

HARMONY GROVE VILLAGE SOUTH

APPENDIX M-1

CEQA PRELIMINARY HYDROLOGY/DRAINAGE STUDY

for the

DRAFT FINAL ENVIRONMENTAL IMPACT REPORT

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PLANNING & DEVELOPMENT SERVICES

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**CEQA PRELIMINARY
HYDROLOGY / DRAINAGE STUDY
HARMONY GROVE VILLAGE SOUTH**

County of San Diego, CA

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DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OR WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



Debby Reece, RCE 56148 Date



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1. INTRODUCTION

This drainage report has been prepared in support of a Tentative Map submittal for the Harmony Grove Village South (HGVS) project. The project is located in the County of San Diego southeast of the Harmony Grove Specific Plan Area. The site is approximately 111 acres in size and located west of Interstate 15 and south of State Route 78 (SR 78). Figure 1 shows the vicinity map for the project.

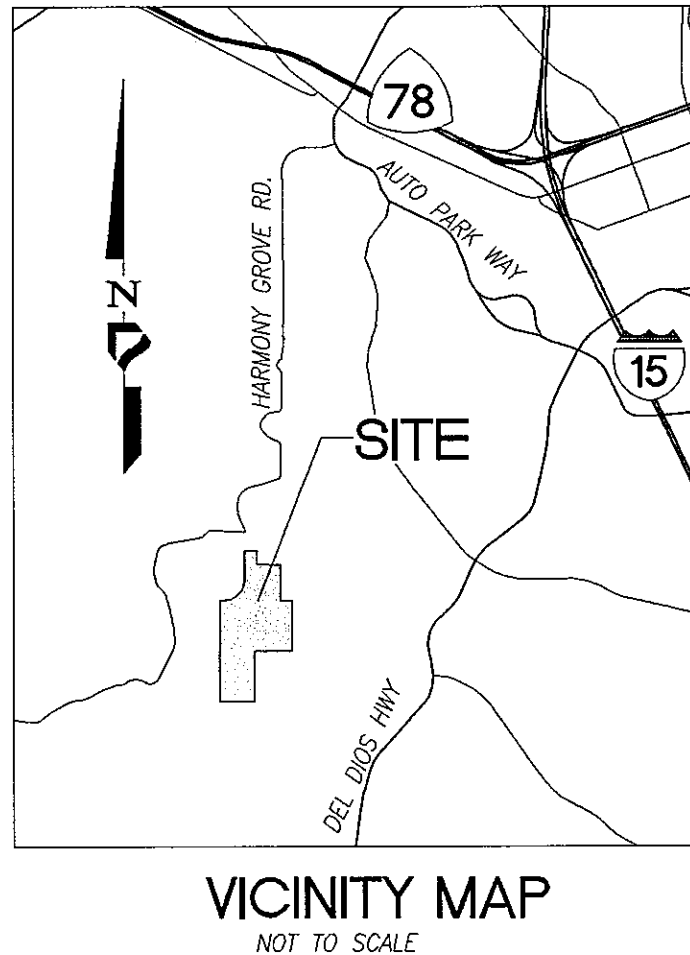


Figure 1: Project Vicinity Map

The purpose of this report is to determine hydrologic impact, if any, to the existing storm drain facilities or natural drainage, and provide peak 100-year discharge values for existing and proposed conditions, and to provide the required analysis for an environmental CEQA-level analysis of potential development impacts and mitigations with respect to drainage.

The drainage analyses presented herein reflect a Tentative Map level-of-effort, which include peak 100-year storm event hydrologic analyses using relative street and lot grades. Hydraulic analyses for detention basins, inlets, pipe inverts and HGL's will be provided during final engineering, although some preliminary calculations are included herein for TM purposes. *Therefore, the purpose of this report submittal is to acquire from the County: 1) concept approval of the proposed storm drain layout and detention basin sizing, 2) approval of the methodology used in the evaluation of the project storm drain system hydrology, and 3) identification of critical path drainage issues that need to be addressed during final engineering.*

The project will meet State NPDES construction and municipal stormwater permit requirements. The construction phase BMPs associated with the project will be addressed in the Grading and Erosion Control Plans and the SWPPP. The post-construction BMPs for the project are currently being developed in conjunction with the Preliminary Storm Water Quality Management Plan (SWQMP) for HGVS project. The final post-construction BMP design will be provided during final engineering.

The project is within FEMA FIRM Panel Nos. 06073C1057G and 06073C1059G, effective date May 16, 2012. The northern portion of the site is within Zone AE of the Special Flood Hazard Area (SFHA) that is subject to inundation by the 1% annual chance flood. Zone AE is defined as areas with "base flood elevations determined". The northern portion is also within Zone X, which is defined by "areas of 0.2% annual chance flood". In addition, the northern portion of the site is within the floodway areas in Zone AE. The floodway is the channel of a stream plus any adjacent areas that must be kept free of encroachment so that the 1% annual flood chance can be carried without substantial increases in flood heights. Refer to Exhibit A in Appendix 6 for the FEMA Floodplain Map.

2. EXISTING AND PROPOSED DRAINAGE PATTERNS AND IMPROVEMENTS

The following sections provide descriptions of the existing and proposed drainage patterns and improvements for the project.

The project lies in the southern portion of a large circular shaped valley surrounded by prominent peaks and steep hillsides. Escondido Creek bisects the valley, and HGVS lies south of the creek.

Under existing conditions, the project area consists of undeveloped land. The north central and southwestern portions of the site are relatively flat, covered in Non-Native Grasslands. Steep slopes occur in the northeastern corner, the southeastern region, the southern tip of the site, and a couple of isolated areas in the central western portion of the site. Diegan Coastal Sage Scrub, Coastal Sage Chaparral Scrub, Mafic Southern Mixed Chaparral, and Granitic Southern Mixed Chaparral, cover the steeper areas of the site. The southern-most portion of the site (preserved as open space) has significant biological habitat including a small area of Coast Live Oak and jurisdictional drainages that flow down from the peaks and exit the site along the western boundary.

The site is bounded by Country Club Drive and existing single-family residential lots on the west, Escondido Creek and open space to the north, and mainly open space to the east and south. There are three existing residences on the east side of the project boundary whose main access is through the property. There appears to be no existing storm drain facilities within the project site area. Existing drainage is divided into four drainage areas, depicted as Systems 100, 200, 300, and 400 on Exhibit B, Existing Condition Hydrology Map, included in Appendix 6. The first, System 100 is located at the northeast corner of the property, originates offsite and drains to Escondido Creek to the north. The second drainage area, System 200, comprises the majority of the site, originates offsite on the east side of the property, drains through the main valley of the project, runs northerly along the east side of Country Club Drive, and flows into Escondido Creek. Systems 300 and 400 are relatively smaller systems that are located in the southwestern corner of the site, originate from the south (on and offsite) and drain west to a defined drainage along the western project boundary. This defined drainage traverses the existing residential properties west of Cordrey Drive and ultimately flows into Escondido Creek downstream and west of the Country Club Drive crossing.

The project proposes a maximum of 453 units. HGVS provides for a variety of single-family and multi-family housing types. These have been designed to preserve and reflect the rural character and architectural heritage of Harmony Grove. For example, structures are planned within the context of the land, with grading thoughtfully designed to fit into the existing landform. In addition, multi-family homes respect the predominant single-family character of Harmony Grove by being designed to appear as a single farmhouse or repurposed agricultural building. A

commercial/civic area; consisting of a homeowner's association clubhouse-type building will provide a public gathering place/destination for the residents. It may accommodate such uses as food/beverage services, limited overnight accommodations, a gym, an event lawn, an equestrian hitching post, electric vehicle charging stations, and possibly a pool. HGVS also reserves space for wastewater treatment uses that may be needed in support of the project. A natural drainage that used to flow through the central portion of the site, which has since been disturbed by prior agricultural operations, has been incorporated into the site plan and would be recreated as a naturalized open space area with a meandering swale, trails, and adjacent community gardens. This vegetated swale will carry surface drainage from adjacent slopes and units along its alignment and convey it to a proposed storm drain system.

