	0.062	0.000				
3.25	2,933	0.067	0.000				
3.50	3,168	0.073	0.000				
3.75	3,392	0.078	0.000				
4.00	3,602	0.083	0.000				
4.25	3,794	0.087	0.000	0.00	0	0.000	0.000
4.50	3,955	0.091	0.236	0.25	161	0.004	0.236
4.75	4,093	0.094	0.669	0.50	299	0.007	0.669
5.00	4,223	0.097	0.819	0.75	429	0.010	0.819
5.25	4,353	0.100	0.945	1.00	559	0.013	0.945
5.50	4,483	0.103	1.057	1.25	689	0.016	1.057
5.75	4,613	0.106	1.158	1.50	819	0.019	1.158

Lugonia Village - Redlands
Underground Storage Analysis

DA 3 - 312-313

MC-3500

Total Units (#)	Total Endcaps (#)	Surface Area per Unit Length (in)	Surface Area per Unit Width (in)
60	10	86.0	65.0

Infiltration

Surface Area Unit (sq ft)	Surface Area Total (sq ft)	Infiltration Rate (in/hr)	Infiltration Rate (cfs)
38.82	2,329	2.40	0.129

Discharge

Orifice C ()	Number Outlets (#)	Outlet Diameter (in)	Outlet Invert (ft)
0.60	1	6.00	4.25

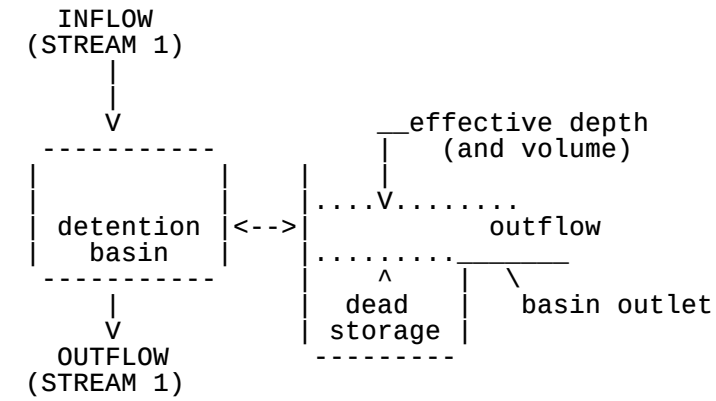
Dead Storage

Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
4.25	9,484	0.218	0.000

Rating Curve (above stone bottom)				Rating Curve (above dead storage)			
Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)	Elevation (ft)	Storage (cu-ft)	Storage (ac-ft)	Discharge (cfs)
0.00	0	0.000	0.000				
0.25	325	0.007	0.000				
0.50	650	0.015	0.000				
0.75	976	0.022	0.000				
1.00	1,301	0.030	0.000				
1.25	2,013	0.046	0.000				
1.50	2,718	0.062	0.000				
1.75	3,415	0.078	0.000				
2.00	4,103	0.094	0.000				
2.25	4,779	0.110	0.000				
2.50	5,443	0.125	0.000				
2.75	6,091	0.140	0.000				
3.00	6,722	0.154	0.000				
3.25	7,333	0.168	0.000				
3.50	7,921	0.182	0.000				
3.75	8,480	0.195	0.000				
4.00	9,005	0.207	0.000				
4.25	9,484	0.218	0.000	0.00	0	0.000	0.000
4.50	9,886	0.227	0.236	0.25	402	0.009	0.236
4.75	10,231	0.235	0.669	0.50	747	0.017	0.669
5.00	10,557	0.242	0.819	0.75	1,072	0.025	0.819
5.25	10,882	0.250	0.945	1.00	1,398	0.032	0.945
5.50	11,207	0.257	1.057	1.25	1,723	0.040	1.057
5.75	11,532	0.265	1.158	1.50	2,048	0.047	1.158

```
 23.967      0.8498      0.18  .Q        .         .         .         V.
 23.983      0.8500      0.18  .Q        .         .         .         V.
 24.000      0.8503      0.18  .Q        .         .         .         V.
 24.017      0.8505      0.18  .Q        .         .         .         V.
 24.033      0.8508      0.18  .Q        .         .         .         V.
 24.050      0.8510      0.18  .Q        .         .         .         V.
 24.067      0.8513      0.17  .Q        .         .         .         V.
 24.083      0.8515      0.16  .Q        .         .         .         V.
 24.100      0.8517      0.14  Q         .         .         .         V.
 24.117      0.8519      0.13  Q         .         .         .         V.
 24.133      0.8520      0.11  Q         .         .         .         V.
 24.150      0.8522      0.09  Q         .         .         .         V.
 24.167      0.8523      0.08  Q         .         .         .         V.
 24.183      0.8523      0.06  Q         .         .         .         V.
 24.200      0.8524      0.05  Q         .         .         .         V.
 24.217      0.8525      0.03  Q         .         .         .         V.
 24.233      0.8525      0.02  Q         .         .         .          V

*******************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE = 3.2
-------------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
===============================================================================
```




```
         ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
         THROUGH A FLOW-THROUGH DETENTION BASIN
         SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
           DEAD STORAGE(AF) =      0.584
           SPECIFIED DEAD STORAGE(AF) FILLED =      0.000
           SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET =      0.000
           DETENTION BASIN CONSTANT LOSS RATE(CFS) =    0.28


         BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

          INTERVAL    DEPTH      OUTFLOW     STORAGE
           NUMBER      (FT)       (CFS)       (AF)
               1       0.00         0.00       0.000
               2       0.25         0.24       0.017
               3       0.50         0.67       0.033
               4       0.75         0.82       0.048
               5       1.00         0.94       0.063
               6       1.25         1.06       0.078
               7       1.50         1.16       0.093


===============================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
 (Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
        MEAN OUTFLOW is the average value during the unit interval.)

           CLOCK                                                  MEAN
            TIME  DEAD-STORAGE  INFLOW    LOSS   EFFECTIVE OUTFLOW  EFFECTIVE
```

```
         23.966        0.337     0.18     0.28      0.00      0.0      0.000
         23.983        0.337     0.18     0.28      0.00      0.0      0.000
         24.000        0.337     0.18     0.28      0.00      0.0      0.000
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      0.852 AF
    BASIN  STORAGE =      0.334 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      0.000 AF
    LOSS    VOLUME =      0.519 AF


********************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    113.00 IS CODE =   4
--------------------------------------------------------------------------------
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
================================================================================

***********
*****ERROR-STREAM  1 CONTAINS NO INFORMATION (EMPTY).
           PROCESS IS NEGATED.
***********



********************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    113.00 IS CODE = 1.2
--------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
================================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.90
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.150
    LOW LOSS FRACTION = 0.242
    TIME OF CONCENTRATION(MIN.) =  5.50
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  10
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.49
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.72
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.24
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.74
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.15

--------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.34
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.15

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                R U N O F F    H Y D R O G R A P H

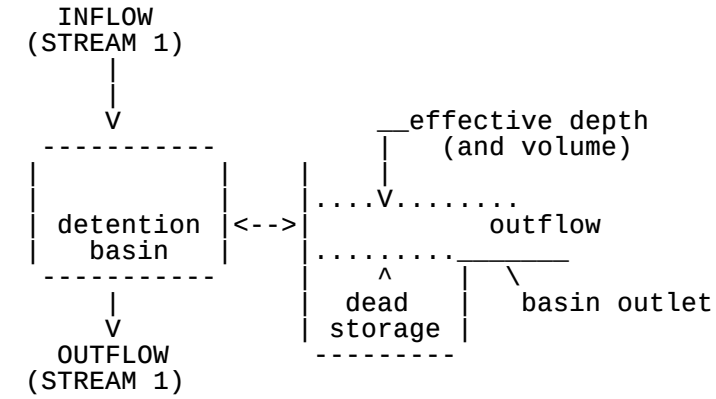
================================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        0.9       1.8       2.6       3.5
--------------------------------------------------------------------------------
   0.017      0.0000      0.00  Q         .         .         .         .
   0.033      0.0000      0.00  Q         .         .         .         .
   0.050      0.0000      0.00  Q         .         .         .         .
   0.067      0.0000      0.01  Q         .         .         .         .
   0.083      0.0000      0.02  Q         .         .         .         .
   0.100      0.0001      0.03  Q         .         .         .         .
```

```
  24.117      0.3442      0.04  Q         .         .         .        V.
  24.133      0.3442      0.03  Q         .         .         .        V.
  24.150      0.3442      0.01  Q         .         .         .        V.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 CLEARED AND SET TO ZERO<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE = 3.2
----------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
============================================================================
```




```
          ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
          THROUGH A FLOW-THROUGH DETENTION BASIN
          SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
            DEAD STORAGE(AF) =      0.349
            SPECIFIED DEAD STORAGE(AF) FILLED =      0.000
            SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET =      0.000
            DETENTION BASIN CONSTANT LOSS RATE(CFS) =    0.17


          BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

           INTERVAL    DEPTH      OUTFLOW     STORAGE
            NUMBER      (FT)       (CFS)       (AF)
                1       0.00        0.00       0.000
                2       0.25        0.24       0.010
                3       0.50        0.67       0.020
                4       0.75        0.82       0.029
                5       1.00        0.94       0.038
                6       1.25        1.06       0.047
                7       1.50        1.16       0.056


============================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
 (Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
        MEAN OUTFLOW is the average value during the unit interval.)

            CLOCK                                                  MEAN
             TIME  DEAD-STORAGE  INFLOW    LOSS   EFFECTIVE OUTFLOW  EFFECTIVE
```

```
         23.966        0.079     0.07     0.17      0.00      0.0      0.000
         23.983        0.078     0.07     0.17      0.00      0.0      0.000
         24.000        0.078     0.07     0.17      0.00      0.0      0.000
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      0.344 AF
    BASIN  STORAGE =      0.077 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      0.000 AF
    LOSS    VOLUME =      0.267 AF


********************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    134.00 IS CODE =   4
--------------------------------------------------------------------------------
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
================================================================================

***********
*****ERROR-STREAM  1 CONTAINS NO INFORMATION (EMPTY).
           PROCESS IS NEGATED.
***********



********************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE = 1.2
--------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
================================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    4.10
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.150
    LOW LOSS FRACTION = 0.242
    TIME OF CONCENTRATION(MIN.) =  8.30
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  10
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.49
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.72
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.24
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.74
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.15

--------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.74
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.33

--------------------------------------------------------------------------------

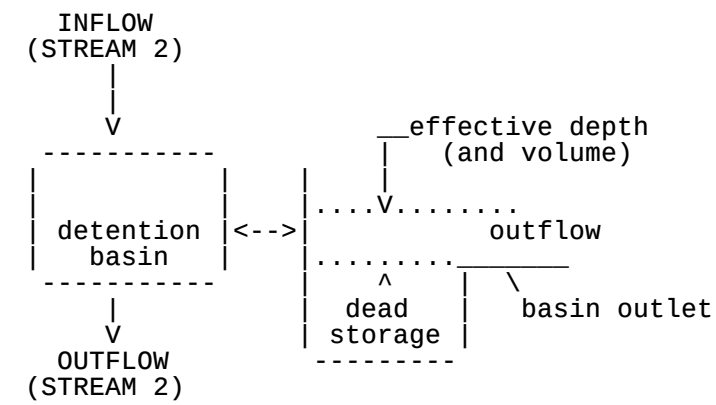
================================================================================

                    2 4 - H O U R    S T O R M
                R U N O F F    H Y D R O G R A P H

================================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        1.5       3.1       4.6       6.1
--------------------------------------------------------------------------------
   0.017      0.0000      0.01  Q         .         .         .         .
   0.033      0.0001      0.04  Q         .         .         .         .
   0.050      0.0002      0.07  Q         .         .         .         .
   0.067      0.0003      0.10  Q         .         .         .         .
   0.083      0.0005      0.13  Q         .         .         .         .
   0.100      0.0007      0.15  VQ        .         .         .         .
```

```
  24.117      0.7429      0.06  Q         .         .         .        V.
  24.133      0.7429      0.04  Q         .         .         .        V.
  24.150      0.7430      0.02  Q         .         .         .         V
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE = 3.2
----------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #2<<<<<
============================================================================
```




```
          ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 2
          THROUGH A FLOW-THROUGH DETENTION BASIN
          SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
            DEAD STORAGE(AF) =      0.518
            SPECIFIED DEAD STORAGE(AF) FILLED =      0.000
            SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET =      0.000
            DETENTION BASIN CONSTANT LOSS RATE(CFS) =    0.25


          BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

           INTERVAL    DEPTH      OUTFLOW     STORAGE
            NUMBER      (FT)       (CFS)       (AF)
                1       0.00        0.00       0.000
                2       0.25        0.24       0.015
                3       0.50        0.67       0.029
                4       0.75        0.82       0.043
                5       1.00        0.94       0.056
                6       1.25        1.06       0.069
                7       1.50        1.16       0.083
```

```
============================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
 (Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
        MEAN OUTFLOW is the average value during the unit interval.)

            CLOCK                                                    MEAN
             TIME  DEAD-STORAGE  INFLOW    LOSS   EFFECTIVE OUTFLOW  EFFECTIVE
            (HRS)   FILLED(AF)    (CFS)    (CFS)  DEPTH(FT)  (CFS)
VOLUME(AF)
 ---------------------------------------------------------------------------
            0.017        0.000     0.01     0.01      0.00      0.0      0.000
            0.033        0.000     0.04     0.06      0.00      0.0      0.000
            0.050        0.000     0.07     0.13      0.00      0.0      0.000
            0.067        0.000     0.10     0.23      0.00      0.0      0.000
            0.083        0.000     0.13     0.25      0.00      0.0      0.000
            0.100        0.000     0.15     0.25      0.00      0.0      0.000
            0.117        0.000     0.16     0.25      0.00      0.0      0.000
            0.133        0.000     0.16     0.25      0.00      0.0      0.000
            0.150        0.000     0.16     0.25      0.00      0.0      0.000
            0.167        0.000     0.16     0.25      0.00      0.0      0.000
            0.183        0.000     0.16     0.25      0.00      0.0      0.000
```

```
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #2<<<<<
================================================================================

**********
*****ERROR-STREAM  2 CONTAINS NO INFORMATION (EMPTY).
           PROCESS IS NEGATED.
**********



********************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    134.00 IS CODE = 1.2
--------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
================================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #3)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    3.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.150
    LOW LOSS FRACTION = 0.242
    TIME OF CONCENTRATION(MIN.) =  5.90
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  10
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.49
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.72
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.24
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.74
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.15

--------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.62
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.28

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                 R U N O F F    H Y D R O G R A P H

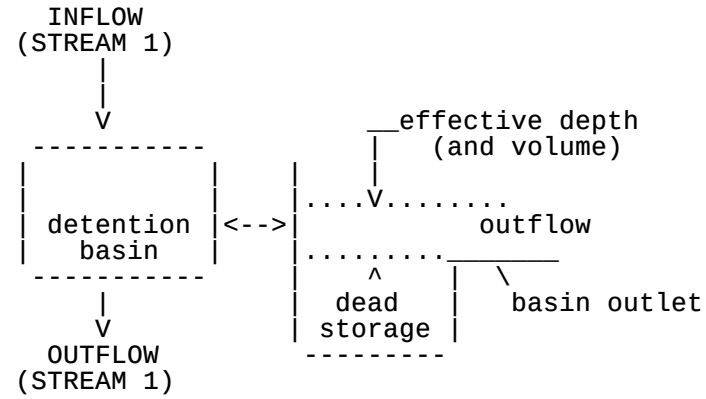
================================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        1.5       3.0       4.5       6.1
--------------------------------------------------------------------------------
   0.017      0.0000      0.00  Q         .         .         .         .
   0.033      0.0000      0.00  Q         .         .         .         .
   0.050      0.0000      0.00  Q         .         .         .         .
   0.067      0.0000      0.00  Q         .         .         .         .
   0.083      0.0000      0.01  Q         .         .         .         .
   0.100      0.0000      0.03  Q         .         .         .         .
   0.117      0.0001      0.05  Q         .         .         .         .
   0.133      0.0002      0.07  Q         .         .         .         .
   0.150      0.0004      0.10  Q         .         .         .         .
   0.167      0.0005      0.12  Q         .         .         .         .
   0.183      0.0007      0.13  Q         .         .         .         .
   0.200      0.0009      0.13  Q         .         .         .         .
   0.217      0.0011      0.13  Q         .         .         .         .
   0.233      0.0012      0.13  Q         .         .         .         .
   0.250      0.0014      0.13  Q         .         .         .         .
   0.267      0.0016      0.13  Q         .         .         .         .
   0.283      0.0018      0.13  Q         .         .         .         .
   0.300      0.0020      0.13  Q         .         .         .         .
   0.317      0.0021      0.13  Q         .         .         .         .
   0.333      0.0023      0.13  Q         .         .         .         .
```

```
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 3 CLEARED AND SET TO ZERO<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   6
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 CLEARED AND SET TO ZERO<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    135.00 IS CODE = 3.2
--------------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
================================================================================
```




```
         ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
         THROUGH A FLOW-THROUGH DETENTION BASIN
         SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
           DEAD STORAGE(AF) =      0.377
           SPECIFIED DEAD STORAGE(AF) FILLED =      0.000
           SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET =      0.000
           DETENTION BASIN CONSTANT LOSS RATE(CFS) =    0.21


         BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

          INTERVAL    DEPTH      OUTFLOW     STORAGE
           NUMBER      (FT)       (CFS)       (AF)
               1        0.00         0.00       0.000
               2        0.25         0.42       0.018
               3        0.50         1.56       0.034
               4        0.75         3.21       0.050
               5        1.00         5.07       0.062
               6        1.25         6.61       0.074
               7        1.50         7.24       0.084
               8        1.75         7.82       0.095
               9        2.00         8.36       0.106
              10        2.25         8.86       0.117


================================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
 (Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
        MEAN OUTFLOW is the average value during the unit interval.)
```

```
         23.916        0.237     0.13     0.21      0.00      0.0      0.000
         23.933        0.236     0.13     0.21      0.00      0.0      0.000
         23.950        0.236     0.13     0.21      0.00      0.0      0.000
         23.966        0.236     0.13     0.21      0.00      0.0      0.000
         23.983        0.236     0.13     0.21      0.00      0.0      0.000
         24.000        0.236     0.13     0.21      0.00      0.0      0.000
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      0.616 AF
    BASIN  STORAGE =      0.235 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      0.000 AF
    LOSS    VOLUME =      0.381 AF


********************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    136.00 IS CODE =   4
--------------------------------------------------------------------------------
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
================================================================================

**********
*****ERROR-STREAM  1 CONTAINS NO INFORMATION (EMPTY).
           PROCESS IS NEGATED.
**********



********************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    136.00 IS CODE =   6
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 CLEARED AND SET TO ZERO<<<<<
================================================================================
================================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