The onsite drainage improvements consist of public and private streets, gutters, and curb inlets that tie into underground storm drain systems. As the project grading has been designed to fit into the existing landform, the proposed drainage areas mimic the existing condition and consist of five drainage systems, Systems 100, 200, 300, 400, and 500. Refer to Exhibit C, Proposed Condition Hydrology Map, included in Appendix 6. The ultimate discharge points of these five systems, in relation to the project boundary, are effectively the same as the existing condition: north to Escondido Creek, and west to the defined drainage along the western project boundary.

In order to mitigate for drainage impacts associated with development, the project will construct two combination detention/hydromodification basins with an additional harvest/reuse storage volume component. One basin is located at the northern tip of the site, adjacent to the Wastewater Land Use Area. This basin discharges directly to Escondido Creek via an underground storm drain. The second basin, located along the western boundary just south of Country Club Drive, drains to the defined drainage at the southwest corner of the project's grading limits. As mentioned, these basins will mitigate for both peak flow attenuation and hydromodification management impacts. Both storm drain outlet locations discharge to unimproved channels, therefore, energy dissipation will be provided to minimize erosion potential. The Best Management Practices are discussed in the project's SWQMP, under separate cover.

3. HYDROLOGY CRITERIA, METHODOLOGY, AND RESULTS

This section of the report summarizes the drainage criteria that were used in the hydrologic analysis and key elements of the methodology. Also included is a description of the computer model used in the computations.

3.1 Hydrology Criteria

The drainage basins were delineated using available topography and the preliminary proposed grading layout for the project. Table 1 summarizes the key hydrology assumptions and criteria used for the hydrologic modeling.

Table 1: Hydrology Criteria

Existing and Proposed Hydrology:	100-year storm frequency
Soil Type:	Hydrologic Soil Group A, C, and D per USDA web soil survey. See Exhibit C.
Land Use / Runoff Coefficients:	Based on criteria presented in the <u>2003 County of San Diego Hydrology Manual</u> ,
Rainfall intensity:	Based on intensity duration frequency relationships presented in the <u>2003 County of San Diego Hydrology Manual</u> .

For subareas with multiple land use zoning and/or soil types, a composite runoff coefficient (C) was calculated for the drainage area. Refer to Appendix 2 for weighted runoff coefficient calculations. For the existing condition analysis, the existing condition runoff coefficients were calculated based on the percentage of soil types within the project. A majority of the onsite area contains type C soils.

3.2 Hydrologic Methodology

The Modified Rational Method was used to determine the 100-year peak discharge flows for the design of the storm drain improvements. The goal of the project hydrology analysis was to:

- Determine existing and design peak 100-year flows for the sizing of the onsite storm drain system gutters, curb inlets, catch basins, and pipes that convey flow to the discharge locations. From an analytical perspective, the project hydrology was prepared using relative lot and street grades.
- Verify that the project does not adversely impact the existing storm drain improvements or natural drainage. A comparative analysis was performed between the existing peak 100-year discharge and project peak 100-year discharge at various locations. For results of the analysis see Exhibits B and C for existing and proposed conditions hydrology maps, and Appendices 3 and 4 for existing and proposed condition Rational Method computer output.

3.3 Description of Hydrologic Modeling Software

The Modified Rational Method was used to determine the 100-year storm flow for the design of the storm system. The AES Rational Method Program was used to perform the hydrologic calculations. This section provides a brief explanation of the computational procedure used in the computer model.

The AES Modified Rational Method Hydrology Program is a computer-aided design program where the user develops a node link model of the watershed. Developing independent node link models for each interior watershed and linking these sub-models together at confluence points creates the node link model. The intensity-duration-frequency relationships are applied to each of the drainage areas in the model to get the peak flow rates at each point of interest.

4. HYDROLOGY RESULTS

In general, the project hydrology results presented herein were used to 1) verify that the project does not adversely impact the existing storm drain system or natural drainage, and 2) verify that the proposed detention volumes are adequate to control post-project peak flows.

Storm runoff from the project will be collected and conveyed to several locations. In order to compare the existing and proposed drainage conditions, two comparison outfall locations have

been established (north and south drainage areas). Table 2 summarizes the Rational Method hydrology results for the project outfalls for the existing and proposed conditions.

Table 2: Hydrology Results

Comparison	System	EXISTING CONDITIONS		PROPOSED CONDITIONS	
		Q ₁₀₀ (cfs)	Contrib. Area (acres)	Q ₁₀₀ (cfs)	Contrib. Area (acres)
Northern Outfalls	100	28.0	18.6	27.4	17.4
	200	116.4	81.9	215.6 (undetained), 101.3 (detained)	81.2
	500	-	-	9.6	1.6
	Subtotal=	144.4	100.5	251.5 undetained, 138.3 detained	100.2
Southern Outfalls	300	26.3	15.7	58.2 (undetained), 25.1 (detained)	14.1
	400	131.6	76.1	132.6	76.8
	Subtotal=	157.9	91.8	190.8 undetained, 157.7 detained	90.9
	Total=	302.3	192.1	442.3 undetained, 296.0 detained	190.9

Table 2 compares the existing and proposed peak flow rates for each outfall with and without detention taken into account.

The results of the hydrology analysis indicate that flows for the proposed condition Basins 200 and 300 will increase above existing conditions. Therefore, detention is provided to detain post-project peak flows to less than pre-project flows. Systems 100 and 400 are less than or approximately equal for both existing and proposed conditions, respectively.

Proposed System 200 (without detention) will increase runoff by approximately 100 cfs. However, detention for 100-year flow attenuation is provided in the North basin, as shown in Table 2. Proposed System 300 is detained in the South basin. Therefore, the combined flows for the Northern Outfalls and the combined flows for the Southern Outfalls are both less than existing conditions with the detention provided. The outfall location of the proposed North Basin is directly into Escondido Creek, therefore flows from the project shall be designed to release at non-erosive velocities via the detention basin and energy dissipation.

The runoff from Proposed System 300 outfalls into a defined drainage along the western project boundary. This defined drainage traverses the existing residential properties west of Cordrey Drive and ultimately flows into Escondido Creek downstream and west of the Country Club

Drive crossing. Proposed System 300 will be detained by the South basin to match pre-development conditions. Appropriate energy dissipation measures will be used at the outlet for erosion control.

4.1 Water Quality Considerations

The lower portion of the North Basin and the South Basin will include the design capture volume, which will be diverted to a harvest and reuse system in combination with the reclaimed water wet weather storage system proposed with the onsite waste water treatment plant. This volume was modeled with a low-flow orifice restriction in order to model the effects of the stage-storage-discharge curve for the 100-year detention routing. The water quality volume was taken into account for the 100-year detention routing by setting the initial water surface elevation of the 100-year detention routing model run set equal to the corresponding BMP design capture volume (per Section 6.2.7 of the County of San Diego Hydraulic Design Manual). Refer to the Preliminary Storm Water Quality Management Plan for further information regarding the post-construction BMPs selected for this project.

The basins will be maintained by the HOA, and sediment and debris collected in the basins and in any of the pretreatment BMPs will be maintained via a vacuum truck procedure. Both the pretreatment BMPs and the underground basins will have strategically placed access holes in order to facilitate maintenance. The basins will be inspected regularly to inspect for sedimentation.

The Harmony Grove Village South project is in a unique position to pursue this reuse opportunity since it is found within the Rincon Water District. The Rincon Water District possesses an existing recycled water system and has a very large winter user at a power generation plant. This condition is unlike the typical County condition where the majority of the rain occurs in the winter when there is minimal-to-no recycled water use. Since guidelines for this reuse program presently do not exist, the project is unable to achieve the documentation and agreements necessary to ensure this use at the tentative tract map stage. However, it is important that the project preserves the right to confirm this use at the final map stage.

In the unlikely event the project is unable to gain approval for stormwater use in the recycled system, the project will construct a stormwater BMP system in accordance with the BMP Design Manual as an alternative to the reuse system. The final BMP system will be designed during final engineering, but for the entitlement, the drainage design for the project is designed to accommodate a stormwater reuse system.

4.2 Hydromodification Analysis

The basins will also address hydromodification requirements in addition to peak flow attenuation requirements. For more information regarding how the project complies with the final hydromodification requirements, refer to the Preliminary Hydromodification Management Study, prepared by Project Design Consultants. The stated purpose of the final hydromodification requirements is "...to manage increases in runoff discharge rates and durations from all Priority Development Projects, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force" (County Final HMP, page ES-1). Flow duration control is the most common form of hydromodification management.