```
******************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==============================================================================
         (C) Copyright 1989-2003 Advanced Engineering Software (aes)
             Ver. 9.0  Release Date: 01/01/2003  License ID 1510

                              Analysis prepared by:

                              DRC Engineering, Inc.
                      160 South Old Springs Road, Suite 210
                         Anaheim Hills, California 92808
                      Tel: 714-685-6860 * Fax: 714-685-6801

******************************************************************************
------------------------------------------------------------------------------

 Problem Descriptions:
  LUGONIA VILLAGE - REDLANDS
  PROPOSED CONDITION - DA 2
  HYDROLOGIC ANALYSIS - 10-YEAR
==============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     3.15 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          4.60       35.00            56.       0.748       0.631

    TOTAL AREA (Acres) =      4.60

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.262

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.369
==============================================================================
```

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

            F L O O D    R O U T I N G    A N A L Y S I S
          USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
         (c) Copyright 1989-2003 Advanced Engineering Software (aes)
             Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                           Analysis prepared by:

                           DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 2                                             *
* HYDROLOGIC ANALYSIS - 10-YEAR                                         *
 ************************************************************************

  FILE NAME: 22112010.FLD
  TIME/DATE OF STUDY: 10:00 06/26/2023

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.20
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.262
    LOW LOSS FRACTION = 0.369
    TIME OF CONCENTRATION(MIN.) = 11.90
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  10
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.49
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.72
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.24
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.74
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.15

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.34
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.24

--------------------------------------------------------------------------

==========================================================================

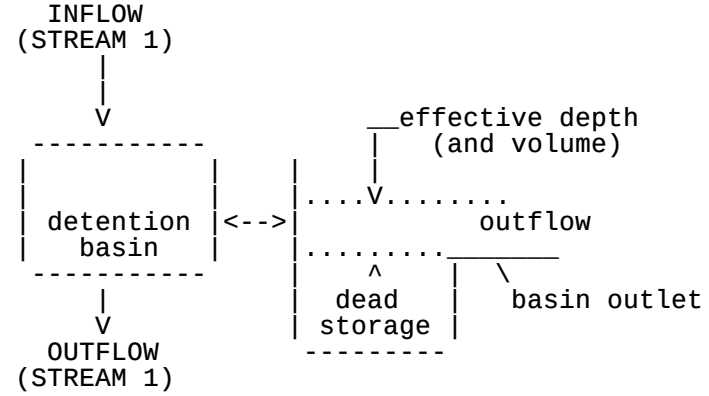
                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
         (Notes: Time indicated is at END of Each Unit Intervals.
                 Peak 5-minute rainfall intensity is modeled as
                 a constant value for entire 5-minute period.)
```

23.967	0.3336	0.07	.Q	.	.	.	V.
23.983	0.3337	0.07	.Q	.	.	.	V.
24.000	0.3338	0.07	.Q	.	.	.	V.
24.017	0.3339	0.07	.Q	.	.	.	V.
24.033	0.3340	0.07	.Q	.	.	.	V.
24.050	0.3341	0.07	.Q	.	.	.	V.
24.067	0.3342	0.07	.Q	.	.	.	V.
24.083	0.3343	0.07	.Q	.	.	.	V.
24.100	0.3344	0.07	.Q	.	.	.	V.
24.117	0.3345	0.07	.Q	.	.	.	V.
24.133	0.3345	0.07	.Q	.	.	.	V.
24.150	0.3346	0.07	.Q	.	.	.	V.
24.167	0.3347	0.06	Q	.	.	.	V.
24.183	0.3348	0.06	Q	.	.	.	V.
24.200	0.3349	0.05	Q	.	.	.	V.
24.217	0.3349	0.04	Q	.	.	.	V.
24.233	0.3350	0.04	Q	.	.	.	V.
24.250	0.3350	0.03	Q	.	.	.	V.
24.267	0.3351	0.03	Q	.	.	.	V.
24.283	0.3351	0.02	Q	.	.	.	V.
24.300	0.3351	0.01	Q	.	.	.	V.
24.317	0.3351	0.01	Q	.	.	.	V

****
FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.225
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.14

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.009
3	0.50	0.67	0.018
4	0.75	0.82	0.025
5	1.00	0.94	0.033
6	1.25	1.06	0.040
7	1.50	1.16	0.048

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):

```
         23.883        0.103     0.07     0.14      0.00      0.0      0.000
         23.900        0.103     0.07     0.14      0.00      0.0      0.000
         23.916        0.103     0.07     0.14      0.00      0.0      0.000
         23.933        0.103     0.07     0.14      0.00      0.0      0.000
         23.950        0.103     0.07     0.14      0.00      0.0      0.000
         23.966        0.103     0.07     0.14      0.00      0.0      0.000
         23.983        0.103     0.07     0.14      0.00      0.0      0.000
         24.000        0.103     0.07     0.14      0.00      0.0      0.000
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      0.335 AF
    BASIN  STORAGE =      0.100 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      0.000 AF
    LOSS    VOLUME =      0.235 AF


********************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    212.00 IS CODE =   4
--------------------------------------------------------------------------------
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
================================================================================

***********
*****ERROR-STREAM  1 CONTAINS NO INFORMATION (EMPTY).
           PROCESS IS NEGATED.
***********



********************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    212.00 IS CODE = 1.2
--------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
================================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.262
    LOW LOSS FRACTION = 0.369
    TIME OF CONCENTRATION(MIN.) = 11.70
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  10
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.49
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.72
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.24
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.74
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.15

--------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.37
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.26

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                R U N O F F    H Y D R O G R A P H

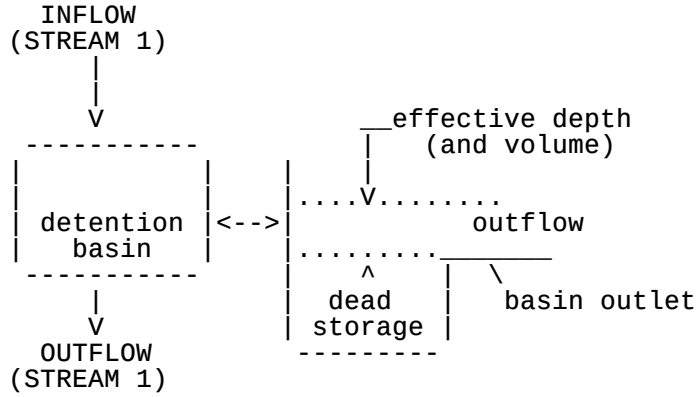
================================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        0.7       1.4       2.1       2.8
--------------------------------------------------------------------------------
   0.017      0.0000      0.00  Q         .         .         .         .
```

```
  24.033      0.3650      0.07  Q         .         .         .         V.
  24.050      0.3651      0.06  Q         .         .         .         V.
  24.067      0.3652      0.05  Q         .         .         .         V.
  24.083      0.3653      0.05  Q         .         .         .         V.
  24.100      0.3653      0.04  Q         .         .         .         V.
  24.117      0.3654      0.03  Q         .         .         .         V.
  24.133      0.3654      0.03  Q         .         .         .         V.
  24.150      0.3654      0.02  Q         .         .         .         V.
  24.167      0.3654      0.01  Q         .         .         .         V.
  24.183      0.3655      0.01  Q         .         .         .         V.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 CLEARED AND SET TO ZERO<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    213.00 IS CODE = 3.2
----------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
============================================================================
```




```
 ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
 THROUGH A FLOW-THROUGH DETENTION BASIN
 SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
   DEAD STORAGE(AF) =      0.225
   SPECIFIED DEAD STORAGE(AF) FILLED =      0.000
   SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET =      0.000
   DETENTION BASIN CONSTANT LOSS RATE(CFS) =    0.14


 BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

  INTERVAL    DEPTH      OUTFLOW     STORAGE
   NUMBER      (FT)       (CFS)       (AF)
       1       0.00        0.00       0.000
       2       0.25        0.24       0.009
       3       0.50        0.67       0.018
       4       0.75        0.82       0.025
       5       1.00        0.94       0.033
       6       1.25        1.06       0.040
       7       1.50        1.16       0.048
```

```
          23.850        0.126     0.08     0.14      0.00      0.0      0.000
          23.866        0.126     0.08     0.14      0.00      0.0      0.000
          23.883        0.126     0.08     0.14      0.00      0.0      0.000
          23.900        0.126     0.08     0.14      0.00      0.0      0.000
          23.916        0.126     0.08     0.14      0.00      0.0      0.000
          23.933        0.126     0.08     0.14      0.00      0.0      0.000
          23.950        0.126     0.08     0.14      0.00      0.0      0.000
          23.966        0.126     0.08     0.14      0.00      0.0      0.000
          23.983        0.126     0.08     0.14      0.00      0.0      0.000
          24.000        0.126     0.08     0.14      0.00      0.0      0.000
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      0.365 AF
    BASIN  STORAGE =      0.122 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      0.000 AF
    LOSS    VOLUME =      0.244 AF


********************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    214.00 IS CODE =   4
--------------------------------------------------------------------------------
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
================================================================================

***********
*****ERROR-STREAM  1 CONTAINS NO INFORMATION (EMPTY).
           PROCESS IS NEGATED.
***********



********************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =   6
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 CLEARED AND SET TO ZERO<<<<<
================================================================================
================================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

```
*****************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
=============================================================================
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             Ver. 9.0  Release Date: 01/01/2003  License ID 1510

                              Analysis prepared by:

                              DRC Engineering, Inc.
                      160 South Old Springs Road, Suite 210
                         Anaheim Hills, California 92808
                      Tel: 714-685-6860 * Fax: 714-685-6801

*****************************************************************************
-----------------------------------------------------------------------------

 Problem Descriptions:
  LUGONIA VILLAGE - REDLANDS
  PROPOSED CONDITION - DA 3
  HYDROLOGIC ANALYSIS - 10-YEAR
=============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     3.15 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          3.90       50.00            56.       0.748       0.505

    TOTAL AREA (Acres) =      3.90

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.374

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.495
=============================================================================
```

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

            F L O O D    R O U T I N G    A N A L Y S I S
          USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
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             Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                           Analysis prepared by:

                           DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 3                                             *
* HYDROLOGIC ANALYSIS - 10-YEAR                                         *
 ************************************************************************

  FILE NAME: 22113010.FLD
  TIME/DATE OF STUDY: 10:00 06/26/2023

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


******************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE = 1.2
------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.20
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.374
    LOW LOSS FRACTION = 0.495
    TIME OF CONCENTRATION(MIN.) = 12.10
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  10
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.49
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.72
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.24
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.74
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.15

------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.15
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.17

------------------------------------------------------------------------------

==============================================================================

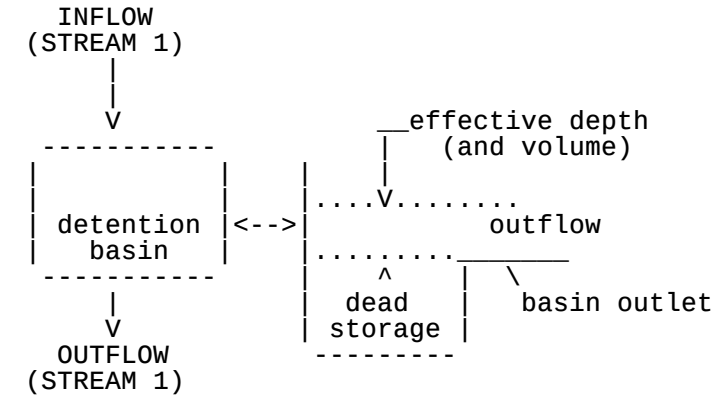
                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==============================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
         (Notes: Time indicated is at END of Each Unit Intervals.
                 Peak 5-minute rainfall intensity is modeled as
                 a constant value for entire 5-minute period.)
```

23.967	0.1484	0.03	.Q	.	.	.	V.
23.983	0.1484	0.03	.Q	.	.	.	V.
24.000	0.1485	0.03	.Q	.	.	.	V.
24.017	0.1485	0.03	.Q	.	.	.	V.
24.033	0.1485	0.03	.Q	.	.	.	V.
24.050	0.1486	0.03	.Q	.	.	.	V.
24.067	0.1486	0.03	.Q	.	.	.	V.
24.083	0.1487	0.03	Q	.	.	.	V.
24.100	0.1487	0.03	Q	.	.	.	V.
24.117	0.1487	0.02	Q	.	.	.	V.
24.133	0.1488	0.02	Q	.	.	.	V.
24.150	0.1488	0.02	Q	.	.	.	V.
24.167	0.1488	0.02	Q	.	.	.	V.
24.183	0.1488	0.01	Q	.	.	.	V.
24.200	0.1489	0.01	Q	.	.	.	V.
24.217	0.1489	0.01	Q	.	.	.	V.

****
FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.087
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.05

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.004
3	0.50	0.67	0.007
4	0.75	0.82	0.010
5	1.00	0.94	0.013
6	1.25	1.06	0.016
7	1.50	1.16	0.019

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE

```
         23.983        0.057     0.03     0.05      0.00      0.0      0.000
         24.000        0.056     0.03     0.05      0.00      0.0      0.000
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      0.149 AF
    BASIN  STORAGE =      0.056 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      0.000 AF
    LOSS    VOLUME =      0.093 AF


********************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =   4
--------------------------------------------------------------------------------
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
================================================================================

***********
*****ERROR-STREAM  1 CONTAINS NO INFORMATION (EMPTY).
           PROCESS IS NEGATED.
***********



********************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =   6
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 CLEARED AND SET TO ZERO<<<<<
================================================================================


********************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    312.00 IS CODE = 1.2
--------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
================================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.70
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.374
    LOW LOSS FRACTION = 0.495
    TIME OF CONCENTRATION(MIN.) = 20.70
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  10
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.49
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.72
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.24
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.74
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.15

--------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.33
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.37

--------------------------------------------------------------------------------

================================================================================

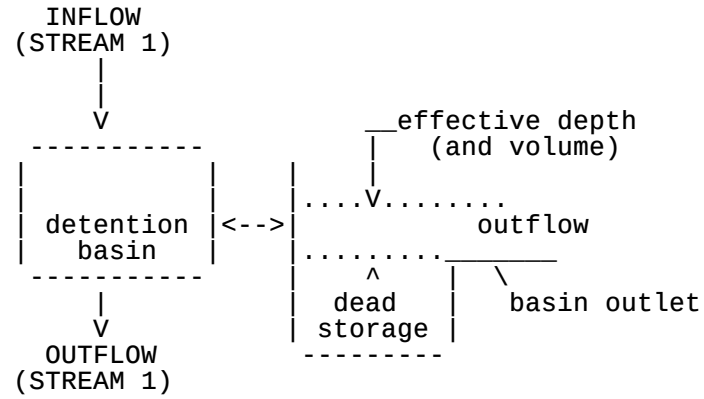
                    2 4 - H O U R    S T O R M
                R U N O F F    H Y D R O G R A P H

================================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        0.5       1.0       1.5       1.9
--------------------------------------------------------------------------------
```

24.017	0.3322	0.07	.Q	.	.	.	V.
24.033	0.3323	0.07	.Q	.	.	.	V.
24.050	0.3324	0.07	.Q	.	.	.	V.
24.067	0.3325	0.07	.Q	.	.	.	V.
24.083	0.3326	0.07	.Q	.	.	.	V.
24.100	0.3327	0.07	.Q	.	.	.	V.
24.117	0.3328	0.07	.Q	.	.	.	V.
24.133	0.3329	0.07	.Q	.	.	.	V.
24.150	0.3330	0.07	.Q	.	.	.	V.
24.167	0.3331	0.07	.Q	.	.	.	V.
24.183	0.3332	0.07	.Q	.	.	.	V.
24.200	0.3333	0.07	.Q	.	.	.	V.
24.217	0.3334	0.07	.Q	.	.	.	V.
24.233	0.3335	0.07	.Q	.	.	.	V.
24.250	0.3336	0.07	.Q	.	.	.	V.
24.267	0.3337	0.07	.Q	.	.	.	V.
24.283	0.3338	0.07	.Q	.	.	.	V.
24.300	0.3339	0.07	.Q	.	.	.	V.
24.317	0.3340	0.06	.Q	.	.	.	V.
24.333	0.3340	0.06	.Q	.	.	.	V.
24.350	0.3341	0.06	.Q	.	.	.	V.
24.367	0.3342	0.05	.Q	.	.	.	V.
24.383	0.3343	0.05	.Q	.	.	.	V.
24.400	0.3343	0.05	Q	.	.	.	V.
24.417	0.3344	0.04	Q	.	.	.	V.
24.433	0.3344	0.04	Q	.	.	.	V.
24.450	0.3345	0.04	Q	.	.	.	V.
24.467	0.3345	0.03	Q	.	.	.	V.
24.483	0.3346	0.03	Q	.	.	.	V.
24.500	0.3346	0.03	Q	.	.	.	V.
24.517	0.3347	0.02	Q	.	.	.	V.
24.533	0.3347	0.02	Q	.	.	.	V.
24.550	0.3347	0.02	Q	.	.	.	V.
24.567	0.3347	0.01	Q	.	.	.	V.
24.583	0.3347	0.01	Q	.	.	.	V.
24.600	0.3347	0.01	Q	.	.	.	V.

****
FLOW PROCESS FROM NODE 312.00 TO NODE 313.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.218
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.13

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.009
3	0.50	0.67	0.017
4	0.75	0.82	0.025
5	1.00	0.94	0.032
6	1.25	1.06	0.040
7	1.50	1.16	0.047

==========

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time; MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.017	0.000	0.00	0.00	0.00	0.0	0.000
0.033	0.000	0.00	0.00	0.00	0.0	0.000
0.050	0.000	0.00	0.00	0.00	0.0	0.000
0.067	0.000	0.00	0.00	0.00	0.0	0.000
0.083	0.000	0.00	0.00	0.00	0.0	0.000
0.100	0.000	0.00	0.00	0.00	0.0	0.000
0.117	0.000	0.00	0.00	0.00	0.0	0.000
0.133	0.000	0.00	0.00	0.00	0.0	0.000
0.150	0.000	0.00	0.00	0.00	0.0	0.000
0.167	0.000	0.01	0.01	0.00	0.0	0.000
0.183	0.000	0.01	0.02	0.00	0.0	0.000
0.200	0.000	0.01	0.03	0.00	0.0	0.000
0.217	0.000	0.02	0.05	0.00	0.0	0.000
0.233	0.000	0.02	0.06	0.00	0.0	0.000
0.250	0.000	0.02	0.09	0.00	0.0	0.000
0.267	0.000	0.03	0.11	0.00	0.0	0.000
0.283	0.000	0.03	0.13	0.00	0.0	0.000
0.300	0.000	0.03	0.13	0.00	0.0	0.000
0.317	0.000	0.04	0.13	0.00	0.0	0.000
0.333	0.000	0.04	0.13	0.00	0.0	0.000
0.350	0.000	0.04	0.13	0.00	0.0	0.000
0.367	0.000	0.05	0.13	0.00	0.0	0.000
0.383	0.000	0.05	0.13	0.00	0.0	0.000
0.400	0.000	0.05	0.13	0.00	0.0	0.000
0.417	0.000	0.06	0.13	0.00	0.0	0.000
0.433	0.000	0.06	0.13	0.00	0.0	0.000
0.450	0.000	0.06	0.13	0.00	0.0	0.000
0.467	0.000	0.07	0.13	0.00	0.0	0.000
0.483	0.000	0.07	0.13	0.00	0.0	0.000
0.500	0.000	0.07	0.13	0.00	0.0	0.000
0.517	0.000	0.07	0.13	0.00	0.0	0.000
0.533	0.000	0.07	0.13	0.00	0.0	0.000
0.550	0.000	0.07	0.13	0.00	0.0	0.000
0.567	0.000	0.07	0.13	0.00	0.0	0.000
0.583	0.000	0.07	0.13	0.00	0.0	0.000
0.600	0.000	0.07	0.13	0.00	0.0	0.000
0.617	0.000	0.07	0.13	0.00	0.0	0.000
0.633	0.000	0.07	0.13	0.00	0.0	0.000
0.650	0.000	0.07	0.13	0.00	0.0	0.000
0.667	0.000	0.07	0.13	0.00	0.0	0.000
0.683	0.000	0.07	0.13	0.00	0.0	0.000
0.700	0.000	0.07	0.13	0.00	0.0	0.000
0.717	0.000	0.07	0.13	0.00	0.0	0.000
0.733	0.000	0.07	0.13	0.00	0.0	0.000
0.750	0.000	0.07	0.13	0.00	0.0	0.000
0.767	0.000	0.07	0.13	0.00	0.0	0.000
0.783	0.000	0.07	0.13	0.00	0.0	0.000
0.800	0.000	0.07	0.13	0.00	0.0	0.000
0.817	0.000	0.07	0.13	0.00	0.0	0.000
0.833	0.000	0.07	0.13	0.00	0.0	0.000

```
          23.650        0.115     0.07     0.13      0.00      0.0      0.000
          23.666        0.115     0.07     0.13      0.00      0.0      0.000
          23.683        0.115     0.07     0.13      0.00      0.0      0.000
          23.700        0.115     0.07     0.13      0.00      0.0      0.000
          23.716        0.115     0.07     0.13      0.00      0.0      0.000
          23.733        0.114     0.07     0.13      0.00      0.0      0.000
          23.750        0.114     0.07     0.13      0.00      0.0      0.000
          23.766        0.114     0.07     0.13      0.00      0.0      0.000
          23.783        0.114     0.07     0.13      0.00      0.0      0.000
          23.800        0.114     0.07     0.13      0.00      0.0      0.000
          23.816        0.114     0.07     0.13      0.00      0.0      0.000
          23.833        0.114     0.07     0.13      0.00      0.0      0.000
          23.850        0.114     0.07     0.13      0.00      0.0      0.000
          23.866        0.114     0.07     0.13      0.00      0.0      0.000
          23.883        0.114     0.07     0.13      0.00      0.0      0.000
          23.900        0.114     0.07     0.13      0.00      0.0      0.000
          23.916        0.114     0.07     0.13      0.00      0.0      0.000
          23.933        0.114     0.07     0.13      0.00      0.0      0.000
          23.950        0.113     0.07     0.13      0.00      0.0      0.000
          23.966        0.113     0.07     0.13      0.00      0.0      0.000
          23.983        0.113     0.07     0.13      0.00      0.0      0.000
          24.000        0.113     0.07     0.13      0.00      0.0      0.000
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      0.335 AF
    BASIN  STORAGE =      0.109 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      0.000 AF
    LOSS    VOLUME =      0.226 AF


********************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =   4
--------------------------------------------------------------------------------
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
================================================================================

***********
*****ERROR-STREAM  1 CONTAINS NO INFORMATION (EMPTY).
           PROCESS IS NEGATED.
***********



********************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =   6
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 CLEARED AND SET TO ZERO<<<<<
================================================================================
================================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

```
*****************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
=============================================================================
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             Ver. 9.0  Release Date: 01/01/2003  License ID 1510

                              Analysis prepared by:

                              DRC Engineering, Inc.
                      160 South Old Springs Road, Suite 210
                         Anaheim Hills, California 92808
                      Tel: 714-685-6860 * Fax: 714-685-6801

*****************************************************************************
-----------------------------------------------------------------------------

 Problem Descriptions:
  LUGONIA VILLAGE - REDLANDS
  PROPOSED CONDITION - DA 1
  HYDROLOGIC ANALYSIS - 100-YEAR
=============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.83 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1         14.50       20.00       56.(AMC II)     0.423       0.761

    TOTAL AREA (Acres) =     14.50

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.085

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.239
=============================================================================
```

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

            F L O O D    R O U T I N G    A N A L Y S I S
          USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
         (c) Copyright 1989-2003 Advanced Engineering Software (aes)
             Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                           Analysis prepared by:

                           DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 1                                             *
* HYDROLOGIC ANALYSIS - 100-YEAR                                        *
 ************************************************************************

  FILE NAME: 22111100.FLD
  TIME/DATE OF STUDY: 16:00 08/08/2022

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    106.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    4.70
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.085
    LOW LOSS FRACTION = 0.239
    TIME OF CONCENTRATION(MIN.) = 11.40
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.30
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.77
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.12
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.92
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.83

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     1.36
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.53

--------------------------------------------------------------------------

==========================================================================

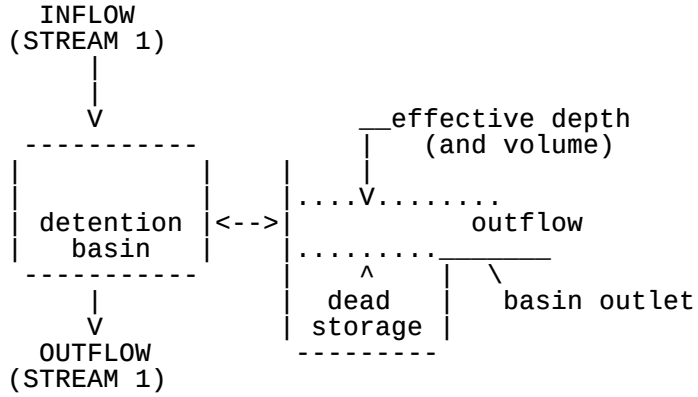
                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
         (Notes: Time indicated is at END of Each Unit Intervals.
                 Peak 5-minute rainfall intensity is modeled as
                 a constant value for entire 5-minute period.)
```

23.967	1.3538	0.28	.Q	.	.	.	V.
23.983	1.3541	0.28	.Q	.	.	.	V.
24.000	1.3545	0.28	.Q	.	.	.	V.
24.017	1.3549	0.28	.Q	.	.	.	V.
24.033	1.3553	0.28	.Q	.	.	.	V.
24.050	1.3557	0.28	.Q	.	.	.	V.
24.067	1.3561	0.28	.Q	.	.	.	V.
24.083	1.3564	0.28	.Q	.	.	.	V.
24.100	1.3568	0.28	.Q	.	.	.	V.
24.117	1.3572	0.28	.Q	.	.	.	V.
24.133	1.3576	0.28	.Q	.	.	.	V.
24.150	1.3580	0.28	.Q	.	.	.	V.
24.167	1.3583	0.28	.Q	.	.	.	V.
24.183	1.3587	0.27	.Q	.	.	.	V.
24.200	1.3591	0.24	Q	.	.	.	V.
24.217	1.3594	0.22	Q	.	.	.	V.
24.233	1.3596	0.20	Q	.	.	.	V.
24.250	1.3599	0.17	Q	.	.	.	V.
24.267	1.3601	0.15	Q	.	.	.	V.
24.283	1.3602	0.12	Q	.	.	.	V.
24.300	1.3604	0.10	Q	.	.	.	V.
24.317	1.3605	0.07	Q	.	.	.	V.
24.333	1.3605	0.05	Q	.	.	.	V.
24.350	1.3606	0.03	Q	.	.	.	V.

****
FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.584
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.28

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.017
3	0.50	0.67	0.033
4	0.75	0.82	0.048
5	1.00	0.94	0.063
6	1.25	1.06	0.078
7	1.50	1.16	0.093

23.816	0.584	0.28	0.28	0.02	0.0	0.002
23.833	0.584	0.28	0.28	0.02	0.0	0.002
23.850	0.584	0.28	0.28	0.02	0.0	0.002
23.866	0.584	0.28	0.28	0.02	0.0	0.002
23.883	0.584	0.28	0.28	0.02	0.0	0.002
23.900	0.584	0.28	0.28	0.02	0.0	0.002
23.916	0.584	0.28	0.28	0.02	0.0	0.002
23.933	0.584	0.28	0.28	0.02	0.0	0.001
23.950	0.584	0.28	0.28	0.02	0.0	0.001
23.966	0.584	0.28	0.28	0.02	0.0	0.001
23.983	0.584	0.28	0.28	0.02	0.0	0.001
24.000	0.584	0.28	0.28	0.02	0.0	0.001

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 1.361 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.214 AF
LOSS VOLUME = 1.147 AF

****

FLOW PROCESS FROM NODE 107.00 TO NODE 113.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<

==========

MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 441.00 MANNINGS FACTOR = 0.012
UPSTREAM ELEVATION(FT) = 2.21
DOWNSTREAM ELEVATION(FT) = 0.00
PIPE DIAMETER(FT) = 1.50

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
0.017	0.00	0.00	0.00	0.000
0.033	0.00	0.00	0.00	0.000
0.050	0.00	0.00	0.00	0.000
0.067	0.00	0.00	0.00	0.000
0.083	0.00	0.00	0.00	0.000
0.100	0.00	0.00	0.00	0.000
0.117	0.00	0.00	0.00	0.000
0.133	0.00	0.00	0.00	0.000
0.150	0.00	0.00	0.00	0.000
0.167	0.00	0.00	0.00	0.000
0.183	0.00	0.00	0.00	0.000
0.200	0.00	0.00	0.00	0.000
0.217	0.00	0.00	0.00	0.000
0.233	0.00	0.00	0.00	0.000
0.250	0.00	0.00	0.00	0.000
0.267	0.00	0.00	0.00	0.000
0.283	0.00	0.00	0.00	0.000
0.300	0.00	0.00	0.00	0.000
0.317	0.00	0.00	0.00	0.000
0.333	0.00	0.00	0.00	0.000
0.350	0.00	0.00	0.00	0.000
0.367	0.00	0.00	0.00	0.000
0.383	0.00	0.00	0.00	0.000
0.400	0.00	0.00	0.00	0.000
0.417	0.00	0.00	0.00	0.000

```
          23.233      0.04      0.50      0.05        0.000
          23.250      0.04      0.50      0.05        0.000
          23.267      0.04      0.50      0.05        0.000
          23.283      0.04      0.50      0.05        0.000
          23.300      0.04      0.50      0.05        0.000
          23.317      0.04      0.50      0.05        0.000
          23.333      0.04      0.50      0.05        0.000
          23.350      0.04      0.50      0.04        0.000
          23.367      0.04      0.50      0.04        0.000
          23.383      0.04      0.50      0.04        0.000
          23.400      0.04      0.50      0.04        0.000
          23.417      0.04      0.50      0.04        0.000
          23.433      0.03      0.50      0.04        0.000
          23.450      0.03      0.50      0.04        0.000
          23.467      0.03      0.50      0.04        0.000
          23.483      0.03      0.50      0.04        0.000
          23.500      0.03      0.50      0.04        0.000
          23.517      0.03      0.50      0.04        0.000
          23.533      0.03      0.50      0.04        0.000
          23.550      0.03      0.50      0.04        0.000
          23.567      0.03      0.50      0.04        0.000
          23.583      0.03      0.50      0.04        0.000
          23.600      0.03      0.50      0.04        0.000
          23.617      0.03      0.50      0.04        0.000
          23.633      0.03      0.50      0.04        0.000
          23.650      0.03      0.50      0.04        0.000
          23.667      0.03      0.50      0.03        0.000
          23.683      0.03      0.50      0.03        0.000
          23.700      0.03      0.50      0.03        0.000
          23.717      0.03      0.50      0.03        0.000
          23.733      0.03      0.50      0.03        0.000
          23.750      0.03      0.50      0.03        0.000
          23.767      0.03      0.50      0.03        0.000
          23.783      0.02      0.50      0.03        0.000
          23.800      0.02      0.50      0.03        0.000
          23.817      0.02      0.50      0.03        0.000
          23.833      0.02      0.50      0.03        0.000
          23.850      0.02      0.50      0.03        0.000
          23.867      0.02      0.50      0.03        0.000
          23.883      0.02      0.50      0.03        0.000
          23.900      0.02      0.50      0.03        0.000
          23.917      0.02      0.50      0.03        0.000
          23.933      0.02      0.50      0.03        0.000
          23.950      0.02      0.50      0.03        0.000
          23.967      0.02      0.50      0.03        0.000
          23.983      0.02      0.50      0.03        0.000
          24.000      0.02      0.50      0.03        0.000

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    113.00 IS CODE = 1.2
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.90
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.085
    LOW LOSS FRACTION = 0.239
    TIME OF CONCENTRATION(MIN.) =  5.50
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.30
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.77
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.12
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.92
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.83
```

```
--------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.55
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.22

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                R U N O F F    H Y D R O G R A P H

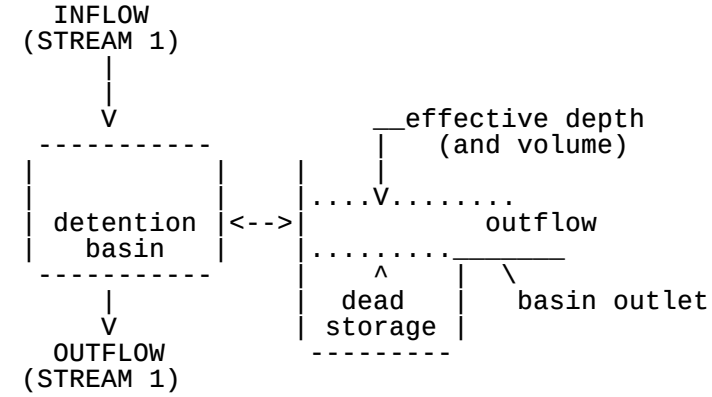
================================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        1.4       2.9       4.3       5.7
--------------------------------------------------------------------------------
   0.017      0.0000      0.00  Q         .         .         .         .
   0.033      0.0000      0.00  Q         .         .         .         .
   0.050      0.0000      0.00  Q         .         .         .         .
   0.067      0.0000      0.01  Q         .         .         .         .
   0.083      0.0001      0.03  Q         .         .         .         .
   0.100      0.0001      0.05  Q         .         .         .         .
   0.117      0.0002      0.07  Q         .         .         .         .
   0.133      0.0003      0.09  Q         .         .         .         .
   0.150      0.0005      0.11  Q         .         .         .         .
   0.167      0.0007      0.11  Q         .         .         .         .
   0.183      0.0008      0.11  Q         .         .         .         .
   0.200      0.0010      0.11  Q         .         .         .         .
   0.217      0.0011      0.11  Q         .         .         .         .
   0.233      0.0013      0.11  Q         .         .         .         .
   0.250      0.0014      0.11  Q         .         .         .         .
   0.267      0.0016      0.11  Q         .         .         .         .
   0.283      0.0017      0.11  Q         .         .         .         .
   0.300      0.0019      0.11  Q         .         .         .         .
   0.317      0.0020      0.11  Q         .         .         .         .
   0.333      0.0022      0.11  Q         .         .         .         .
   0.350      0.0024      0.11  Q         .         .         .         .
   0.367      0.0025      0.11  Q         .         .         .         .
   0.383      0.0027      0.11  Q         .         .         .         .
   0.400      0.0028      0.11  Q         .         .         .         .
   0.417      0.0030      0.11  Q         .         .         .         .
   0.433      0.0031      0.11  Q         .         .         .         .
   0.450      0.0033      0.11  Q         .         .         .         .
   0.467      0.0034      0.11  Q         .         .         .         .
   0.483      0.0036      0.11  Q         .         .         .         .
   0.500      0.0037      0.11  Q         .         .         .         .
   0.517      0.0039      0.11  Q         .         .         .         .
   0.533      0.0041      0.11  Q         .         .         .         .
   0.550      0.0042      0.11  Q         .         .         .         .
   0.567      0.0044      0.11  Q         .         .         .         .
   0.583      0.0045      0.11  Q         .         .         .         .
   0.600      0.0047      0.11  Q         .         .         .         .
   0.617      0.0048      0.11  Q         .         .         .         .
   0.633      0.0050      0.11  Q         .         .         .         .
   0.650      0.0052      0.11  Q         .         .         .         .
   0.667      0.0053      0.11  Q         .         .         .         .
   0.683      0.0055      0.11  Q         .         .         .         .
   0.700      0.0056      0.11  Q         .         .         .         .
   0.717      0.0058      0.11  Q         .         .         .         .
   0.733      0.0059      0.11  Q         .         .         .         .
   0.750      0.0061      0.11  Q         .         .         .         .
   0.767      0.0063      0.11  Q         .         .         .         .
   0.783      0.0064      0.11  Q         .         .         .         .
   0.800      0.0066      0.11  Q         .         .         .         .
   0.817      0.0067      0.11  Q         .         .         .         .
   0.833      0.0069      0.11  Q         .         .         .         .
   0.850      0.0070      0.11  Q         .         .         .         .
   0.867      0.0072      0.11  Q         .         .         .         .
   0.883      0.0074      0.11  Q         .         .         .         .
```

```
 23.700      0.5453      0.11  Q          .          .          .          V.
 23.717      0.5454      0.11  Q          .          .          .          V.
 23.733      0.5456      0.11  Q          .          .          .          V.
 23.750      0.5458      0.11  Q          .          .          .          V.
 23.767      0.5459      0.11  Q          .          .          .          V.
 23.783      0.5461      0.11  Q          .          .          .          V.
 23.800      0.5462      0.11  Q          .          .          .          V.
 23.817      0.5464      0.11  Q          .          .          .          V.
 23.833      0.5465      0.11  Q          .          .          .          V.
 23.850      0.5467      0.11  Q          .          .          .          V.
 23.867      0.5469      0.11  Q          .          .          .          V.
 23.883      0.5470      0.11  Q          .          .          .          V.
 23.900      0.5472      0.11  Q          .          .          .          V.
 23.917      0.5473      0.11  Q          .          .          .          V.
 23.933      0.5475      0.11  Q          .          .          .          V.
 23.950      0.5476      0.11  Q          .          .          .          V.
 23.967      0.5478      0.11  Q          .          .          .          V.
 23.983      0.5479      0.11  Q          .          .          .          V.
 24.000      0.5481      0.11  Q          .          .          .          V.
 24.017      0.5482      0.11  Q          .          .          .          V.
 24.033      0.5484      0.11  Q          .          .          .          V.
 24.050      0.5486      0.11  Q          .          .          .          V.
 24.067      0.5487      0.11  Q          .          .          .          V.
 24.083      0.5488      0.10  Q          .          .          .          V.
 24.100      0.5490      0.08  Q          .          .          .          V.
 24.117      0.5490      0.06  Q          .          .          .          V.
 24.133      0.5491      0.04  Q          .          .          .          V.
 24.150      0.5491      0.02  Q          .          .          .           V

********************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =   6
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 CLEARED AND SET TO ZERO<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE = 3.2
--------------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
================================================================================
```




```
        ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
        THROUGH A FLOW-THROUGH DETENTION BASIN
        SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
          DEAD STORAGE(AF) =      0.349
```

SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.17

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.010
3	0.50	0.67	0.020
4	0.75	0.82	0.029
5	1.00	0.94	0.038
6	1.25	1.06	0.047
7	1.50	1.16	0.056

==========

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time; MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.017	0.000	0.00	0.00	0.00	0.0	0.000
0.033	0.000	0.00	0.00	0.00	0.0	0.000
0.050	0.000	0.00	0.00	0.00	0.0	0.000
0.067	0.000	0.01	0.01	0.00	0.0	0.000
0.083	0.000	0.03	0.04	0.00	0.0	0.000
0.100	0.000	0.05	0.09	0.00	0.0	0.000
0.117	0.000	0.07	0.16	0.00	0.0	0.000
0.133	0.000	0.09	0.17	0.00	0.0	0.000
0.150	0.000	0.11	0.17	0.00	0.0	0.000
0.167	0.000	0.11	0.17	0.00	0.0	0.000
0.183	0.000	0.11	0.17	0.00	0.0	0.000
0.200	0.000	0.11	0.17	0.00	0.0	0.000
0.217	0.000	0.11	0.17	0.00	0.0	0.000
0.233	0.000	0.11	0.17	0.00	0.0	0.000
0.250	0.000	0.11	0.17	0.00	0.0	0.000
0.267	0.000	0.11	0.17	0.00	0.0	0.000
0.283	0.000	0.11	0.17	0.00	0.0	0.000
0.300	0.000	0.11	0.17	0.00	0.0	0.000
0.317	0.000	0.11	0.17	0.00	0.0	0.000
0.333	0.000	0.11	0.17	0.00	0.0	0.000
0.350	0.000	0.11	0.17	0.00	0.0	0.000
0.367	0.000	0.11	0.17	0.00	0.0	0.000
0.383	0.000	0.11	0.17	0.00	0.0	0.000
0.400	0.000	0.11	0.17	0.00	0.0	0.000
0.417	0.000	0.11	0.17	0.00	0.0	0.000
0.433	0.000	0.11	0.17	0.00	0.0	0.000
0.450	0.000	0.11	0.17	0.00	0.0	0.000
0.467	0.000	0.11	0.17	0.00	0.0	0.000
0.483	0.000	0.11	0.17	0.00	0.0	0.000
0.500	0.000	0.11	0.17	0.00	0.0	0.000
0.517	0.000	0.11	0.17	0.00	0.0	0.000
0.533	0.000	0.11	0.17	0.00	0.0	0.000
0.550	0.000	0.11	0.17	0.00	0.0	0.000
0.567	0.000	0.11	0.17	0.00	0.0	0.000
0.583	0.000	0.11	0.17	0.00	0.0	0.000
0.600	0.000	0.11	0.17	0.00	0.0	0.000
0.617	0.000	0.11	0.17	0.00	0.0	0.000
0.633	0.000	0.11	0.17	0.00	0.0	0.000
0.650	0.000	0.11	0.17	0.00	0.0	0.000
0.667	0.000	0.11	0.17	0.00	0.0	0.000
0.683	0.000	0.11	0.17	0.00	0.0	0.000
0.700	0.000	0.11	0.17	0.00	0.0	0.000
0.717	0.000	0.11	0.17	0.00	0.0	0.000
0.733	0.000	0.11	0.17	0.00	0.0	0.000

23.516	0.349	0.16	0.17	0.01	0.0	0.000
23.533	0.349	0.15	0.17	0.01	0.0	0.000
23.550	0.349	0.15	0.17	0.01	0.0	0.000
23.566	0.349	0.15	0.17	0.01	0.0	0.000
23.583	0.349	0.15	0.17	0.01	0.0	0.000
23.600	0.349	0.15	0.17	0.01	0.0	0.000
23.616	0.349	0.15	0.17	0.01	0.0	0.000
23.633	0.349	0.15	0.17	0.01	0.0	0.000
23.650	0.349	0.15	0.17	0.01	0.0	0.000
23.666	0.349	0.15	0.17	0.00	0.0	0.000
23.683	0.349	0.15	0.17	0.00	0.0	0.000
23.700	0.349	0.15	0.17	0.00	0.0	0.000
23.716	0.349	0.15	0.17	0.00	0.0	0.000
23.733	0.349	0.15	0.17	0.00	0.0	0.000
23.750	0.349	0.15	0.17	0.00	0.0	0.000
23.766	0.349	0.15	0.17	0.00	0.0	0.000
23.783	0.349	0.15	0.17	0.00	0.0	0.000
23.800	0.349	0.14	0.17	0.00	0.0	0.000
23.816	0.349	0.14	0.17	0.00	0.0	0.000
23.833	0.349	0.14	0.17	0.00	0.0	0.000
23.850	0.349	0.14	0.17	0.00	0.0	0.000
23.866	0.349	0.14	0.17	0.00	0.0	0.000
23.883	0.349	0.14	0.17	0.00	0.0	0.000
23.900	0.349	0.14	0.17	0.00	0.0	0.000
23.916	0.349	0.14	0.17	0.00	0.0	0.000
23.933	0.349	0.14	0.17	0.00	0.0	0.000
23.950	0.349	0.14	0.17	0.00	0.0	0.000
23.966	0.349	0.14	0.17	0.00	0.0	0.000
23.983	0.349	0.14	0.17	0.00	0.0	0.000
24.000	0.349	0.14	0.17	0.00	0.0	0.000

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.763 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.104 AF
LOSS VOLUME = 0.658 AF

****

FLOW PROCESS FROM NODE 114.00 TO NODE 134.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<

==========

MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 376.00 MANNINGS FACTOR = 0.012
UPSTREAM ELEVATION(FT) = 1.88
DOWNSTREAM ELEVATION(FT) = 0.00
PIPE DIAMETER(FT) = 1.50

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
0.017	0.00	0.00	0.00	0.000
0.033	0.00	0.00	0.00	0.000
0.050	0.00	0.00	0.00	0.000
0.067	0.00	0.00	0.00	0.000
0.083	0.00	0.00	0.00	0.000
0.100	0.00	0.00	0.00	0.000
0.117	0.00	0.00	0.00	0.000

22.933	0.04	0.50	0.05	0.000
22.950	0.04	0.50	0.05	0.000
22.967	0.04	0.50	0.05	0.000
22.983	0.04	0.50	0.05	0.000
23.000	0.03	0.50	0.04	0.000
23.017	0.03	0.50	0.04	0.000
23.033	0.03	0.50	0.04	0.000
23.050	0.03	0.50	0.04	0.000
23.067	0.03	0.50	0.04	0.000
23.083	0.03	0.50	0.04	0.000
23.100	0.03	0.50	0.04	0.000
23.117	0.03	0.50	0.04	0.000
23.133	0.03	0.50	0.04	0.000
23.150	0.03	0.50	0.04	0.000
23.167	0.03	0.50	0.04	0.000
23.183	0.03	0.50	0.04	0.000
23.200	0.03	0.50	0.03	0.000
23.217	0.02	0.50	0.03	0.000
23.233	0.02	0.50	0.03	0.000
23.250	0.02	0.50	0.03	0.000
23.267	0.02	0.50	0.03	0.000
23.283	0.02	0.50	0.03	0.000
23.300	0.02	0.50	0.03	0.000
23.317	0.02	0.50	0.03	0.000
23.333	0.02	0.50	0.03	0.000
23.350	0.02	0.50	0.03	0.000
23.367	0.02	0.50	0.03	0.000
23.383	0.02	0.50	0.03	0.000
23.400	0.02	0.50	0.03	0.000
23.417	0.02	0.50	0.02	0.000
23.433	0.01	0.50	0.02	0.000
23.450	0.01	0.50	0.02	0.000
23.467	0.01	0.50	0.02	0.000
23.483	0.01	0.50	0.02	0.000
23.500	0.01	0.50	0.02	0.000
23.517	0.01	0.50	0.02	0.000
23.533	0.01	0.50	0.02	0.000
23.550	0.01	0.50	0.02	0.000
23.567	0.01	0.50	0.02	0.000
23.583	0.01	0.50	0.02	0.000
23.600	0.01	0.50	0.02	0.000
23.617	0.01	0.50	0.02	0.000
23.633	0.01	0.50	0.01	0.000
23.650	0.01	0.50	0.01	0.000
23.667	0.00	0.50	0.01	0.000
23.683	0.00	0.50	0.01	0.000
23.700	0.00	0.50	0.01	0.000
23.717	0.00	0.50	0.01	0.000
23.733	0.00	0.50	0.01	0.000
23.750	0.00	0.00	0.01	0.000
23.767	0.00	0.00	0.01	0.000
23.783	0.00	0.00	0.01	0.000
23.800	0.00	0.00	0.01	0.000
23.817	0.00	0.00	0.01	0.000
23.833	0.00	0.00	0.01	0.000
23.850	0.00	0.00	0.01	0.000
23.867	0.00	0.00	0.00	0.000
23.883	0.00	0.00	0.00	0.000
23.900	0.00	0.00	0.00	0.000
23.917	0.00	0.00	0.00	0.000
23.933	0.00	0.00	0.00	0.000
23.950	0.00	0.00	0.00	0.000
23.967	0.00	0.00	0.00	0.000
23.983	0.00	0.00	0.00	0.000
24.000	0.00	0.00	0.00	0.000

```
****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE = 1.2
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================
```

(SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 4.10
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.085
LOW LOSS FRACTION = 0.239
TIME OF CONCENTRATION(MIN.) = 8.10
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED:
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.30
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.77
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.12
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.92
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.68
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.83

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.19
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.47

==========

2 4 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

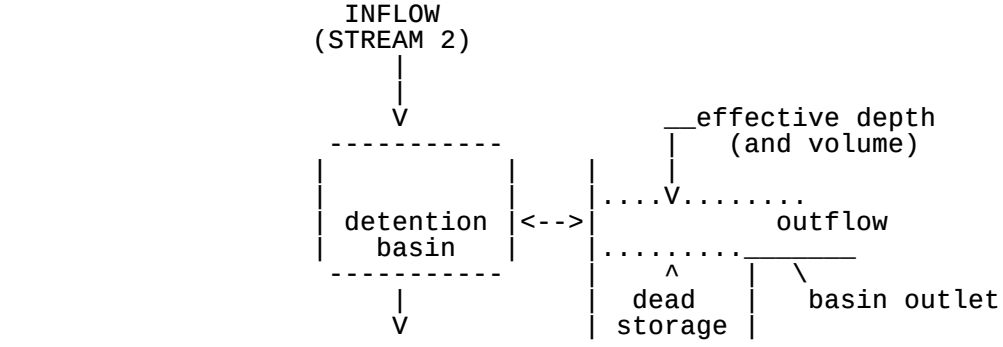
==========

HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.6	5.1	7.7	10.3
0.017	0.0000	0.00	Q	.	.	.	.
0.033	0.0000	0.00	Q	.	.	.	.
0.050	0.0000	0.00	Q	.	.	.	.
0.067	0.0000	0.00	Q	.	.	.	.
0.083	0.0000	0.01	Q	.	.	.	.
0.100	0.0001	0.04	Q	.	.	.	.
0.117	0.0002	0.07	Q	.	.	.	.
0.133	0.0003	0.10	Q	.	.	.	.
0.150	0.0005	0.13	Q	.	.	.	.
0.167	0.0007	0.16	Q	.	.	.	.
0.183	0.0009	0.19	Q	.	.	.	.
0.200	0.0012	0.22	Q	.	.	.	.
0.217	0.0016	0.24	Q	.	.	.	.
0.233	0.0019	0.24	Q	.	.	.	.
0.250	0.0022	0.24	Q	.	.	.	.
0.267	0.0026	0.24	Q	.	.	.	.
0.283	0.0029	0.24	Q	.	.	.	.
0.300	0.0032	0.24	Q	.	.	.	.
0.317	0.0036	0.24	Q	.	.	.	.
0.333	0.0039	0.24	Q	.	.	.	.
0.350	0.0042	0.24	Q	.	.	.	.
0.367	0.0046	0.24	Q	.	.	.	.
0.383	0.0049	0.24	Q	.	.	.	.
0.400	0.0052	0.24	Q	.	.	.	.
0.417	0.0056	0.24	Q	.	.	.	.
0.433	0.0059	0.24	Q	.	.	.	.
0.450	0.0062	0.24	Q	.	.	.	.
0.467	0.0066	0.24	Q	.	.	.	.
0.483	0.0069	0.24	Q	.	.	.	.
0.500	0.0073	0.24	Q	.	.	.	.
0.517	0.0076	0.24	Q	.	.	.	.
0.533	0.0079	0.24	Q	.	.	.	.
0.550	0.0083	0.24	Q	.	.	.	.
0.567	0.0086	0.24	Q	.	.	.	.
0.583	0.0089	0.24	Q	.	.	.	.

```
 23.400      1.1696      0.25  Q          .          .          .          V.
 23.417      1.1700      0.25  Q          .          .          .          V.
 23.433      1.1703      0.25  Q          .          .          .          V.
 23.450      1.1707      0.25  Q          .          .          .          V.
 23.467      1.1710      0.25  Q          .          .          .          V.
 23.483      1.1714      0.25  Q          .          .          .          V.
 23.500      1.1717      0.25  Q          .          .          .          V.
 23.517      1.1721      0.25  Q          .          .          .          V.
 23.533      1.1724      0.25  Q          .          .          .          V.
 23.550      1.1728      0.25  Q          .          .          .          V.
 23.567      1.1731      0.25  Q          .          .          .          V.
 23.583      1.1734      0.25  Q          .          .          .          V.
 23.600      1.1738      0.25  Q          .          .          .          V.
 23.617      1.1741      0.25  Q          .          .          .          V.
 23.633      1.1745      0.25  Q          .          .          .          V.
 23.650      1.1748      0.25  Q          .          .          .          V.
 23.667      1.1752      0.25  Q          .          .          .          V.
 23.683      1.1755      0.25  Q          .          .          .          V.
 23.700      1.1758      0.25  Q          .          .          .          V.
 23.717      1.1762      0.25  Q          .          .          .          V.
 23.733      1.1765      0.25  Q          .          .          .          V.
 23.750      1.1769      0.25  Q          .          .          .          V.
 23.767      1.1772      0.25  Q          .          .          .          V.
 23.783      1.1775      0.25  Q          .          .          .          V.
 23.800      1.1779      0.25  Q          .          .          .          V.
 23.817      1.1782      0.25  Q          .          .          .          V.
 23.833      1.1786      0.25  Q          .          .          .          V.
 23.850      1.1789      0.24  Q          .          .          .          V.
 23.867      1.1792      0.24  Q          .          .          .          V.
 23.883      1.1796      0.24  Q          .          .          .          V.
 23.900      1.1799      0.24  Q          .          .          .          V.
 23.917      1.1802      0.24  Q          .          .          .          V.
 23.933      1.1806      0.24  Q          .          .          .          V.
 23.950      1.1809      0.24  Q          .          .          .          V.
 23.967      1.1812      0.24  Q          .          .          .          V.
 23.983      1.1816      0.24  Q          .          .          .          V.
 24.000      1.1819      0.24  Q          .          .          .          V.
 24.017      1.1822      0.24  Q          .          .          .          V.
 24.033      1.1826      0.24  Q          .          .          .          V.
 24.050      1.1829      0.24  Q          .          .          .          V.
 24.067      1.1832      0.24  Q          .          .          .          V.
 24.083      1.1836      0.24  Q          .          .          .          V.
 24.100      1.1839      0.24  Q          .          .          .          V.
 24.117      1.1842      0.23  Q          .          .          .          V.
 24.133      1.1845      0.20  Q          .          .          .          V.
 24.150      1.1847      0.17  Q          .          .          .          V.
 24.167      1.1849      0.14  Q          .          .          .          V.
 24.183      1.1850      0.11  Q          .          .          .          V.
 24.200      1.1852      0.08  Q          .          .          .          V.
 24.217      1.1852      0.05  Q          .          .          .          V.
 24.233      1.1852      0.02  Q          .          .          .           V

**************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE = 3.2
--------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #2<<<<<
==========================================================================
```