5. HYDRAULIC CRITERIA, METHODOLOGY, AND RESULTS

Hydraulic calculations for pipes, inlets, and ditches will be performed during final engineering. Offsite and north of the project, a new bridge crossing for Country Club Drive over Escondido Creek is proposed. Refer to the project Preliminary Flood Study, prepared by Chang Consultants for the results of the study.

The preliminary 100-year detention calculations were performed with Bentley's PondPack software. The preliminary detention calculations are included for CEQA purposes only and will be updated during final engineering to reflect the final design. The basins were modeled as underground vaults with complex outlet structures to accommodate the various hydromodification and detention requirements. From the Rational Method results for Systems 200 and 300, the proposed condition peak inflow hydrographs were generated with Rick Engineering Rational Method Hydrograph Generator. This program develops a synthetic

hydrograph per the 2003 County Hydrology Manual using the results of the Rational Method output. The inflow hydrograph for each system was then entered into Bentley's PondPack software and the detention routing was performed with the preliminary design of the detention basin and the proposed outlet structure. The 100-year hydrograph was routed through the basin to demonstrate that the post-development peak flow rate will be less than the pre-development peak flow rate and that the detention facility will not overtop during the 100-year peak event. The riser for each basin was designed to ensure that riser size, rim elevation, and orifice placement worked in conjunction to properly mitigate the increase flow rate. The preliminary hydrograph routing calculations are included in Appendix 5. Also included in Appendix 5 are preliminary hydraulic calculations for a portion of the proposed storm drains. These calculations will be updated during final engineering.

The preliminary calculations show that the outlet structure is not controlled by the tailwater elevation, because the bottom of the North basin set a lot higher than the corresponding water surface elevation in Escondido Creek. Refer to Appendix 5 for further detail.

6. ENVIRONMENTAL IMPACTS

This section summarizes the following questions for CEQA purposes.

Would the project:

- 1. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?**

The project's drainage patterns mimic the existing conditions, so no substantial impacts will exist. The project does not propose to substantially alter the adjacent Escondido Creek. Development of the project will not result in substantial erosion or siltation on- or off-site.

- 2. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?**

Existing drainage patterns will be maintained. The project will not increase the rate or amount of surface runoff compared to the pre-project rates flow rates in the receiving streams.

3. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems?

The proposed runoff from the project will not tie-in with any existing downstream storm drain pipe systems in Country Club Drive. The runoff will outlet directly into Escondido Creek. It is anticipated that the proposed bridge for Country Club Drive over Escondido Creek will be sized appropriately to convey the peak 100-year flow in Escondido Creek. Therefore, the project will not contribute runoff water which would substantially change the existing condition to exceed the capacity of existing or planned storm water drainage systems.

4. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps? For example; research the foregoing and provide same (to indicate applicability or not) in the study.

No. The hydraulic modeling of Escondido Creek shows that the proposed residential development area is well above the creek flood elevation.

5. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

The northern portion of the project site, south of Escondido Creek, is currently partially within the 100-year flood hazard area. A HGVS Escondido Creek Floodplain Study has been conducted to ensure that the pads will not significantly impede flood flows. In addition, the pads will be raised out of the flood hazard area.

6. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam on-site or off site?

There are no dams or levees within or near the project site.

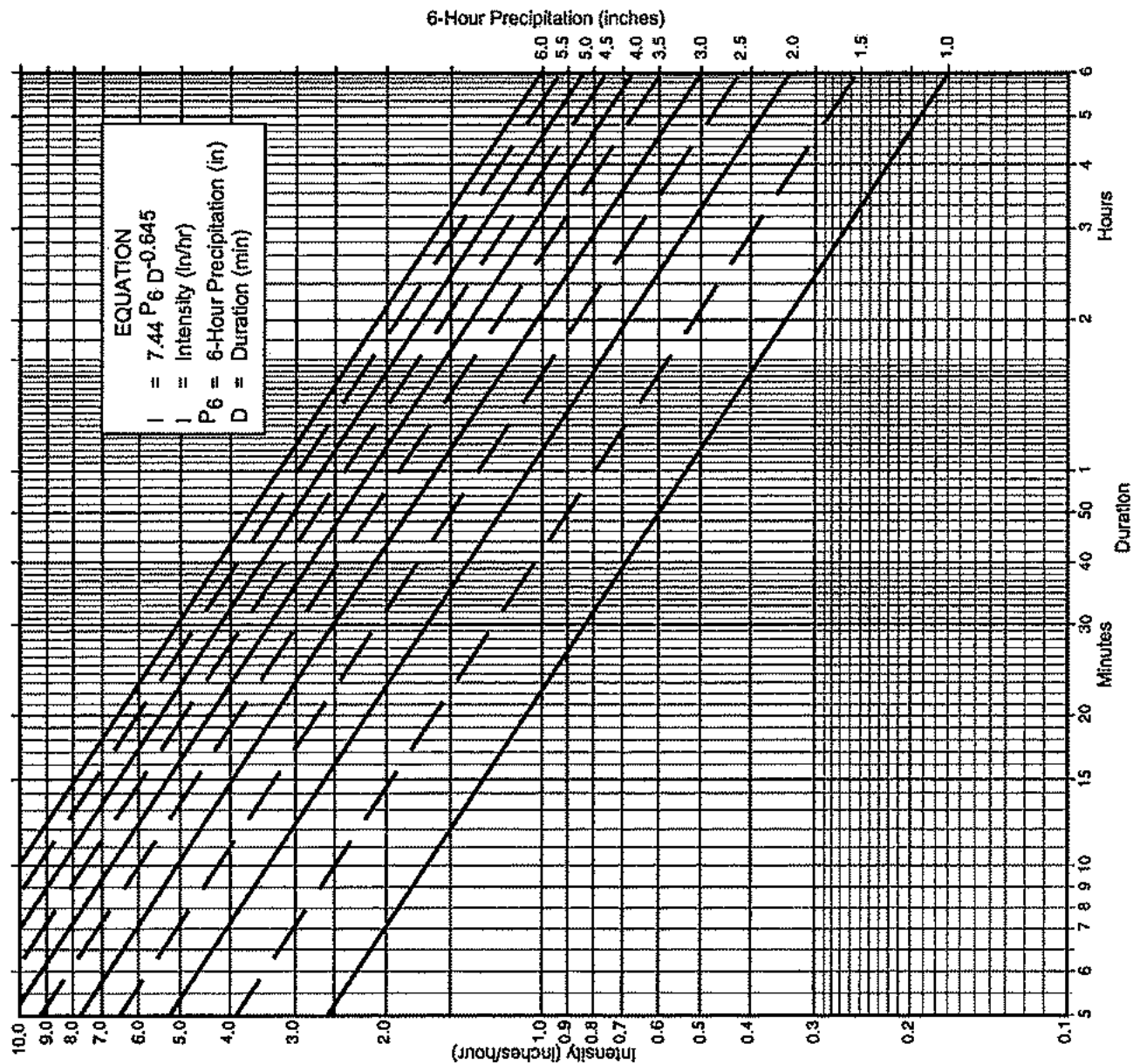
7. CONCLUSION

This drainage report has been prepared in support of the preliminary design of the storm drain improvements for the tentative map for the Harmony Grove Village South project. The purpose of this report is to provide peak discharges for use in designing the private and public storm drain systems for the project and to address the CEQA drainage issues. The hydrology results indicate that the peak flow from the developed site do not exceed the capacity of existing storm water drainage systems, and will be mitigated with the proposed detention basins to ensure post-project flow rates do not exceed pre-project flow rates. Therefore, the storm drain system will be sufficient to satisfy County criteria in the post-development condition.