OUTFLOW ---------
(STREAM 2)

ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 2
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.518
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.25

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.015
3	0.50	0.67	0.029
4	0.75	0.82	0.043
5	1.00	0.94	0.056
6	1.25	1.06	0.069
7	1.50	1.16	0.083

==========

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.017	0.000	0.00	0.00	0.00	0.0	0.000
0.033	0.000	0.00	0.00	0.00	0.0	0.000
0.050	0.000	0.00	0.00	0.00	0.0	0.000
0.067	0.000	0.00	0.00	0.00	0.0	0.000
0.083	0.000	0.01	0.01	0.00	0.0	0.000
0.100	0.000	0.04	0.05	0.00	0.0	0.000
0.117	0.000	0.07	0.12	0.00	0.0	0.000
0.133	0.000	0.10	0.21	0.00	0.0	0.000
0.150	0.000	0.13	0.25	0.00	0.0	0.000
0.167	0.000	0.16	0.25	0.00	0.0	0.000
0.183	0.000	0.19	0.25	0.00	0.0	0.000
0.200	0.000	0.22	0.25	0.00	0.0	0.000
0.217	0.000	0.24	0.25	0.00	0.0	0.000
0.233	0.000	0.24	0.25	0.00	0.0	0.000
0.250	0.000	0.24	0.25	0.00	0.0	0.000
0.267	0.000	0.24	0.25	0.00	0.0	0.000
0.283	0.000	0.24	0.25	0.00	0.0	0.000
0.300	0.000	0.24	0.25	0.00	0.0	0.000
0.317	0.000	0.24	0.25	0.00	0.0	0.000
0.333	0.000	0.24	0.25	0.00	0.0	0.000
0.350	0.000	0.24	0.25	0.00	0.0	0.000
0.367	0.000	0.24	0.25	0.00	0.0	0.000
0.383	0.000	0.24	0.25	0.00	0.0	0.000
0.400	0.000	0.24	0.25	0.00	0.0	0.000
0.417	0.000	0.24	0.25	0.00	0.0	0.000
0.433	0.000	0.24	0.25	0.00	0.0	0.000
0.450	0.000	0.24	0.25	0.00	0.0	0.000
0.467	0.000	0.24	0.25	0.00	0.0	0.000
0.483	0.000	0.24	0.25	0.00	0.0	0.000
0.500	0.000	0.24	0.25	0.00	0.0	0.000
0.517	0.000	0.24	0.25	0.00	0.0	0.000
0.533	0.000	0.24	0.25	0.00	0.0	0.000
0.550	0.000	0.24	0.25	0.00	0.0	0.000
0.567	0.000	0.24	0.25	0.00	0.0	0.000
0.583	0.000	0.24	0.25	0.00	0.0	0.000

23.366	0.518	0.25	0.25	0.03	0.0	0.002
23.383	0.518	0.25	0.25	0.03	0.0	0.002
23.400	0.518	0.25	0.25	0.02	0.0	0.001
23.416	0.518	0.25	0.25	0.02	0.0	0.001
23.433	0.518	0.25	0.25	0.02	0.0	0.001
23.450	0.518	0.25	0.25	0.02	0.0	0.001
23.466	0.518	0.25	0.25	0.02	0.0	0.001
23.483	0.518	0.25	0.25	0.02	0.0	0.001
23.500	0.518	0.25	0.25	0.02	0.0	0.001
23.516	0.518	0.25	0.25	0.02	0.0	0.001
23.533	0.518	0.25	0.25	0.02	0.0	0.001
23.550	0.518	0.25	0.25	0.02	0.0	0.001
23.566	0.518	0.25	0.25	0.02	0.0	0.001
23.583	0.518	0.25	0.25	0.02	0.0	0.001
23.600	0.518	0.25	0.25	0.02	0.0	0.001
23.616	0.518	0.25	0.25	0.02	0.0	0.001
23.633	0.518	0.25	0.25	0.02	0.0	0.001
23.650	0.518	0.25	0.25	0.02	0.0	0.001
23.666	0.518	0.25	0.25	0.02	0.0	0.001
23.683	0.518	0.25	0.25	0.02	0.0	0.001
23.700	0.518	0.25	0.25	0.02	0.0	0.001
23.716	0.518	0.25	0.25	0.02	0.0	0.001
23.733	0.518	0.25	0.25	0.02	0.0	0.001
23.750	0.518	0.25	0.25	0.02	0.0	0.001
23.766	0.518	0.25	0.25	0.02	0.0	0.001
23.783	0.518	0.25	0.25	0.02	0.0	0.001
23.800	0.518	0.25	0.25	0.01	0.0	0.001
23.816	0.518	0.25	0.25	0.01	0.0	0.001
23.833	0.518	0.25	0.25	0.01	0.0	0.001
23.850	0.518	0.24	0.25	0.01	0.0	0.001
23.866	0.518	0.24	0.25	0.01	0.0	0.001
23.883	0.518	0.24	0.25	0.01	0.0	0.001
23.900	0.518	0.24	0.25	0.01	0.0	0.001
23.916	0.518	0.24	0.25	0.01	0.0	0.001
23.933	0.518	0.24	0.25	0.01	0.0	0.001
23.950	0.518	0.24	0.25	0.01	0.0	0.001
23.966	0.518	0.24	0.25	0.01	0.0	0.001
23.983	0.518	0.24	0.25	0.01	0.0	0.001
24.000	0.518	0.24	0.25	0.01	0.0	0.001

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 1.185 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.173 AF
LOSS VOLUME = 1.013 AF

****

FLOW PROCESS FROM NODE 126.00 TO NODE 134.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #2<<<<<

==========

MODEL PIPEFLOW ROUTING OF STREAM 2 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 562.00 MANNINGS FACTOR = 0.012
UPSTREAM ELEVATION(FT) = 2.81
DOWNSTREAM ELEVATION(FT) = 0.00
PIPE DIAMETER(FT) = 1.50

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

```
         23.983      0.01      0.50      0.02        0.000
         24.000      0.01      0.50      0.02        0.000

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    134.00 IS CODE = 1.2
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #3)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    3.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.085
    LOW LOSS FRACTION = 0.239
    TIME OF CONCENTRATION(MIN.) =  5.80
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.30
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.77
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.12
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.92
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.83

----------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.98
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.39

----------------------------------------------------------------------------

============================================================================

                    2 4 - H O U R    S T O R M
                R U N O F F    H Y D R O G R A P H

============================================================================
             HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        2.5       5.0       7.5      10.0
----------------------------------------------------------------------------
   0.017      0.0000      0.03  Q         .         .         .         .
   0.033      0.0002      0.10  Q         .         .         .         .
   0.050      0.0004      0.17  Q         .         .         .         .
   0.067      0.0007      0.20  Q         .         .         .         .
   0.083      0.0010      0.20  Q         .         .         .         .
   0.100      0.0012      0.20  Q         .         .         .         .
   0.117      0.0015      0.20  Q         .         .         .         .
   0.133      0.0018      0.20  Q         .         .         .         .
   0.150      0.0021      0.20  Q         .         .         .         .
   0.167      0.0023      0.20  Q         .         .         .         .
   0.183      0.0026      0.20  Q         .         .         .         .
   0.200      0.0029      0.20  Q         .         .         .         .
   0.217      0.0032      0.20  Q         .         .         .         .
   0.233      0.0034      0.20  Q         .         .         .         .
   0.250      0.0037      0.20  Q         .         .         .         .
   0.267      0.0040      0.20  Q         .         .         .         .
   0.283      0.0043      0.20  Q         .         .         .         .
   0.300      0.0045      0.20  Q         .         .         .         .
   0.317      0.0048      0.20  Q         .         .         .         .
   0.333      0.0051      0.20  Q         .         .         .         .
   0.350      0.0054      0.20  Q         .         .         .         .
   0.367      0.0056      0.20  Q         .         .         .         .
   0.383      0.0059      0.20  Q         .         .         .         .
   0.400      0.0062      0.20  Q         .         .         .         .
   0.417      0.0065      0.20  Q         .         .         .         .
   0.433      0.0068      0.20  Q         .         .         .         .
```

```
  23.250      0.9693      0.21  Q          .          .          .          V.
  23.267      0.9695      0.21  Q          .          .          .          V.
  23.283      0.9698      0.21  Q          .          .          .          V.
  23.300      0.9701      0.21  Q          .          .          .          V.
  23.317      0.9704      0.21  Q          .          .          .          V.
  23.333      0.9707      0.21  Q          .          .          .          V.
  23.350      0.9710      0.21  Q          .          .          .          V.
  23.367      0.9713      0.21  Q          .          .          .          V.
  23.383      0.9716      0.21  Q          .          .          .          V.
  23.400      0.9719      0.21  Q          .          .          .          V.
  23.417      0.9722      0.21  Q          .          .          .          V.
  23.433      0.9724      0.21  Q          .          .          .          V.
  23.450      0.9727      0.21  Q          .          .          .          V.
  23.467      0.9730      0.21  Q          .          .          .          V.
  23.483      0.9733      0.21  Q          .          .          .          V.
  23.500      0.9736      0.21  Q          .          .          .          V.
  23.517      0.9739      0.21  Q          .          .          .          V.
  23.533      0.9742      0.21  Q          .          .          .          V.
  23.550      0.9744      0.21  Q          .          .          .          V.
  23.567      0.9747      0.21  Q          .          .          .          V.
  23.583      0.9750      0.21  Q          .          .          .          V.
  23.600      0.9753      0.21  Q          .          .          .          V.
  23.617      0.9756      0.21  Q          .          .          .          V.
  23.633      0.9759      0.21  Q          .          .          .          V.
  23.650      0.9762      0.21  Q          .          .          .          V.
  23.667      0.9764      0.21  Q          .          .          .          V.
  23.683      0.9767      0.21  Q          .          .          .          V.
  23.700      0.9770      0.20  Q          .          .          .          V.
  23.717      0.9773      0.20  Q          .          .          .          V.
  23.733      0.9776      0.20  Q          .          .          .          V.
  23.750      0.9778      0.20  Q          .          .          .          V.
  23.767      0.9781      0.20  Q          .          .          .          V.
  23.783      0.9784      0.20  Q          .          .          .          V.
  23.800      0.9787      0.20  Q          .          .          .          V.
  23.817      0.9790      0.20  Q          .          .          .          V.
  23.833      0.9792      0.20  Q          .          .          .          V.
  23.850      0.9795      0.20  Q          .          .          .          V.
  23.867      0.9798      0.20  Q          .          .          .          V.
  23.883      0.9801      0.20  Q          .          .          .          V.
  23.900      0.9804      0.20  Q          .          .          .          V.
  23.917      0.9806      0.20  Q          .          .          .          V.
  23.933      0.9809      0.20  Q          .          .          .          V.
  23.950      0.9812      0.20  Q          .          .          .          V.
  23.967      0.9815      0.20  Q          .          .          .          V.
  23.983      0.9817      0.20  Q          .          .          .          V.
  24.000      0.9820      0.20  Q          .          .          .          V.
  24.017      0.9823      0.20  Q          .          .          .          V.
  24.033      0.9826      0.19  Q          .          .          .          V.
  24.050      0.9828      0.16  Q          .          .          .          V.
  24.067      0.9830      0.13  Q          .          .          .          V.
  24.083      0.9831      0.09  Q          .          .          .          V.
  24.100      0.9832      0.06  Q          .          .          .          V.
  24.117      0.9832      0.02  Q          .          .          .           V

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 3 ADDED TO STREAM NUMBER 2<<<<<
============================================================================

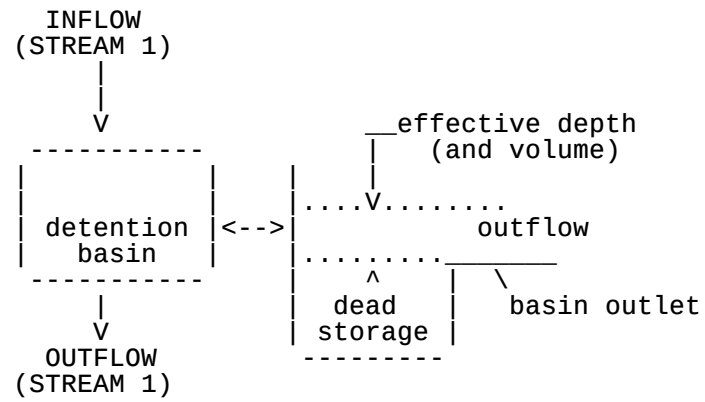
****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 3 CLEARED AND SET TO ZERO<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   7
----------------------------------------------------------------------------
```

```
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   6
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 CLEARED AND SET TO ZERO<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    135.00 IS CODE = 3.2
--------------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
================================================================================
```



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
  DEAD STORAGE(AF) = 0.377
  SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
  SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
  DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.21

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.42	0.018
3	0.50	1.56	0.034
4	0.75	3.21	0.050
5	1.00	5.07	0.062
6	1.25	6.61	0.074
7	1.50	7.24	0.084
8	1.75	7.82	0.095
9	2.00	8.36	0.106
10	2.25	8.86	0.117

```
================================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
 (Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
        MEAN OUTFLOW is the average value during the unit interval.)
```

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.017	0.000	0.03	0.03	0.00	0.0	0.000
0.033	0.000	0.10	0.13	0.00	0.0	0.000

```
------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      1.260 AF
    BASIN  STORAGE =      0.000 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      0.465 AF
    LOSS    VOLUME =      0.796 AF


******************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    136.00 IS CODE =   4
------------------------------------------------------------------------------
  >>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
==============================================================================

         MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
         STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
         VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
         EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
         OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
         UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
         (0.938)(DIAMETER):


         PIPELENGTH(FT) =     143.00     MANNINGS FACTOR = 0.012
         UPSTREAM ELEVATION(FT) =       0.72
         DOWNSTREAM ELEVATION(FT) =       0.00
         PIPE DIAMETER(FT) =   1.50


         NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

           TIME       INFLOW    VELOCITY    OUTFLOW     UPSTREAM
          (HRS)        (CFS)      (FPS)      (CFS)     PONDING(AF)
           0.017       0.00       0.00       0.00         0.000
           0.033       0.00       0.00       0.00         0.000
           0.050       0.00       0.00       0.00         0.000
           0.067       0.00       0.00       0.00         0.000
           0.083       0.00       0.00       0.00         0.000
           0.100       0.00       0.00       0.00         0.000
           0.117       0.00       0.00       0.00         0.000
           0.133       0.00       0.00       0.00         0.000
           0.150       0.00       0.00       0.00         0.000
           0.167       0.00       0.00       0.00         0.000
           0.183       0.00       0.00       0.00         0.000
           0.200       0.00       0.00       0.00         0.000
           0.217       0.00       0.00       0.00         0.000
           0.233       0.00       0.00       0.00         0.000
           0.250       0.00       0.00       0.00         0.000
           0.267       0.00       0.00       0.00         0.000
           0.283       0.00       0.00       0.00         0.000
           0.300       0.00       0.00       0.00         0.000
           0.317       0.00       0.00       0.00         0.000
           0.333       0.00       0.00       0.00         0.000
           0.350       0.00       0.00       0.00         0.000
           0.367       0.00       0.00       0.00         0.000
           0.383       0.00       0.00       0.00         0.000
           0.400       0.00       0.00       0.00         0.000
           0.417       0.00       0.00       0.00         0.000
           0.433       0.00       0.00       0.00         0.000
           0.450       0.00       0.00       0.00         0.000
           0.467       0.00       0.00       0.00         0.000
           0.483       0.00       0.00       0.00         0.000
           0.500       0.00       0.00       0.00         0.000
           0.517       0.00       0.00       0.00         0.000
           0.533       0.00       0.00       0.00         0.000
           0.550       0.00       0.00       0.00         0.000
           0.567       0.00       0.00       0.00         0.000
           0.583       0.00       0.00       0.00         0.000
           0.600       0.00       0.00       0.00         0.000
           0.617       0.00       0.00       0.00         0.000
```

23.433	0.10	0.61	0.10	0.000
23.450	0.10	0.60	0.10	0.000
23.467	0.10	0.59	0.10	0.000
23.483	0.10	0.58	0.10	0.000
23.500	0.10	0.57	0.10	0.000
23.517	0.10	0.56	0.10	0.000
23.533	0.09	0.55	0.10	0.000
23.550	0.09	0.54	0.09	0.000
23.567	0.09	0.53	0.09	0.000
23.583	0.09	0.52	0.09	0.000
23.600	0.09	0.52	0.09	0.000
23.617	0.09	0.51	0.09	0.000
23.633	0.08	0.50	0.08	0.000
23.650	0.08	0.50	0.08	0.000
23.667	0.08	0.50	0.08	0.000
23.683	0.08	0.50	0.08	0.000
23.700	0.08	0.50	0.08	0.000
23.717	0.08	0.50	0.08	0.000
23.733	0.08	0.50	0.08	0.000
23.750	0.07	0.50	0.08	0.000
23.767	0.07	0.50	0.08	0.000
23.783	0.07	0.50	0.08	0.000
23.800	0.07	0.50	0.08	0.000
23.817	0.07	0.50	0.07	0.000
23.833	0.07	0.50	0.07	0.000
23.850	0.06	0.50	0.07	0.000
23.867	0.06	0.50	0.07	0.000
23.883	0.06	0.50	0.07	0.000
23.900	0.06	0.50	0.07	0.000
23.917	0.06	0.50	0.07	0.000
23.933	0.06	0.50	0.06	0.000
23.950	0.06	0.50	0.06	0.000
23.967	0.05	0.50	0.06	0.000
23.983	0.05	0.50	0.06	0.000
24.000	0.05	0.50	0.06	0.000

```
**************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    136.00 IS CODE =   6
--------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 CLEARED AND SET TO ZERO<<<<<
==========================================================================
==========================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

```
*****************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
=============================================================================
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             Ver. 9.0  Release Date: 01/01/2003  License ID 1510

                              Analysis prepared by:

                              DRC Engineering, Inc.
                        160 South Old Springs Road, Suite 210
                           Anaheim Hills, California 92808
                        Tel: 714-685-6860 * Fax: 714-685-6801

*****************************************************************************
-----------------------------------------------------------------------------

 Problem Descriptions:
  LUGONIA VILLAGE - REDLANDS
  PROPOSED CONDITION - DA 2
  HYDROLOGIC ANALYSIS - 100-YEAR
=============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.83 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          4.60       35.00       56.(AMC II)     0.423       0.618

    TOTAL AREA (Acres) =      4.60

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.148

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.382
=============================================================================
```

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

            F L O O D    R O U T I N G    A N A L Y S I S
          USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
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             Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                           Analysis prepared by:

                           DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 2                                             *
* HYDROLOGIC ANALYSIS - 100-YEAR                                        *
 ************************************************************************

  FILE NAME: 22112100.FLD
  TIME/DATE OF STUDY: 10:00 06/26/2023

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.20
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.148
    LOW LOSS FRACTION = 0.382
    TIME OF CONCENTRATION(MIN.) = 11.90
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.30
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.77
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.12
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.92
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.83

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.54
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.35

--------------------------------------------------------------------------

==========================================================================

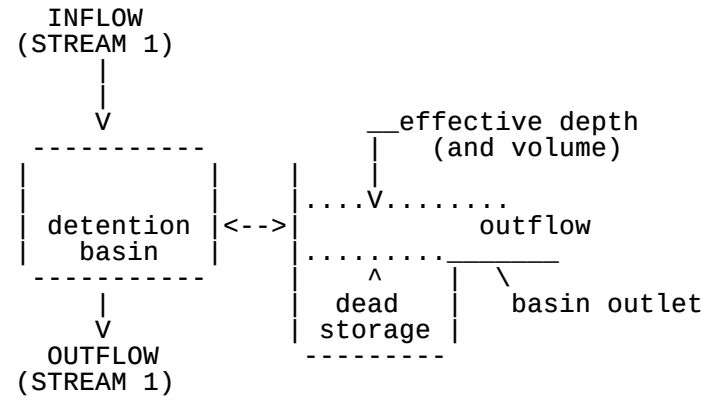
                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
         (Notes: Time indicated is at END of Each Unit Intervals.
                 Peak 5-minute rainfall intensity is modeled as
                 a constant value for entire 5-minute period.)
```

23.967	0.5362	0.11	Q	.	.	.	V.
23.983	0.5363	0.11	Q	.	.	.	V.
24.000	0.5365	0.11	Q	.	.	.	V.
24.017	0.5366	0.11	Q	.	.	.	V.
24.033	0.5368	0.11	Q	.	.	.	V.
24.050	0.5369	0.11	Q	.	.	.	V.
24.067	0.5371	0.11	Q	.	.	.	V.
24.083	0.5372	0.11	Q	.	.	.	V.
24.100	0.5374	0.11	Q	.	.	.	V.
24.117	0.5375	0.11	Q	.	.	.	V.
24.133	0.5376	0.10	Q	.	.	.	V.
24.150	0.5378	0.10	Q	.	.	.	V.
24.167	0.5379	0.09	Q	.	.	.	V.
24.183	0.5380	0.08	Q	.	.	.	V.
24.200	0.5381	0.07	Q	.	.	.	V.
24.217	0.5382	0.06	Q	.	.	.	V.
24.233	0.5383	0.06	Q	.	.	.	V.
24.250	0.5383	0.05	Q	.	.	.	V.
24.267	0.5384	0.04	Q	.	.	.	V.
24.283	0.5384	0.03	Q	.	.	.	V.
24.300	0.5385	0.02	Q	.	.	.	V.
24.317	0.5385	0.01	Q	.	.	.	V.

****
FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.225
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.14

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.009
3	0.50	0.67	0.018
4	0.75	0.82	0.025
5	1.00	0.94	0.033
6	1.25	1.06	0.040
7	1.50	1.16	0.048

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):

23.850	0.221	0.11	0.14	0.00	0.0	0.000
23.866	0.221	0.11	0.14	0.00	0.0	0.000
23.883	0.221	0.11	0.14	0.00	0.0	0.000
23.900	0.221	0.11	0.14	0.00	0.0	0.000
23.916	0.221	0.11	0.14	0.00	0.0	0.000
23.933	0.221	0.11	0.14	0.00	0.0	0.000
23.950	0.221	0.11	0.14	0.00	0.0	0.000
23.966	0.221	0.11	0.14	0.00	0.0	0.000
23.983	0.221	0.11	0.14	0.00	0.0	0.000
24.000	0.221	0.11	0.14	0.00	0.0	0.000

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.538 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.054 AF
LOSS VOLUME = 0.485 AF

****

FLOW PROCESS FROM NODE 203.00 TO NODE 212.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<

==========

MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 132.00 MANNINGS FACTOR = 0.012
UPSTREAM ELEVATION(FT) = 0.66
DOWNSTREAM ELEVATION(FT) = 0.00
PIPE DIAMETER(FT) = 1.50

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
0.017	0.00	0.00	0.00	0.000
0.033	0.00	0.00	0.00	0.000
0.050	0.00	0.00	0.00	0.000
0.067	0.00	0.00	0.00	0.000
0.083	0.00	0.00	0.00	0.000
0.100	0.00	0.00	0.00	0.000
0.117	0.00	0.00	0.00	0.000
0.133	0.00	0.00	0.00	0.000
0.150	0.00	0.00	0.00	0.000
0.167	0.00	0.00	0.00	0.000
0.183	0.00	0.00	0.00	0.000
0.200	0.00	0.00	0.00	0.000
0.217	0.00	0.00	0.00	0.000
0.233	0.00	0.00	0.00	0.000
0.250	0.00	0.00	0.00	0.000
0.267	0.00	0.00	0.00	0.000
0.283	0.00	0.00	0.00	0.000
0.300	0.00	0.00	0.00	0.000
0.317	0.00	0.00	0.00	0.000
0.333	0.00	0.00	0.00	0.000
0.350	0.00	0.00	0.00	0.000
0.367	0.00	0.00	0.00	0.000
0.383	0.00	0.00	0.00	0.000
0.400	0.00	0.00	0.00	0.000
0.417	0.00	0.00	0.00	0.000
0.433	0.00	0.00	0.00	0.000
0.450	0.00	0.00	0.00	0.000

23.267	0.00	0.00	0.00	0.000
23.283	0.00	0.00	0.00	0.000
23.300	0.00	0.00	0.00	0.000
23.317	0.00	0.00	0.00	0.000
23.333	0.00	0.00	0.00	0.000
23.350	0.00	0.00	0.00	0.000
23.367	0.00	0.00	0.00	0.000
23.383	0.00	0.00	0.00	0.000
23.400	0.00	0.00	0.00	0.000
23.417	0.00	0.00	0.00	0.000
23.433	0.00	0.00	0.00	0.000
23.450	0.00	0.00	0.00	0.000
23.467	0.00	0.00	0.00	0.000
23.483	0.00	0.00	0.00	0.000
23.500	0.00	0.00	0.00	0.000
23.517	0.00	0.00	0.00	0.000
23.533	0.00	0.00	0.00	0.000
23.550	0.00	0.00	0.00	0.000
23.567	0.00	0.00	0.00	0.000
23.583	0.00	0.00	0.00	0.000
23.600	0.00	0.00	0.00	0.000
23.617	0.00	0.00	0.00	0.000
23.633	0.00	0.00	0.00	0.000
23.650	0.00	0.00	0.00	0.000
23.667	0.00	0.00	0.00	0.000
23.683	0.00	0.00	0.00	0.000
23.700	0.00	0.00	0.00	0.000
23.717	0.00	0.00	0.00	0.000
23.733	0.00	0.00	0.00	0.000
23.750	0.00	0.00	0.00	0.000
23.767	0.00	0.00	0.00	0.000
23.783	0.00	0.00	0.00	0.000
23.800	0.00	0.00	0.00	0.000
23.817	0.00	0.00	0.00	0.000
23.833	0.00	0.00	0.00	0.000
23.850	0.00	0.00	0.00	0.000
23.867	0.00	0.00	0.00	0.000
23.883	0.00	0.00	0.00	0.000
23.900	0.00	0.00	0.00	0.000
23.917	0.00	0.00	0.00	0.000
23.933	0.00	0.00	0.00	0.000
23.950	0.00	0.00	0.00	0.000
23.967	0.00	0.00	0.00	0.000
23.983	0.00	0.00	0.00	0.000
24.000	0.00	0.00	0.00	0.000

```
****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    212.00 IS CODE = 1.2
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.148
    LOW LOSS FRACTION = 0.382
    TIME OF CONCENTRATION(MIN.) = 11.70
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.30
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.77
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.12
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.92
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.83

----------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.59
```

TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.38

==========

2 4 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

==========

HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.2	2.4	3.7	4.9
0.017	0.0000	0.00	Q	.	.	.	.
0.033	0.0000	0.01	Q	.	.	.	.
0.050	0.0000	0.02	Q	.	.	.	.
0.067	0.0001	0.03	Q	.	.	.	.
0.083	0.0001	0.04	Q	.	.	.	.
0.100	0.0002	0.05	Q	.	.	.	.
0.117	0.0003	0.06	Q	.	.	.	.
0.133	0.0004	0.07	Q	.	.	.	.
0.150	0.0005	0.08	Q	.	.	.	.
0.167	0.0006	0.09	Q	.	.	.	.
0.183	0.0007	0.10	Q	.	.	.	.
0.200	0.0009	0.11	Q	.	.	.	.
0.217	0.0010	0.11	Q	.	.	.	.
0.233	0.0012	0.11	Q	.	.	.	.
0.250	0.0013	0.11	Q	.	.	.	.
0.267	0.0015	0.11	Q	.	.	.	.
0.283	0.0017	0.11	Q	.	.	.	.
0.300	0.0018	0.11	Q	.	.	.	.
0.317	0.0020	0.11	Q	.	.	.	.
0.333	0.0021	0.11	Q	.	.	.	.
0.350	0.0023	0.11	Q	.	.	.	.
0.367	0.0025	0.11	Q	.	.	.	.
0.383	0.0026	0.11	Q	.	.	.	.
0.400	0.0028	0.11	Q	.	.	.	.
0.417	0.0029	0.12	Q	.	.	.	.
0.433	0.0031	0.12	Q	.	.	.	.
0.450	0.0032	0.12	Q	.	.	.	.
0.467	0.0034	0.12	Q	.	.	.	.
0.483	0.0036	0.12	Q	.	.	.	.
0.500	0.0037	0.12	Q	.	.	.	.
0.517	0.0039	0.12	Q	.	.	.	.
0.533	0.0040	0.12	Q	.	.	.	.
0.550	0.0042	0.12	Q	.	.	.	.
0.567	0.0044	0.12	Q	.	.	.	.
0.583	0.0045	0.12	Q	.	.	.	.
0.600	0.0047	0.12	Q	.	.	.	.
0.617	0.0048	0.12	Q	.	.	.	.
0.633	0.0050	0.12	Q	.	.	.	.
0.650	0.0052	0.12	Q	.	.	.	.
0.667	0.0053	0.12	Q	.	.	.	.
0.683	0.0055	0.12	Q	.	.	.	.
0.700	0.0056	0.12	Q	.	.	.	.
0.717	0.0058	0.12	Q	.	.	.	.
0.733	0.0060	0.12	Q	.	.	.	.
0.750	0.0061	0.12	Q	.	.	.	.
0.767	0.0063	0.12	Q	.	.	.	.
0.783	0.0064	0.12	Q	.	.	.	.
0.800	0.0066	0.12	Q	.	.	.	.
0.817	0.0068	0.12	Q	.	.	.	.
0.833	0.0069	0.12	Q	.	.	.	.
0.850	0.0071	0.12	Q	.	.	.	.
0.867	0.0072	0.12	Q	.	.	.	.
0.883	0.0074	0.12	Q	.	.	.	.
0.900	0.0076	0.12	Q	.	.	.	.
0.917	0.0077	0.12	Q	.	.	.	.

23.733	0.5838	0.12	Q	.	.	.	V.
23.750	0.5840	0.12	Q	.	.	.	V.
23.767	0.5841	0.12	Q	.	.	.	V.
23.783	0.5843	0.12	Q	.	.	.	V.
23.800	0.5845	0.12	Q	.	.	.	V.
23.817	0.5846	0.12	Q	.	.	.	V.
23.833	0.5848	0.12	Q	.	.	.	V.
23.850	0.5850	0.12	Q	.	.	.	V.
23.867	0.5851	0.12	Q	.	.	.	V.
23.883	0.5853	0.12	Q	.	.	.	V.
23.900	0.5854	0.12	Q	.	.	.	V.
23.917	0.5856	0.12	Q	.	.	.	V.
23.933	0.5858	0.12	Q	.	.	.	V.
23.950	0.5859	0.12	Q	.	.	.	V.
23.967	0.5861	0.12	Q	.	.	.	V.
23.983	0.5862	0.12	Q	.	.	.	V.
24.000	0.5864	0.12	Q	.	.	.	V.
24.017	0.5865	0.11	Q	.	.	.	V.
24.033	0.5867	0.10	Q	.	.	.	V.
24.050	0.5868	0.09	Q	.	.	.	V.
24.067	0.5869	0.08	Q	.	.	.	V.
24.083	0.5870	0.07	Q	.	.	.	V.
24.100	0.5871	0.06	Q	.	.	.	V.
24.117	0.5871	0.05	Q	.	.	.	V.
24.133	0.5872	0.04	Q	.	.	.	V.
24.150	0.5872	0.03	Q	.	.	.	V.
24.167	0.5873	0.02	Q	.	.	.	V.
24.183	0.5873	0.01	Q	.	.	.	V.

****
FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 7

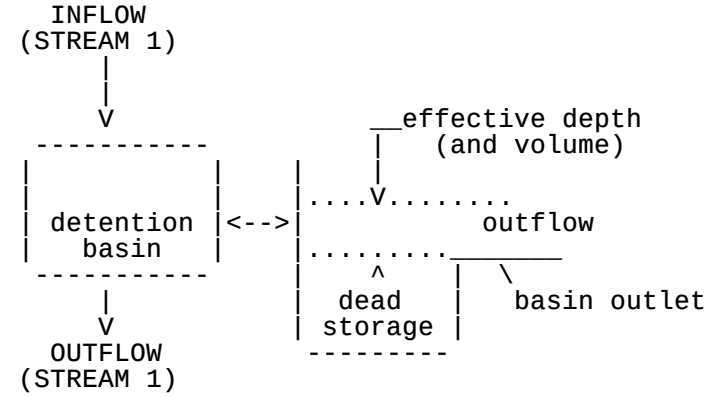
>>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
==========

****
FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 6

>>>>>STREAM NUMBER 2 CLEARED AND SET TO ZERO<<<<<
==========

****
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.225

SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.14

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.009
3	0.50	0.67	0.018
4	0.75	0.82	0.025
5	1.00	0.94	0.033
6	1.25	1.06	0.040
7	1.50	1.16	0.048

==========

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time; MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.017	0.000	0.00	0.00	0.00	0.0	0.000
0.033	0.000	0.01	0.01	0.00	0.0	0.000
0.050	0.000	0.02	0.03	0.00	0.0	0.000
0.067	0.000	0.03	0.06	0.00	0.0	0.000
0.083	0.000	0.04	0.09	0.00	0.0	0.000
0.100	0.000	0.05	0.14	0.00	0.0	0.000
0.117	0.000	0.06	0.14	0.00	0.0	0.000
0.133	0.000	0.07	0.14	0.00	0.0	0.000
0.150	0.000	0.08	0.14	0.00	0.0	0.000
0.167	0.000	0.09	0.14	0.00	0.0	0.000
0.183	0.000	0.10	0.14	0.00	0.0	0.000
0.200	0.000	0.11	0.14	0.00	0.0	0.000
0.217	0.000	0.11	0.14	0.00	0.0	0.000
0.233	0.000	0.11	0.14	0.00	0.0	0.000
0.250	0.000	0.11	0.14	0.00	0.0	0.000
0.267	0.000	0.11	0.14	0.00	0.0	0.000
0.283	0.000	0.11	0.14	0.00	0.0	0.000
0.300	0.000	0.11	0.14	0.00	0.0	0.000
0.317	0.000	0.11	0.14	0.00	0.0	0.000
0.333	0.000	0.11	0.14	0.00	0.0	0.000
0.350	0.000	0.11	0.14	0.00	0.0	0.000
0.367	0.000	0.11	0.14	0.00	0.0	0.000
0.383	0.000	0.11	0.14	0.00	0.0	0.000
0.400	0.000	0.11	0.14	0.00	0.0	0.000
0.417	0.000	0.12	0.14	0.00	0.0	0.000
0.433	0.000	0.12	0.14	0.00	0.0	0.000
0.450	0.000	0.12	0.14	0.00	0.0	0.000
0.467	0.000	0.12	0.14	0.00	0.0	0.000
0.483	0.000	0.12	0.14	0.00	0.0	0.000
0.500	0.000	0.12	0.14	0.00	0.0	0.000
0.517	0.000	0.12	0.14	0.00	0.0	0.000
0.533	0.000	0.12	0.14	0.00	0.0	0.000
0.550	0.000	0.12	0.14	0.00	0.0	0.000
0.567	0.000	0.12	0.14	0.00	0.0	0.000
0.583	0.000	0.12	0.14	0.00	0.0	0.000
0.600	0.000	0.12	0.14	0.00	0.0	0.000
0.617	0.000	0.12	0.14	0.00	0.0	0.000
0.633	0.000	0.12	0.14	0.00	0.0	0.000
0.650	0.000	0.12	0.14	0.00	0.0	0.000
0.667	0.000	0.12	0.14	0.00	0.0	0.000
0.683	0.000	0.12	0.14	0.00	0.0	0.000
0.700	0.000	0.12	0.14	0.00	0.0	0.000
0.717	0.000	0.12	0.14	0.00	0.0	0.000
0.733	0.000	0.12	0.14	0.00	0.0	0.000