APPENDIX 1

Isopluvials - Intensity-Duration Chart - Runoff Coefficients – NRCS Hydrologic Soil Groups



Directions for Application:

- (1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).
- (2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).
- (3) Plot 6 hr precipitation on the right side of the chart.
- (4) Draw a line through the point parallel to the plotted lines.
- (5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

- (a) Selected frequency 100 year
- (b) $P_6 = 3.3$ in., $P_{24} = 5.7$ in., $\frac{P_6}{P_{24}} = 58\%$
- (c) Adjusted $P_6^{(2)} = 3.3$ in.
- (d) $t_x =$ _____ min.
- (e) $I =$ _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P_6 Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.38	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

FIGURE

Intensity-Duration Design Chart - Template

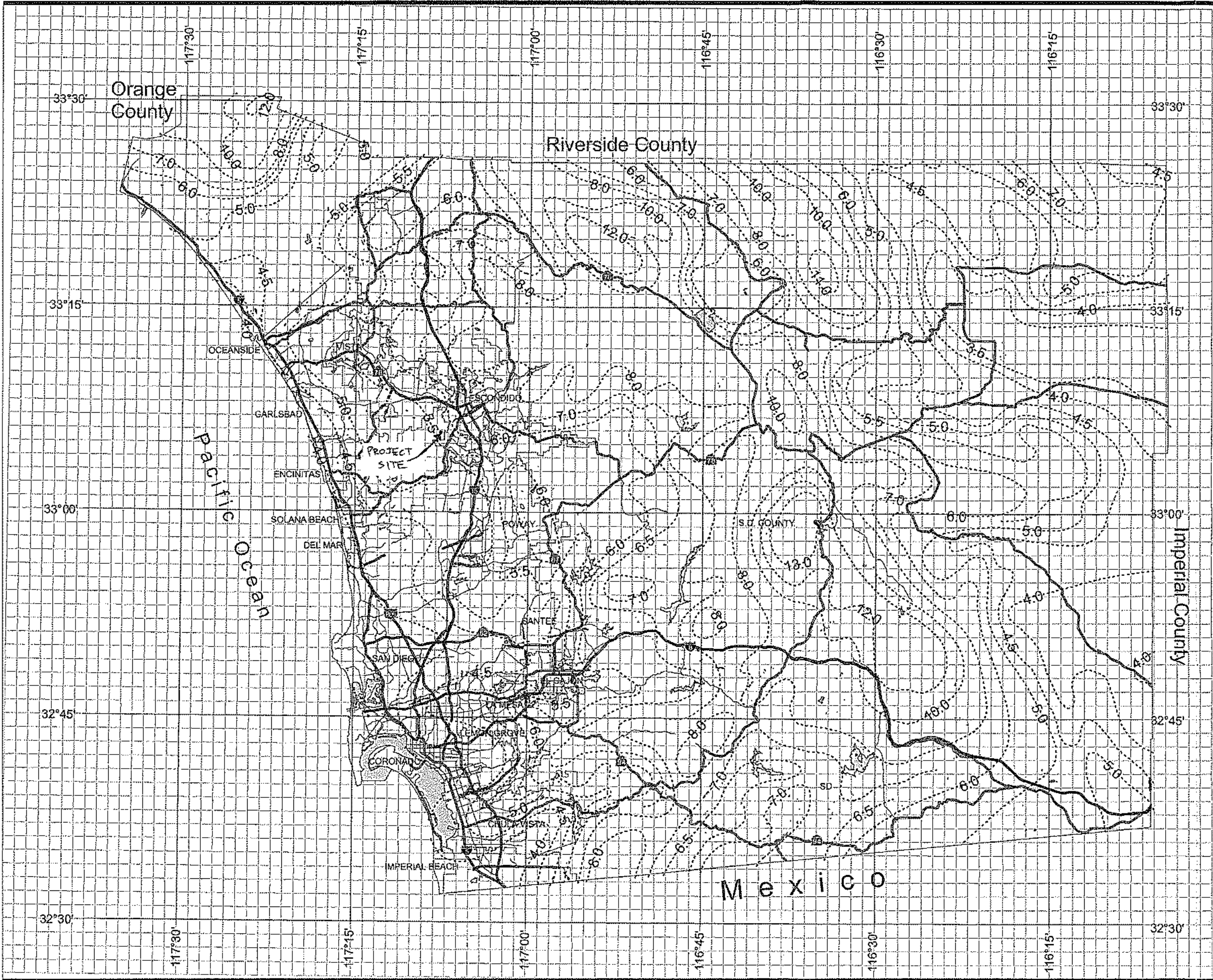
County of San Diego Hydrology Manual



Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

----- Isopluvial (inches)



3 0 3 Miles

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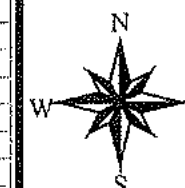
Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

----- Isopluvial (inches)

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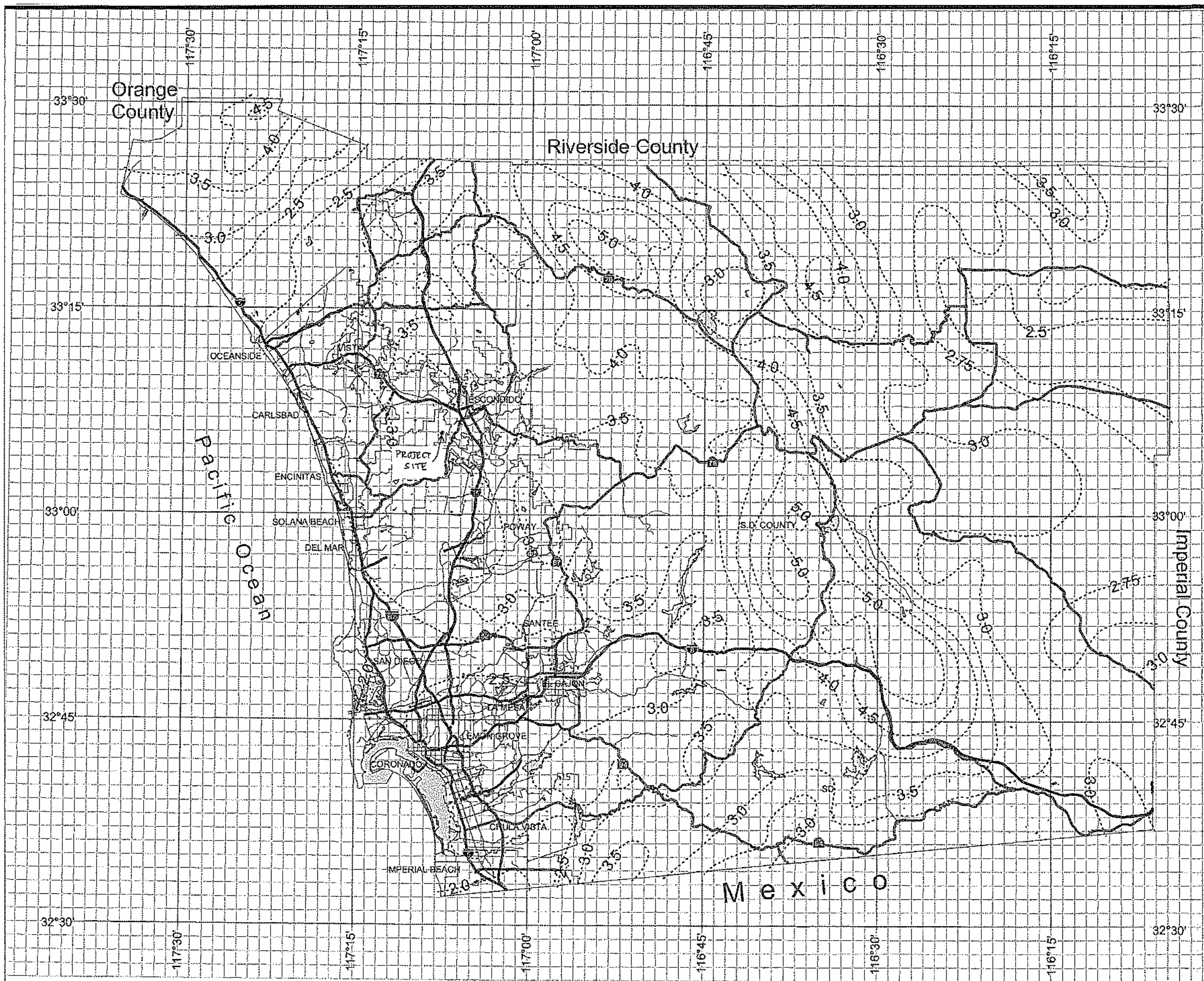


3 0 3 Miles

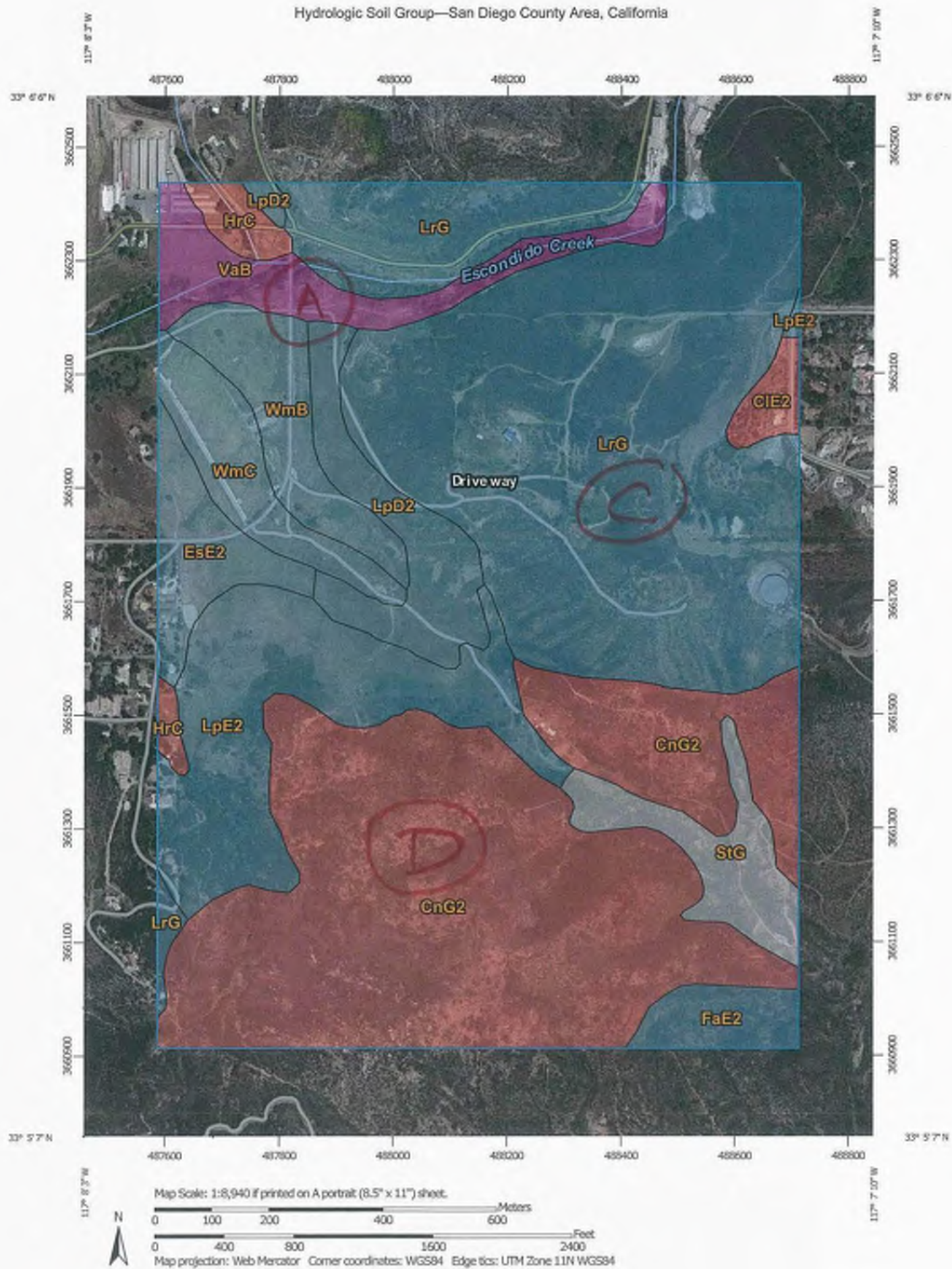
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Hydrologic Soil Group—San Diego County Area, California



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
 Survey Area Data: Version 8, Sep 17, 2014

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

Date(s) aerial images were photographed: May 3, 2010—Jun 19, 2010

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CIE2	Cienega coarse sandy loam, 15 to 30 percent slopes, eroded	D	3.7	0.9%
CnG2	Cienega-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded	D	130.2	30.6%
EsE2	Escondido very fine sandy loam, 15 to 30 percent slopes, eroded	C	12.3	2.9%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	7.2	1.7%
HrC	Huerfano loam, 2 to 9 percent slopes	D	5.2	1.2%
LpD2	Las Posas fine sandy loam, 9 to 15 percent slopes, eroded	C	18.1	4.3%
LpE2	Las Posas fine sandy loam, 15 to 30 percent slopes, eroded	C	41.8	9.8%
LrG	Las Posas stony fine sandy loam, 30 to 65 percent slopes	C	147.3	34.6%
StG	Steep gullied land		13.5	3.2%
VaB	Visalia sandy loam, 2 to 5 percent slopes	A	17.2	4.0%
WmB	Wyman loam, 2 to 5 percent slopes	C	15.5	3.6%
WmC	Wyman loam, 5 to 9 percent slopes	C	13.7	3.2%
Totals for Area of Interest			425.6	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

**Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS**

Land Use		Runoff Coefficient "C"				
NRCS Elements	County Elements	% IMPER.	Soil Type			
			A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, C_p , for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service



APPENDIX 2

Weighted Runoff Coefficient Calculations for Subareas with Multiple Land uses and/or Soil Types

Summary Calculations to Determine Existing Condition Composite Runoff Coefficients for Individual Subareas

EXISTING CONDITIONS & OFFSITE CONDITIONS

Node 201

Total acreage= 0.85

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Med Density Resid, 7.5du/ac or less	0.53	0.00	0.16	0.16	0.48	0.51	0.54	0.57	0.25	0.00	0.09	0.09	0.51

Node 210-202

Total acreage= 31.90

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Low Density Resid, 1du/ac or less	0	0.00	25.62	6.28	0.2	0.25	0.3	0.35	0.00	0.00	7.69	2.20	0.31

Node 212-210

Total acreage= 10.40

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Low Density Resid, 1du/ac or less	0	0.00	9.33	1.07	0.2	0.25	0.3	0.35	0.00	0.00	2.80	0.37	0.31

Node 214-212

Total acreage= 0.48

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	0.2	0.28	0.2	0.25	0.3	0.35	0.00	0.00	0.06	0.10	0.33

Node 302-300

Total acreage= 15.40

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0	14.17	1.23	0.2	0.25	0.3	0.35	0.00	0.00	4.25	0.43	0.30

Node 304-302

Total acreage= 0.33

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0	0.3	0.03	0.2	0.25	0.3	0.35	0.00	0.00	0.09	0.01	0.30

Node 458-462

Total acreage= 34.50

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	6.01	28.49	0.2	0.25	0.3	0.35	0.00	0.00	1.80	9.97	0.34

Node 462-400

Total acreage= 0.95

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0	0.79	0.16	0.2	0.25	0.3	0.35	0.00	0.00	0.24	0.06	0.31

Summary Calculations to Determine Existing Condition Composite Runoff Coefficients for Individual Subareas

EXISTING CONDITIONS & OFFSITE CONDITIONS

Node 464-468														
Total acreage=		6.88												
	Soil A	Soil B	Soil C	Soil D	Soil A	Soil B	Soil C	Soil D	Soil A	Soil B	Soil C	Soil D	Composite Runoff Coef.	
Land Use / Land Cover	(acres)	(acres)	(acres)	(acres)	C	C	C	C	A*C	A*C	A*C	A*C		
Undisturbed Natural Terrain	0	0	0.28	6.6	0.2	0.25	0.3	0.35	0.00	0.00	0.08	2.31		
													0.35	

Node 468-462														
Total acreage=		3.85												
	Soil A	Soil B	Soil C	Soil D	Soil A	Soil B	Soil C	Soil D	Soil A	Soil B	Soil C	Soil D	Composite Runoff Coef.	
Land Use / Land Cover	(acres)	(acres)	(acres)	(acres)	C	C	C	C	A*C	A*C	A*C	A*C		
Undisturbed Natural Terrain	0	0	2.86	0.99	0.2	0.25	0.3	0.35	0.00	0.00	0.86	0.35		
													0.31	