23.516	0.224	0.12	0.14	0.00	0.0	0.000
23.533	0.224	0.12	0.14	0.00	0.0	0.000
23.550	0.224	0.12	0.14	0.00	0.0	0.000
23.566	0.224	0.12	0.14	0.00	0.0	0.000
23.583	0.224	0.12	0.14	0.00	0.0	0.000
23.600	0.224	0.12	0.14	0.00	0.0	0.000
23.616	0.224	0.12	0.14	0.00	0.0	0.000
23.633	0.224	0.12	0.14	0.00	0.0	0.000
23.650	0.224	0.12	0.14	0.00	0.0	0.000
23.666	0.224	0.12	0.14	0.00	0.0	0.000
23.683	0.224	0.12	0.14	0.00	0.0	0.000
23.700	0.224	0.12	0.14	0.00	0.0	0.000
23.716	0.224	0.12	0.14	0.00	0.0	0.000
23.733	0.224	0.12	0.14	0.00	0.0	0.000
23.750	0.224	0.12	0.14	0.00	0.0	0.000
23.766	0.224	0.12	0.14	0.00	0.0	0.000
23.783	0.223	0.12	0.14	0.00	0.0	0.000
23.800	0.223	0.12	0.14	0.00	0.0	0.000
23.816	0.223	0.12	0.14	0.00	0.0	0.000
23.833	0.223	0.12	0.14	0.00	0.0	0.000
23.850	0.223	0.12	0.14	0.00	0.0	0.000
23.866	0.223	0.12	0.14	0.00	0.0	0.000
23.883	0.223	0.12	0.14	0.00	0.0	0.000
23.900	0.223	0.12	0.14	0.00	0.0	0.000
23.916	0.223	0.12	0.14	0.00	0.0	0.000
23.933	0.223	0.12	0.14	0.00	0.0	0.000
23.950	0.223	0.12	0.14	0.00	0.0	0.000
23.966	0.223	0.12	0.14	0.00	0.0	0.000
23.983	0.223	0.12	0.14	0.00	0.0	0.000
24.000	0.223	0.12	0.14	0.00	0.0	0.000

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.641 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.150 AF
LOSS VOLUME = 0.492 AF

****

FLOW PROCESS FROM NODE 213.00 TO NODE 214.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<

==========

MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 111.00 MANNINGS FACTOR = 0.012
UPSTREAM ELEVATION(FT) = 0.56
DOWNSTREAM ELEVATION(FT) = 0.00
PIPE DIAMETER(FT) = 1.50

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
0.017	0.00	0.00	0.00	0.000
0.033	0.00	0.00	0.00	0.000
0.050	0.00	0.00	0.00	0.000
0.067	0.00	0.00	0.00	0.000
0.083	0.00	0.00	0.00	0.000
0.100	0.00	0.00	0.00	0.000
0.117	0.00	0.00	0.00	0.000

```
******************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==============================================================================
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             Ver. 9.0  Release Date: 01/01/2003  License ID 1510

                              Analysis prepared by:

                              DRC Engineering, Inc.
                      160 South Old Springs Road, Suite 210
                         Anaheim Hills, California 92808
                      Tel: 714-685-6860 * Fax: 714-685-6801

******************************************************************************
------------------------------------------------------------------------------

 Problem Descriptions:
  LUGONIA VILLAGE - REDLANDS
  PROPOSED CONDITION - DA 3
  HYDROLOGIC ANALYSIS - 100-YEAR
==============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.83 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          3.90       50.00       56.(AMC II)     0.423       0.476

    TOTAL AREA (Acres) =      3.90

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.212

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.524
==============================================================================
```

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**************************************************************************

            F L O O D    R O U T I N G    A N A L Y S I S
          USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
         (c) Copyright 1989-2003 Advanced Engineering Software (aes)
             Ver. 8.0  Release Date: 01/01/2003  License ID 1510

                           Analysis prepared by:

                           DRC Engineering, Inc.
                    160 South Old Springs Road, Suite 210
                       Anaheim Hills, California 92808
                    Tel: 714-685-6860 * Fax: 714-685-6801

 ************************* DESCRIPTION OF STUDY *************************
* LUGONIA VILLAGE - REDLANDS                                            *
* PROPOSED CONDITION - DA 3                                             *
* HYDROLOGIC ANALYSIS - 100-YEAR                                        *
 ************************************************************************

  FILE NAME: 22113100.FLD
  TIME/DATE OF STUDY: 10:00 06/26/2023

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.20
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.212
    LOW LOSS FRACTION = 0.524
    TIME OF CONCENTRATION(MIN.) = 12.10
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.30
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.77
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.12
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.92
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.83

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.24
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.24

--------------------------------------------------------------------------

==========================================================================

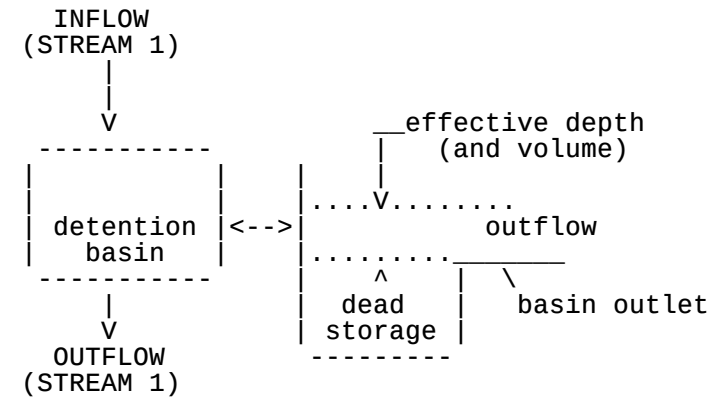
                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
         (Notes: Time indicated is at END of Each Unit Intervals.
                 Peak 5-minute rainfall intensity is modeled as
                 a constant value for entire 5-minute period.)
```

23.967	0.2405	0.04	Q	.	.	.	V.
23.983	0.2406	0.04	Q	.	.	.	V.
24.000	0.2406	0.04	Q	.	.	.	V.
24.017	0.2407	0.04	Q	.	.	.	V.
24.033	0.2408	0.04	Q	.	.	.	V.
24.050	0.2408	0.04	Q	.	.	.	V.
24.067	0.2409	0.04	Q	.	.	.	V.
24.083	0.2409	0.04	Q	.	.	.	V.
24.100	0.2410	0.04	Q	.	.	.	V.
24.117	0.2410	0.04	Q	.	.	.	V.
24.133	0.2411	0.03	Q	.	.	.	V.
24.150	0.2411	0.03	Q	.	.	.	V.
24.167	0.2411	0.02	Q	.	.	.	V.
24.183	0.2412	0.02	Q	.	.	.	V.
24.200	0.2412	0.02	Q	.	.	.	V.
24.217	0.2412	0.01	Q	.	.	.	V.
24.233	0.2412	0.01	Q	.	.	.	V.

****
FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.087
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.05

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.004
3	0.50	0.67	0.007
4	0.75	0.82	0.010
5	1.00	0.94	0.013
6	1.25	1.06	0.016
7	1.50	1.16	0.019

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME	DEAD-STORAGE	INFLOW	LOSS	EFFECTIVE	MEAN OUTFLOW	EFFECTIVE

23.933	0.086	0.04	0.05	0.00	0.0	0.000
23.950	0.086	0.04	0.05	0.00	0.0	0.000
23.966	0.086	0.04	0.05	0.00	0.0	0.000
23.983	0.086	0.04	0.05	0.00	0.0	0.000
24.000	0.086	0.04	0.05	0.00	0.0	0.000

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.241 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.053 AF
LOSS VOLUME = 0.188 AF

****

FLOW PROCESS FROM NODE 303.00 TO NODE 304.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<

==========

MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 78.00 MANNINGS FACTOR = 0.012
UPSTREAM ELEVATION(FT) = 0.39
DOWNSTREAM ELEVATION(FT) = 0.00
PIPE DIAMETER(FT) = 1.50

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
0.017	0.00	0.00	0.00	0.000
0.033	0.00	0.00	0.00	0.000
0.050	0.00	0.00	0.00	0.000
0.067	0.00	0.00	0.00	0.000
0.083	0.00	0.00	0.00	0.000
0.100	0.00	0.00	0.00	0.000
0.117	0.00	0.00	0.00	0.000
0.133	0.00	0.00	0.00	0.000
0.150	0.00	0.00	0.00	0.000
0.167	0.00	0.00	0.00	0.000
0.183	0.00	0.00	0.00	0.000
0.200	0.00	0.00	0.00	0.000
0.217	0.00	0.00	0.00	0.000
0.233	0.00	0.00	0.00	0.000
0.250	0.00	0.00	0.00	0.000
0.267	0.00	0.00	0.00	0.000
0.283	0.00	0.00	0.00	0.000
0.300	0.00	0.00	0.00	0.000
0.317	0.00	0.00	0.00	0.000
0.333	0.00	0.00	0.00	0.000
0.350	0.00	0.00	0.00	0.000
0.367	0.00	0.00	0.00	0.000
0.383	0.00	0.00	0.00	0.000
0.400	0.00	0.00	0.00	0.000
0.417	0.00	0.00	0.00	0.000
0.433	0.00	0.00	0.00	0.000
0.450	0.00	0.00	0.00	0.000
0.467	0.00	0.00	0.00	0.000
0.483	0.00	0.00	0.00	0.000
0.500	0.00	0.00	0.00	0.000
0.517	0.00	0.00	0.00	0.000
0.533	0.00	0.00	0.00	0.000

23.350	0.00	0.00	0.00	0.000
23.367	0.00	0.00	0.00	0.000
23.383	0.00	0.00	0.00	0.000
23.400	0.00	0.00	0.00	0.000
23.417	0.00	0.00	0.00	0.000
23.433	0.00	0.00	0.00	0.000
23.450	0.00	0.00	0.00	0.000
23.467	0.00	0.00	0.00	0.000
23.483	0.00	0.00	0.00	0.000
23.500	0.00	0.00	0.00	0.000
23.517	0.00	0.00	0.00	0.000
23.533	0.00	0.00	0.00	0.000
23.550	0.00	0.00	0.00	0.000
23.567	0.00	0.00	0.00	0.000
23.583	0.00	0.00	0.00	0.000
23.600	0.00	0.00	0.00	0.000
23.617	0.00	0.00	0.00	0.000
23.633	0.00	0.00	0.00	0.000
23.650	0.00	0.00	0.00	0.000
23.667	0.00	0.00	0.00	0.000
23.683	0.00	0.00	0.00	0.000
23.700	0.00	0.00	0.00	0.000
23.717	0.00	0.00	0.00	0.000
23.733	0.00	0.00	0.00	0.000
23.750	0.00	0.00	0.00	0.000
23.767	0.00	0.00	0.00	0.000
23.783	0.00	0.00	0.00	0.000
23.800	0.00	0.00	0.00	0.000
23.817	0.00	0.00	0.00	0.000
23.833	0.00	0.00	0.00	0.000
23.850	0.00	0.00	0.00	0.000
23.867	0.00	0.00	0.00	0.000
23.883	0.00	0.00	0.00	0.000
23.900	0.00	0.00	0.00	0.000
23.917	0.00	0.00	0.00	0.000
23.933	0.00	0.00	0.00	0.000
23.950	0.00	0.00	0.00	0.000
23.967	0.00	0.00	0.00	0.000
23.983	0.00	0.00	0.00	0.000
24.000	0.00	0.00	0.00	0.000

```
****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 CLEARED AND SET TO ZERO<<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    312.00 IS CODE = 1.2
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.70
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.212
    LOW LOSS FRACTION = 0.524
    TIME OF CONCENTRATION(MIN.) = 20.70
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.30
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.77
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.12
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.92
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.83
```

```
--------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.54
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.54

--------------------------------------------------------------------------------

================================================================================

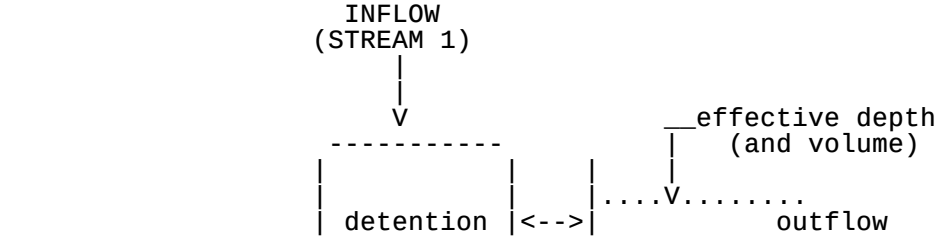
                    2 4 - H O U R    S T O R M
                R U N O F F    H Y D R O G R A P H