Node 470-468														
Total acreage=		25.90												
	Soil A	Soil B	Soil C	Soil D	Soil A	Soil B	Soil C	Soil D	Soil A	Soil B	Soil C	Soil D	Composite Runoff Coef.	
Land Use / Land Cover	(acres)	(acres)	(acres)	(acres)	C	C	C	C	A*C	A*C	A*C	A*C		
Undisturbed Natural Terrain	0	0	0.71	25.19	0.2	0.25	0.3	0.35	0.00	0.00	0.21	8.82		
													0.35	

Summary Calculations to Determine Existing Condition Composite Runoff Coefficients for Individual Subareas

PROPOSED CONDITION & OFFSITE CONDITIONS

Node 204.6-202.6

Total acreage= 3.41

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	0.34	3.07	0.2	0.25	0.3	0.35	0.00	0.00	0.10	1.07	0.35

Node 262.4-260.4

Total acreage= 12.60

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	11.49	1.11	0.2	0.25	0.3	0.35	0.00	0.00	3.45	0.39	0.30

Node 264.4-262.4

Total acreage= 0.48

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	0.2	0.28	0.2	0.25	0.3	0.35	0.00	0.00	0.06	0.10	0.33

Node 268.4-266.4

Total acreage= 2.31

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	1.58	0.73	0.2	0.25	0.3	0.35	0.00	0.00	0.47	0.26	0.32

Node 288.4-286.4

Total acreage= 1.65

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	0.21	1.44	0.2	0.25	0.3	0.35	0.00	0.00	0.06	0.50	0.34

Node 324-322

Total acreage= 0.87

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Residential, 24.0 DU/A	0	0	0.85	0.02	0.66	0.67	0.69	0.71	0.00	0.00	0.59	0.01	0.69

Node 325-324

Total acreage= 0.34

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Residential, 24.0 DU/A	0	0	0.11	0.23	0.66	0.67	0.69	0.71	0.00	0.00	0.08	0.16	0.70

Node 328-326

Total acreage= 5.59

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Residential, 24.0 DU/A	0	0	5.09	0.5	0.66	0.67	0.69	0.71	0.00	0.00	3.51	0.36	0.69

Node 338-336

Total acreage= 0.31

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Residential, 24.0 DU/A	0	0	0.27	0.04	0.66	0.67	0.69	0.71	0.00	0.00	0.19	0.03	0.69

Node 346-344

Total acreage= 1.10

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Residential, 24.0 DU/A	0	0	0.03	1.07	0.66	0.67	0.69	0.71	0.00	0.00	0.02	0.76	0.71

Summary Calculations to Determine Existing Condition Composite Runoff Coefficients for Individual Subareas

PROPOSED CONDITION & OFFSITE CONDITIONS

Node 348-346

Total acreage= 0.19

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
Residential, 14.5 DU/A	0	0	0.1	0.09	0.55	0.58	0.6	0.63	0.00	0.00	0.06	0.06	0.61

Node 354-352

Total acreage= 0.08

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
General Industrial	0	0	0.06	0.02	0.87	0.87	0.87	0.87	0.00	0.00	0.05	0.02	0.87

Node 458-462

Total acreage= 34.50

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	6.01	28.49	0.2	0.25	0.3	0.35	0.00	0.00	1.80	9.97	0.34

Node 462-400

Total acreage= 1.25

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0.00	1.03	0.22	0.2	0.25	0.3	0.35	0.00	0.00	0.31	0.08	0.31

Node 464-468

Total acreage= 5.97

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0	0.09	5.88	0.2	0.25	0.3	0.35	0.00	0.00	0.03	2.06	0.35

Node 470-468

Total acreage= 25.90

Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
Undisturbed Natural Terrain	0	0	0.7	25.2	0.2	0.25	0.3	0.35	0.00	0.00	0.21	8.82	0.35



APPENDIX 3

100-year Existing Conditions Rational Method Computer Output

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
 2003, 1985, 1981 HYDROLOGY MANUAL
 (c) Copyright 1982-2012 Advanced Engineering Software (aes)
 Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * HARMONY GROVE *
 * JN 409S *
 * BASIN 100-EXISTING CONDITION-100-YEAR STORM EVENT *

FILE NAME: S100F100.DAT
 TIME/DATE OF STUDY: 15:06 11/10/2015

 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
 USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND SURFFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GUTTERFALL: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
 NO. (FI) (FT) SIDE / SIDE/ WAY (FI) (FI) (FT) (FI) (n)

 1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL SURFFLOW FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FFEI
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FI*FI/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

 FLOW PROCESS FROM NODE 106.00 TO NODE 104.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85

INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00
 UPSIRFAM FLOW(FFFI) = 1020.00
 DOWNSTRFAM ELEVATION(FEET) = 966.00
 ELEVATION DIFFERENCE(FEET) = 54.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN THE CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.210
 SUBAREA RUNOFF(CFS) = 2.16
 TOTAL AREA(ACRES) = 1.00 TOTAL RUNOFF(CFS) = 2.16

 FLOW PROCESS FROM NODE 104.00 TO NODE 102.00 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

 ELEVATION DATA: UPSIRFAM(FFFI) = 966.00 DOWNSTRFAM(FEET) = 708.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1445.00 CHANNEL SLOPE = 0.1785
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FFFI) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.317
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.32
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.97
 AVERAGE FLOW DEPTH(FEET) = 0.22 TRAVEL TIME(MIN.) = 4.03
 IC(MIN.) = 10.72
 SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 23.77
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
 TOTAL AREA(ACRES) = 15.9 PFAK FLOW RATE(CFS) = 25.36

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FFFI) = 0.30 FLOW VELOCITY(FEET/SEC.) = 7.34
 LONGEST FLOWPATH FROM NODE 106.00 TO NODE 102.00 = 1645.00 FFEI.

 FLOW PROCESS FROM NODE 102.00 TO NODE 100.00 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

 ELEVATION DATA: UPSIRFAM(FEET) = 708.00 DOWNSTRFAM(FEET) = 670.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 390.00 CHANNEL SLOPE = 0.0974
 CHANNEL BASE(FFFI) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FFFI) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.008
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.43
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.24
 AVERAGE FLOW DEPTH(FEET) = 0.37 TRAVEL TIME(MIN.) = 1.04
 IC(MIN.) = 11.76

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SUBAREA AREA(ACRES) = 2.75 SUBAREA RUNOFF(CFS) = 4.13
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
 TOTAL AREA(ACRES) = 18.6 PEAK FLOW RATE(CFS) = 28.02

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.38 FLOW VELOCITY(FEET/SEC.) = 6.26
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 100.00 = 2035.00 FEET.

 FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 81

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

=====

100 YEAR RAINEALL INTENSITY(INCH/HOUR) = 5.008
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
 SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00
 TOTAL AREA(ACRES) = 18.6 TOTAL RUNOFF(CFS) = 28.02
 TC(MIN.) = 11.76

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 18.6 TC(MIN.) = 11.76
 PEAK FLOW RATE(CFS) = 28.02

=====

END OF RATIONAL METHOD ANALYSIS

20

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* HARMONY GROVE *
* BASIN 200 *
* EXISTING CONDITION - 100-YEAR STORM EVENT *

FILE NAME: S200E100.DAT
TIME/LATE OF STUDY: 12:13 12/20/2016

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:-----
2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENT(S) TO USE FOR FRICTION SLOPE = 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET- SIDE / SIDE / WAY	CURB CUTTER- HEIGHT (FT)	CEOMETRIES: WIDTH (FT)	MANNING LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.8150

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.*

FLOW PROCESS FROM NODE 214.00 TO NODE 212.00 IS CODE = 21-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3300
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(Feet) = 180.00
UPSTREAM ELEVATION(Feet) = 828.50
DOWNSTREAM ELEVATION(Feet) = 808.00
ELEVATION DIFFERENCE(Feet) = 20.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.434
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

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THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION:
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.390
SUBAREA RUNOFF(CFS) = 1.17
TOTAL AREA(ACRES) = 0.48 TOTAL RUNOFF(CFS) = 1.17

FLOW PROCESS FROM NODE 212.00 TO NODE 210.00 IS CODE = 51-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(Feet) = 808.00 DOWNSTREAM(Feet) = 690.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 725.00 CHANNEL SLOPE = 0.1628
CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.096

*USER SPECIFIED(SUBAREA):

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.10

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.40

AVERAGE FLOW DEPTH(Feet) = 0.19 TRAVEL TIME(MIN.) = 2.24

Tc(MIN.) = 8.67

SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 19.65

AREA-AVERAGE RUNOFF COEFFICIENT = 0.311

TOTAL AREA(ACRES) = 10.9 PEAK FLOW RATE(CFS) = 20.62

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 0.27 FLOW VELOCITY(Feet/Sec.) = 6.68

LONGEST FLOWPATH FROM NODE 214.00 TO NODE 210.00 = 905.00 FEET.

FLOW PROCESS FROM NODE 210.00 TO NODE 202.00 IS CODE = 51-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(Feet) = 690.00 DOWNSTREAM(Feet) = 638.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 990.00 CHANNEL SLOPE = 0.0525
CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.102

*USER SPECIFIED(SUBAREA):

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 45.95

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.99

AVERAGE FLOW DEPTH(Feet) = 0.59 TRAVEL TIME(MIN.) = 2.76

Tc(MIN.) = 11.43

SUBAREA AREA(ACRES) = 31.90 SUBAREA RUNOFF(CFS) = 50.45

AREA-AVERAGE RUNOFF COEFFICIENT = 0.310

TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 67.71

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 0.74 FLOW VELOCITY(Feet/Sec.) = 6.73

LONGEST FLOWPATH FROM NODE 214.00 TO NODE 202.00 = 1895.00 FEET.

FLOW PROCESS FROM NODE 210.00 TO NODE 202.00 IS CODE = 1-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 11.43
RAINFALL INTENSITY(INCH/HR) = 5.10
TOTAL STREAM AREA(ACRES) = 42.78
PEAK FLOW RATE(CFS) AT CONFLUENCE = 67.71

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*****
FLOW PROCESS FROM NODE 208.00 TO NODE 206.00 IS CODE = 21

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>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

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NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
INITIAL SUBAREA FLOW-LENGTH(FEET) = 170.00
UPSTREAM ELEVATION(FEET) = 898.00
DOWNSTREAM ELEVATION(FEET) = 828.00
ELEVATION DIFFERENCE(FEET) = 60.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-16 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HR) = 7.210
SUBAREA RUNOFF(CFS) = 0.71
TOTAL AREA(ACRES) = 0.33 TOTAL RUNOFF(CFS) = 0.71

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*****
FLOW PROCESS FROM NODE 206.00 TO NODE 204.00 IS CODE = 51

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>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

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ELEVATION DATA: UPSTREAM( FEET) = 828.00 DOWNSTREAM( FEET) = 680.00
CHANNEL LENGTH THRU SUBAREA( FEET) = 610.00 CHANNEL SLOPE = 0.2426
CHANNEL BASE( FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH( FEET) = 1.00
100 YEAR RAINFALL INTENSITY( INCH/ HOUR) = 5.061
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.05
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY( FEET/ SEC.) = 4.09
AVERAGE FLOW DEPTH( FEET) = 0.09 TRAVEL TIME( MIN.) = 2.48
Tc( MIN.) = 9.17
SUBAREA AREA( ACRES) = 3.73 SUBAREA RUNOFF( CFS) = 6.59
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA( ACRES) = 4.1 PEAK FLOW RATE( CFS) = 7.16

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH( FEET) = 0.13 FLOW VELOCITY( FEET/ SEC.) = 5.07
LONGEST FLOWPATH FROM NODE 208.00 TO NODE 204.00 = 780.00 FEET.

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*****
FLOW PROCESS FROM NODE 204.00 TO NODE 202.00 IS CODE = 51

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```

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

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```

ELEVATION DATA: UPSTREAM( FEET) = 680.00 DOWNSTREAM( FEET) = 638.00
CHANNEL LENGTH THRU SUBAREA( FEET) = 545.00 CHANNEL SLOPE = 0.0771

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CHANNEL BASE( FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH( FEET) = 1.00
100 YEAR RAINFALL INTENSITY( INCH/ HOUR) = 5.064
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.15
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY( FEET/ SEC.) = 3.80
AVERAGE FLOW DEPTH( FEET) = 0.20 TRAVEL TIME( MIN.) = 2.39
Tc( MIN.) = 11.56
SUBAREA AREA( ACRES) = 1.30 SUBAREA RUNOFF( CFS) = 1.97
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA( ACRES) = 5.4 PEAK FLOW RATE( CFS) = 8.14

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH( FEET) = 0.20 FLOW VELOCITY( FEET/ SEC.) = 3.79
LONGEST FLOWPATH FROM NODE 208.00 TO NODE 202.00 = 1325.00 FEET.

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*****
FLOW PROCESS FROM NODE 204.00 TO NODE 202.00 IS CODE = 1

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>>>>>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.) = 11.56
RAINFALL INTENSITY(INCH/HR) = 5.06
TOTAL STREAM AREA(ACRES) = 5.36
PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.14

```

```

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HR) (ACRES)
1 67.71 11.43 5.102 42.78
2 8.14 11.56 5.064 5.36

```

```

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

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** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HR)
1 75.76 11.43 5.102
2 75.35 11.56 5.064

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 75.76 Tc(MIN.) = 11.43
TOTAL AREA(ACRES) = 48.1
LONGEST FLOWPATH FROM NODE 214.00 TO NODE 202.00 = 1895.00 FEET.

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*****
FLOW PROCESS FROM NODE 202.00 TO NODE 200.00 IS CODE = 51

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>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

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```

ELEVATION DATA: UPSTREAM( FEET) = 638.00 DOWNSTREAM( FEET) = 579.00
CHANNEL LENGTH THRU SUBAREA( FEET) = 1525.00 CHANNEL SLOPE = 0.0446
CHANNEL BASE( FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH( FEET) = 2.00
100 YEAR RAINFALL INTENSITY( INCH/ HOUR) = 4.284
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600

```

SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 101.14
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.15
 AVERAGE FLOW DEPTH(FEET) = 0.96 TRAVEL TIME(MIN.) = 3.55
 TC(MIN.) = 14.98
 SUBAREA AREA(ACRES) = 32.90 SUBAREA RUNOFF(CFS) = 50.74
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.330
 TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 114.49

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.02 FLOW VELOCITY(FEET/SEC.) = 7.44
 LONGEST FLOWPATH FROM NODE 214.00 TO NODE 200.00 = 3420.00 FEET.

 FLOW PROCESS FROM NODE 201.00 TO NODE 200.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.284
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5100
 S.C.S. CURVE NUMBER (AMC II) = 76
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3316
 SUBAREA AREA(ACRES) = 0.85 SUBAREA RUNOFF(CFS) = 1.86
 TOTAL AREA(ACRES) = 81.9 TOTAL RUNOFF(CFS) = 116.35
 TC(MIN.) = 14.98

 FLOW PROCESS FROM NODE 200.00 TO NODE 200.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.284
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3316
 SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00
 TOTAL AREA(ACRES) = 81.9 TOTAL RUNOFF(CFS) = 116.35
 TC(MIN.) = 14.98

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 81.9 TC(MIN.) = 14.98
 PEAK FLOW RATE(CFS) = 116.35

END OF RATIONAL METHOD ANALYSIS

RAIIONAL MEIHOO HYOROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003, 1985, 1981 HYOROLOGY MANUAL

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Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****

* HARMONY GROVE *
* JN 4095.01 *
* BASIN 300 - EXISTING CONDITION - 100-YEAR STORM EVENT *

FILE NAME: S300E100.OAT
TIME/DATE OF STUDY: 08:18 01/21/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

USER-DEFINED SIREET-SECTIONS FOR COUPLED PIPEFLOW AND SIREETFLOW MODEL

NO.	(EI)	(EI)	SIZE / SIDE / WAY	(EI)	(EI)	(FT)	(FI)	(n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL SIREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 EEEI
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FI*EI/5)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 304.00 TO NODE 302.00 IS CODE = 21

>>>>RAIIONAL MEIHOO INITIAL SUBAREA ANALYSIS<<<<

*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(EEEE) = 260.00
UPSTREAM ELEVATION(EEEE) = 812.00
DOWNSTREAM ELEVATION(EEEE) = 757.00
ELEVATION DIFFERENCE(FEEI) = 55.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN IC CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.210
SUBAREA RUNOFF(CFS) = 0.71
TOTAL AREA(ACRES) = 0.33 TOTAL RUNOFF(CFS) = 0.71

FLOW PROCESS FROM NODE 302.00 TO NODE 300.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(EEEE) = 757.00 DOWNSTREAM(EEEE) = 606.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1090.00 CHANNEL SLOPE = 0.1385
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(EEEE) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.562

*USER SPECIFIED(SUBAREA):

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CES) = 13.80
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(EEEE/SEC.) = 5.49
AVERAGE FLOW DEPTH(EEEE) = 0.23 TRAVEL TIME(MIN.) = 3.31
TC(MIN.) = 10.00
SUBAREA AREA(ACRES) = 15.40 SUBAREA RUNOFF(CFS) = 25.70
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 15.7 PEAK FLOW RATE(CES) = 26.25

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(EEEE) = 0.33 FLOW VELOCITY(EEEE/SEC.) = 6.81
LONGEST FLOWPATH FROM NODE 304.00 TO NODE 300.00 = 1350.00 EEEI.

FLOW PROCESS FROM NODE 300.00 TO NODE 300.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.562
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CES) = 0.00
TOTAL AREA(ACRES) = 15.7 TOTAL RUNOFF(CES) = 26.25
TC(MIN.) = 10.00

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 15.7 TC(MIN.) = 10.00
PEAK FLOW RATE(CES) = 26.25

=====

END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003, 1985, 1981 HYDROLOGY MANUAL

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Analysis prepared by:

***** DESCRIPTION OF STUDY *****

* HARMONY GROVE *
* 3N 4095.0T *
* BASTN 400 - EXISTING CONDITION - 100-YEAR STORM EVENT *

FILE NAME: S400E100.DAT
TIME/DATE OF STUDY: 09:36 01/21/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
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) (n)
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0750

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.*

FLOW PROCESS FROM NODE 472.00 TO NODE 470.00 IS CODE = 2T

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88

INITIAL SUBAREA FLOW-LENGTH(FEET) = 220.00
UPSTREAM ELEVATION(FEET) = 983.00
DOWNSTREAM ELEVATION(FEET) = 875.00
ELEVATION DIFFERENCE(FEET) = 108.00
SUBAREA OVERLAND TIME OF FLOW(MTN.) = 6.267
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-T8 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
SUBAREA RUNOFF(CFS) = 3.42
TOTAL AREA(ACRES) = 1.30 TOTAL RUNOFF(CFS) = 3.42

FLOW PROCESS FROM NODE 470.00 TO NODE 468.00 IS CODE = 5T

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 875.00 DOWNSTREAM(FEET) = 652.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1480.00 CHANNEL SLOPE = 0.1507
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.694

*USER SPECIFIED(SUBAREA):

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) = 88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 29.70
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.3T
AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MTN.) = 3.37
Tc(MTN.) = 9.64
SUBAREA AREA(ACRES) = 25.90 SUBAREA RUNOFF(CFS) = 51.61
AREA-AVERAGE RUNOFF COEFFICIENT = 0.350
TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 54.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.49 FLOW VELOCITY(FEET/SEC.) = 8.99
LONGEST FLOWPATH FROM NODE 472.00 TO NODE 468.00 = 1700.00 FEET.

FLOW PROCESS FROM NODE 470.00 TO NODE 468.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM ARE:
TIME OF CONCENTRATION(MTN.) = 9.64
RAINFALL INTENSITY(INCH/HR) = 5.69
TOTAL STREAM AREA(ACRES) = 27.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 54.20

FLOW PROCESS FROM NODE 468.00 TO NODE 464.00 IS CODE = 2T

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500

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SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 88
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 200.00
 UPSTREAM ELEVATION(Feet) = 995.00
 DOWNSTREAM ELEVATION(Feet) = 875.00
 ELEVATION DIFFERENCE(Feet) = 120.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
 SUBAREA RUNOFF(CFS) = 2.42
 TOTAL AREA(ACRES) = 0.92 TOTAL RUNOFF(CFS) = 2.42

 FLOW PROCESS FROM NODE 464.00 TO NODE 468.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
 =====
 ELEVATION DATA: UPSTREAM(Feet) = 875.00 DOWNSTREAM(Feet) = 652.00
 CHANNEL LENGTH THRU SUBAREA(Feet) = 750.00 CHANNEL SLOPE = 0.2973
 CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.284
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.04
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 6.24
 AVERAGE FLOW DEPTH(Feet) = 0.15 TRAVEL TIME(MIN.) = 2.00
 Tc(MIN.) = 8.27
 SUBAREA AREA(ACRES) = 6.88 SUBAREA RUNOFF(CFS) = 15.13
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.350
 TOTAL AREA(ACRES) = 7.8 PEAK FLOW RATE(CFS) = 17.16
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.20 FLOW VELOCITY(Feet/Sec.) = 7.67
 LONGEST FLOWPATH FROM NODE 466.00 TO NODE 468.00 = 950.00 FEET.

 FLOW PROCESS FROM NODE 464.00 TO NODE 468.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
 =====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.27
 RAINFALL INTENSITY(INCH/HR) = 6.28
 TOTAL STREAM AREA(ACRES) = 7.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.16

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	2.42	6.267	7.516	0.92
2	15.13	8.27	6.28	6.88

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1	54.20	9.64	5.694	27.20
2	17.16	8.27	6.284	7.80

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	63.67	8.27	6.284
2	69.75	9.64	5.694

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 69.75 Tc(MIN.) = 9.64
 TOTAL AREA(ACRES) = 35.0
 LONGEST FLOWPATH FROM NODE 472.00 TO NODE 468.00 = 1700.00 FEET.

 FLOW PROCESS FROM NODE 468.00 TO NODE 462.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
 =====
 ELEVATION DATA: UPSTREAM(Feet) = 652.00 DOWNSTREAM(Feet) = 618.00
 CHANNEL LENGTH THRU SUBAREA(Feet) = 480.00 CHANNEL SLOPE = 0.0708
 CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.327
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 72.93
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 7.63
 AVERAGE FLOW DEPTH(Feet) = 0.71 TRAVEL TIME(MIN.) = 1.05
 Tc(MIN.) = 10.69
 SUBAREA AREA(ACRES) = 3.85 SUBAREA RUNOFF(CFS) = 6.36
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.346
 TOTAL AREA(ACRES) = 38.8 PEAK FLOW RATE(CFS) = 71.61
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.70 FLOW VELOCITY(Feet/Sec.) = 7.59
 LONGEST FLOWPATH FROM NODE 472.00 TO NODE 462.00 = 2180.00 FEET.

 FLOW PROCESS FROM NODE 468.00 TO NODE 462.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 =====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.69
 RAINFALL INTENSITY(INCH/HR) = 5.33
 TOTAL STREAM AREA(ACRES) = 38.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 71.61

 FLOW PROCESS FROM NODE 460.00 TO NODE 458.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

```

=====
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88
INITIAL SUBAREA ELOW-LENGTH(FEET) = 180.00
UPSTREAM ELEVATION(FEET) = 1324.00
DOWNSTREAM ELEVATION(FEET) = 1200.00
ELEVATION DIFFERENCE(FEET) = 124.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
WARNING: INITIAL SUBAREA ELOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND ELOW LENGTH = 100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
SUBAREA RUNOFF(CFS) = 4.76
TOTAL AREA(ACRES) = 1.81 TOTAL RUNOFF(CFS) = 4.76

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```

*****
ELOW PROCESS FROM NODE 458.00 TO NODE 462.00 IS CODE = S1

```

>>>>COMPUTE TRAPEZOIDAL CHANNEL ELOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 1200.00 DOWNSTREAM(FEET) = 618.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 2720.00 CHANNEL SLOPE = 0.2140
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.099
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3400
S.C.S. CURVE NUMBER (AMC II) = 88
TRAVEL TIME COMPUTED USING ESTIMATED ELOW(CFS) = 35.62
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.77
AVERAGE ELOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 5.