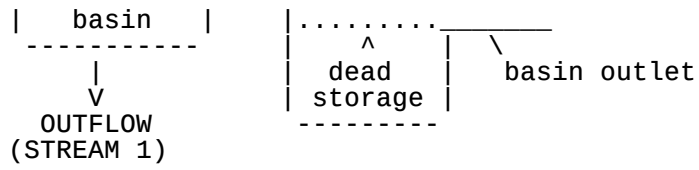
================================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        1.0       2.0       3.0       3.9
--------------------------------------------------------------------------------
   0.017      0.0000      0.00  Q         .         .         .         .
   0.033      0.0000      0.00  Q         .         .         .         .
   0.050      0.0000      0.00  Q         .         .         .         .
   0.067      0.0000      0.00  Q         .         .         .         .
   0.083      0.0000      0.00  Q         .         .         .         .
   0.100      0.0000      0.00  Q         .         .         .         .
   0.117      0.0000      0.00  Q         .         .         .         .
   0.133      0.0000      0.00  Q         .         .         .         .
   0.150      0.0000      0.00  Q         .         .         .         .
   0.167      0.0000      0.01  Q         .         .         .         .
   0.183      0.0000      0.01  Q         .         .         .         .
   0.200      0.0001      0.02  Q         .         .         .         .
   0.217      0.0001      0.02  Q         .         .         .         .
   0.233      0.0001      0.03  Q         .         .         .         .
   0.250      0.0002      0.03  Q         .         .         .         .
   0.267      0.0002      0.04  Q         .         .         .         .
   0.283      0.0003      0.04  Q         .         .         .         .
   0.300      0.0003      0.05  Q         .         .         .         .
   0.317      0.0004      0.05  Q         .         .         .         .
   0.333      0.0005      0.06  Q         .         .         .         .
   0.350      0.0006      0.06  Q         .         .         .         .
   0.367      0.0007      0.07  Q         .         .         .         .
   0.383      0.0008      0.07  Q         .         .         .         .
   0.400      0.0009      0.08  Q         .         .         .         .
   0.417      0.0010      0.08  Q         .         .         .         .
   0.433      0.0011      0.09  Q         .         .         .         .
   0.450      0.0012      0.09  Q         .         .         .         .
   0.467      0.0014      0.09  Q         .         .         .         .
   0.483      0.0015      0.10  VQ        .         .         .         .
   0.500      0.0016      0.10  VQ        .         .         .         .
   0.517      0.0018      0.10  VQ        .         .         .         .
   0.533      0.0019      0.10  VQ        .         .         .         .
   0.550      0.0020      0.10  VQ        .         .         .         .
   0.567      0.0022      0.10  VQ        .         .         .         .
   0.583      0.0023      0.10  VQ        .         .         .         .
   0.600      0.0025      0.10  VQ        .         .         .         .
   0.617      0.0026      0.10  VQ        .         .         .         .
   0.633      0.0027      0.10  VQ        .         .         .         .
   0.650      0.0029      0.10  VQ        .         .         .         .
   0.667      0.0030      0.10  VQ        .         .         .         .
   0.683      0.0031      0.10  VQ        .         .         .         .
   0.700      0.0033      0.10  VQ        .         .         .         .
   0.717      0.0034      0.10  VQ        .         .         .         .
   0.733      0.0036      0.10  VQ        .         .         .         .
   0.750      0.0037      0.10  VQ        .         .         .         .
   0.767      0.0038      0.10  VQ        .         .         .         .
   0.783      0.0040      0.10  VQ        .         .         .         .
   0.800      0.0041      0.10  VQ        .         .         .         .
   0.817      0.0043      0.10  VQ        .         .         .         .
   0.833      0.0044      0.10  VQ        .         .         .         .
   0.850      0.0045      0.10  VQ        .         .         .         .
   0.867      0.0047      0.10  VQ        .         .         .         .
   0.883      0.0048      0.10  VQ        .         .         .         .
```

23.700	0.5373	0.10	.Q	.	.	.	V.
23.717	0.5374	0.10	.Q	.	.	.	V.
23.733	0.5376	0.10	.Q	.	.	.	V.
23.750	0.5377	0.10	.Q	.	.	.	V.
23.767	0.5379	0.10	.Q	.	.	.	V.
23.783	0.5380	0.10	.Q	.	.	.	V.
23.800	0.5381	0.10	.Q	.	.	.	V.
23.817	0.5383	0.10	.Q	.	.	.	V.
23.833	0.5384	0.10	.Q	.	.	.	V.
23.850	0.5386	0.10	.Q	.	.	.	V.
23.867	0.5387	0.10	.Q	.	.	.	V.
23.883	0.5389	0.10	.Q	.	.	.	V.
23.900	0.5390	0.10	.Q	.	.	.	V.
23.917	0.5391	0.10	.Q	.	.	.	V.
23.933	0.5393	0.10	.Q	.	.	.	V.
23.950	0.5394	0.10	.Q	.	.	.	V.
23.967	0.5396	0.10	.Q	.	.	.	V.
23.983	0.5397	0.10	.Q	.	.	.	V.
24.000	0.5398	0.10	.Q	.	.	.	V.
24.017	0.5400	0.10	.Q	.	.	.	V.
24.033	0.5401	0.10	.Q	.	.	.	V.
24.050	0.5402	0.10	.Q	.	.	.	V.
24.067	0.5404	0.10	.Q	.	.	.	V.
24.083	0.5405	0.10	.Q	.	.	.	V.
24.100	0.5407	0.10	.Q	.	.	.	V.
24.117	0.5408	0.10	.Q	.	.	.	V.
24.133	0.5409	0.10	.Q	.	.	.	V.
24.150	0.5411	0.10	.Q	.	.	.	V.
24.167	0.5412	0.10	.Q	.	.	.	V.
24.183	0.5414	0.10	.Q	.	.	.	V.
24.200	0.5415	0.10	.Q	.	.	.	V.
24.217	0.5416	0.10	.Q	.	.	.	V.
24.233	0.5418	0.10	.Q	.	.	.	V.
24.250	0.5419	0.10	.Q	.	.	.	V.
24.267	0.5420	0.10	.Q	.	.	.	V.
24.283	0.5422	0.10	.Q	.	.	.	V.
24.300	0.5423	0.10	Q	.	.	.	V.
24.317	0.5424	0.09	Q	.	.	.	V.
24.333	0.5426	0.09	Q	.	.	.	V.
24.350	0.5427	0.08	Q	.	.	.	V.
24.367	0.5428	0.08	Q	.	.	.	V.
24.383	0.5429	0.07	Q	.	.	.	V.
24.400	0.5430	0.07	Q	.	.	.	V.
24.417	0.5430	0.06	Q	.	.	.	V.
24.433	0.5431	0.06	Q	.	.	.	V.
24.450	0.5432	0.05	Q	.	.	.	V.
24.467	0.5433	0.05	Q	.	.	.	V.
24.483	0.5433	0.04	Q	.	.	.	V.
24.500	0.5434	0.04	Q	.	.	.	V.
24.517	0.5434	0.03	Q	.	.	.	V.
24.533	0.5435	0.03	Q	.	.	.	V.
24.550	0.5435	0.02	Q	.	.	.	V.
24.567	0.5435	0.02	Q	.	.	.	V.
24.583	0.5435	0.01	Q	.	.	.	V.
24.600	0.5436	0.01	Q	.	.	.	V.

****
FLOW PROCESS FROM NODE 312.00 TO NODE 313.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========





ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.218
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.13

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.25	0.24	0.009
3	0.50	0.67	0.017
4	0.75	0.82	0.025
5	1.00	0.94	0.032
6	1.25	1.06	0.040
7	1.50	1.16	0.047

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.017	0.000	0.00	0.00	0.00	0.0	0.000
0.033	0.000	0.00	0.00	0.00	0.0	0.000
0.050	0.000	0.00	0.00	0.00	0.0	0.000
0.067	0.000	0.00	0.00	0.00	0.0	0.000
0.083	0.000	0.00	0.00	0.00	0.0	0.000
0.100	0.000	0.00	0.00	0.00	0.0	0.000
0.117	0.000	0.00	0.00	0.00	0.0	0.000
0.133	0.000	0.00	0.00	0.00	0.0	0.000
0.150	0.000	0.00	0.00	0.00	0.0	0.000
0.167	0.000	0.01	0.01	0.00	0.0	0.000
0.183	0.000	0.01	0.02	0.00	0.0	0.000
0.200	0.000	0.02	0.04	0.00	0.0	0.000
0.217	0.000	0.02	0.07	0.00	0.0	0.000
0.233	0.000	0.03	0.09	0.00	0.0	0.000
0.250	0.000	0.03	0.12	0.00	0.0	0.000
0.267	0.000	0.04	0.13	0.00	0.0	0.000
0.283	0.000	0.04	0.13	0.00	0.0	0.000
0.300	0.000	0.05	0.13	0.00	0.0	0.000
0.317	0.000	0.05	0.13	0.00	0.0	0.000
0.333	0.000	0.06	0.13	0.00	0.0	0.000
0.350	0.000	0.06	0.13	0.00	0.0	0.000
0.367	0.000	0.07	0.13	0.00	0.0	0.000
0.383	0.000	0.07	0.13	0.00	0.0	0.000
0.400	0.000	0.08	0.13	0.00	0.0	0.000
0.417	0.000	0.08	0.13	0.00	0.0	0.000
0.433	0.000	0.09	0.13	0.00	0.0	0.000
0.450	0.000	0.09	0.13	0.00	0.0	0.000
0.467	0.000	0.09	0.13	0.00	0.0	0.000
0.483	0.000	0.10	0.13	0.00	0.0	0.000
0.500	0.000	0.10	0.13	0.00	0.0	0.000
0.517	0.000	0.10	0.13	0.00	0.0	0.000

23.300	0.216	0.11	0.13	0.00	0.0	0.000
23.316	0.216	0.11	0.13	0.00	0.0	0.000
23.333	0.216	0.11	0.13	0.00	0.0	0.000
23.350	0.216	0.11	0.13	0.00	0.0	0.000
23.366	0.216	0.11	0.13	0.00	0.0	0.000
23.383	0.216	0.11	0.13	0.00	0.0	0.000
23.400	0.216	0.11	0.13	0.00	0.0	0.000
23.416	0.216	0.11	0.13	0.00	0.0	0.000
23.433	0.216	0.11	0.13	0.00	0.0	0.000
23.450	0.216	0.11	0.13	0.00	0.0	0.000
23.466	0.216	0.11	0.13	0.00	0.0	0.000
23.483	0.216	0.11	0.13	0.00	0.0	0.000
23.500	0.216	0.11	0.13	0.00	0.0	0.000
23.516	0.216	0.10	0.13	0.00	0.0	0.000
23.533	0.216	0.10	0.13	0.00	0.0	0.000
23.550	0.216	0.10	0.13	0.00	0.0	0.000
23.566	0.216	0.10	0.13	0.00	0.0	0.000
23.583	0.216	0.10	0.13	0.00	0.0	0.000
23.600	0.216	0.10	0.13	0.00	0.0	0.000
23.616	0.216	0.10	0.13	0.00	0.0	0.000
23.633	0.216	0.10	0.13	0.00	0.0	0.000
23.650	0.215	0.10	0.13	0.00	0.0	0.000
23.666	0.215	0.10	0.13	0.00	0.0	0.000
23.683	0.215	0.10	0.13	0.00	0.0	0.000
23.700	0.215	0.10	0.13	0.00	0.0	0.000
23.716	0.215	0.10	0.13	0.00	0.0	0.000
23.733	0.215	0.10	0.13	0.00	0.0	0.000
23.750	0.215	0.10	0.13	0.00	0.0	0.000
23.766	0.215	0.10	0.13	0.00	0.0	0.000
23.783	0.215	0.10	0.13	0.00	0.0	0.000
23.800	0.215	0.10	0.13	0.00	0.0	0.000
23.816	0.215	0.10	0.13	0.00	0.0	0.000
23.833	0.215	0.10	0.13	0.00	0.0	0.000
23.850	0.215	0.10	0.13	0.00	0.0	0.000
23.866	0.215	0.10	0.13	0.00	0.0	0.000
23.883	0.215	0.10	0.13	0.00	0.0	0.000
23.900	0.215	0.10	0.13	0.00	0.0	0.000
23.916	0.215	0.10	0.13	0.00	0.0	0.000
23.933	0.215	0.10	0.13	0.00	0.0	0.000
23.950	0.215	0.10	0.13	0.00	0.0	0.000
23.966	0.215	0.10	0.13	0.00	0.0	0.000
23.983	0.215	0.10	0.13	0.00	0.0	0.000
24.000	0.215	0.10	0.13	0.00	0.0	0.000

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.544 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.081 AF
LOSS VOLUME = 0.463 AF

****

FLOW PROCESS FROM NODE 313.00 TO NODE 314.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<

==========

MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 37.00 MANNINGS FACTOR = 0.012
UPSTREAM ELEVATION(FT) = 0.19
DOWNSTREAM ELEVATION(FT) = 0.00
PIPE DIAMETER(FT) = 1.50

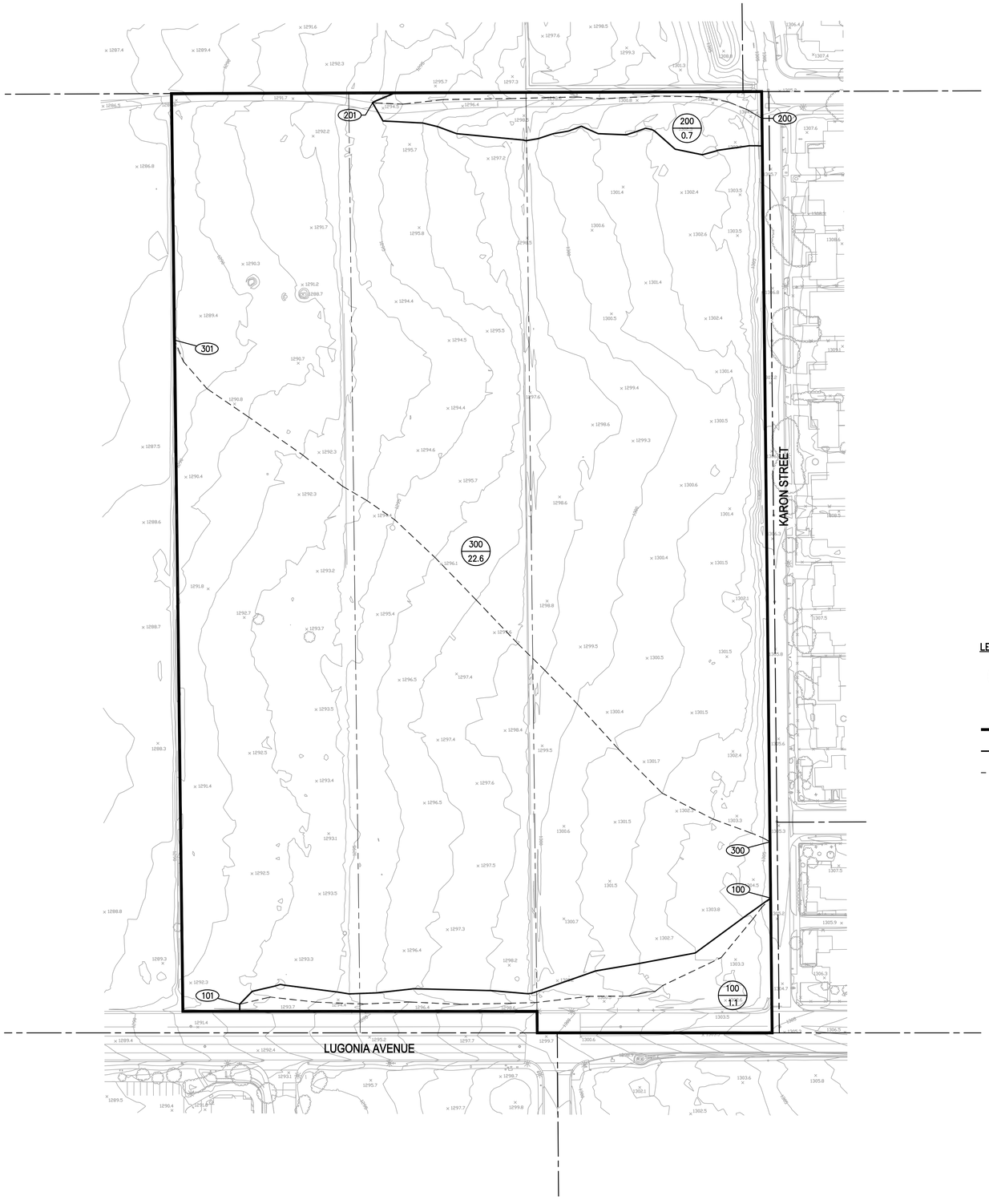
```
         23.917      0.00      0.00      0.00        0.000
         23.933      0.00      0.00      0.00        0.000
         23.950      0.00      0.00      0.00        0.000
         23.967      0.00      0.00      0.00        0.000
         23.983      0.00      0.00      0.00        0.000
         24.000      0.00      0.00      0.00        0.000

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 CLEARED AND SET TO ZERO<<<<<
============================================================================
============================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

Technical Appendix F

Hydrology Maps



LEGEND

- XXX / XX.X — DRAINAGE AREA ID / DRAINAGE AREA ACREAGE
- XXX — NODE NUMBER
- SITE BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH

N

80' 40' 0' 80' 160' 240'

GRAPHIC SCALE: 1"=80'

NOT FOR CONSTRUCTION

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860
GREGORY R. COOKE R.C.E. 39478 DATE

NO:	REVISION:	DATE:

PROJECT: THE NEIGHBORHOOD AT LUGONIA VILLAGE
TPM 20469
REDLANDS, CA

DRAWING NAME: HYDROLOGY MAP - EXISITNG

ISSUE:	CONCEPTUAL
DATE:	05/24/2022
CHECKED: DRC	DRAWN: DRC
DRAWING FILE:	.
PROJECT NO.:	21-086
SHEET NUMBER:	1
OF	1 SHEETS
SCALE:	AS SHOWN

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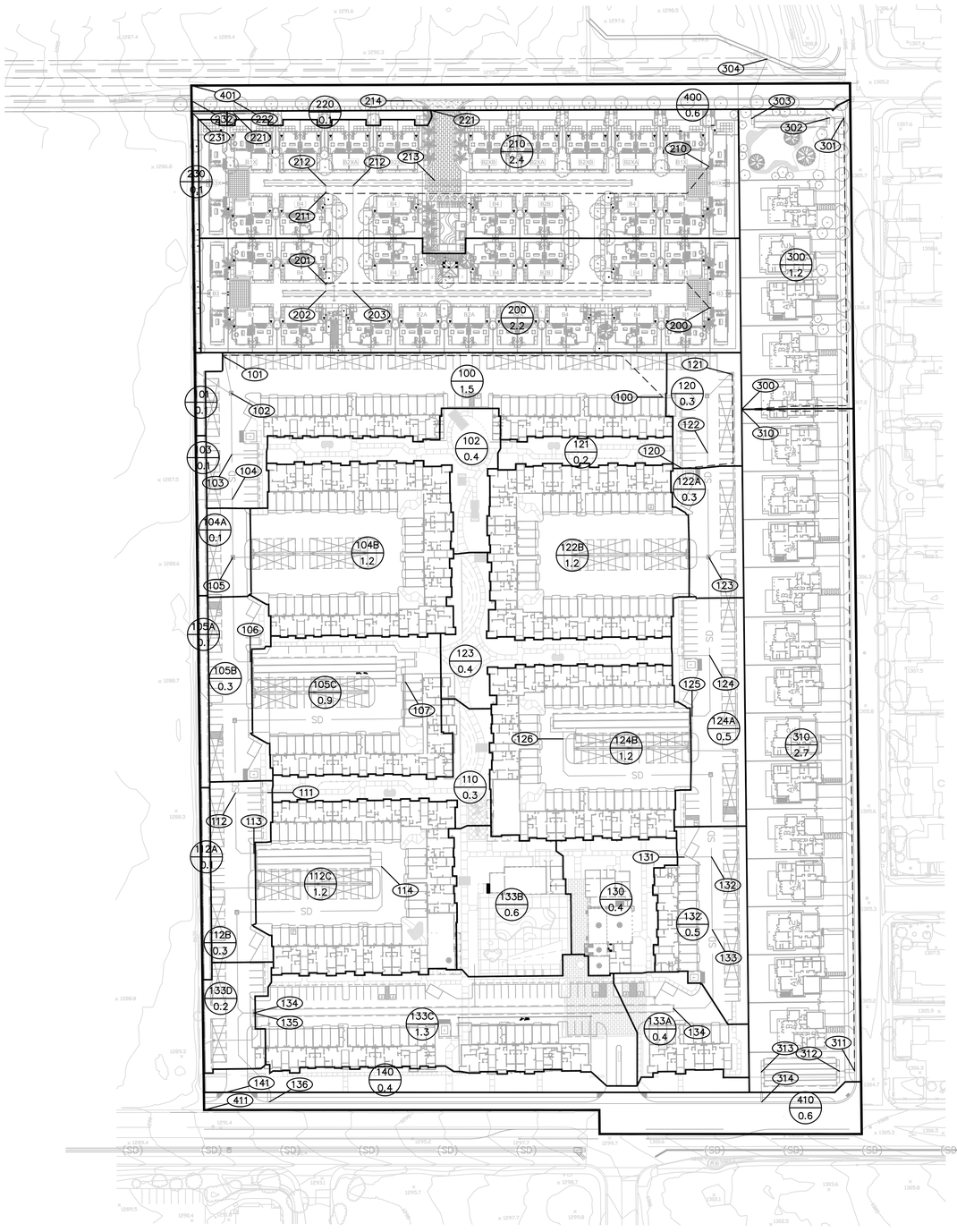
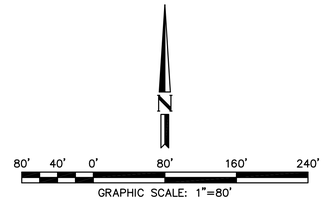


LEGEND

- XXX / XX.X — DRAINAGE AREA ID / DRAINAGE AREA ACREAGE
- XXX — NODE NUMBER
- SITE BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH



NOT FOR CONSTRUCTION

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860
GREGORY R. COOKE R.C.E. 39478 DATE

NO:	REVISION:	DATE:

PROJECT: THE NEIGHBORHOOD AT LUGONIA VILLAGE
TPM 20469
REDLANDS, CA

DRAWING NAME: HYDROLOGY MAP - PROPOSED

ISSUE:	CONCEPTUAL
DATE:	06/26/2023
CHECKED: DRC	DRAWN: DRC
DRAWING FILE:	.
PROJECT NO.:	21-086
SHEET NUMBER:	1
OF	1 SHEETS
SCALE:	AS SHOWN

FILENAME: M:\2021\21-086 Summit Homes Redlands\hydrology\21-086 hm prop.dwg, LAST SAVED ON: Jun 27 2023 9:11am PLOTTED BY: HOMER, ON: Jun 27 2023 9:12am, CFG: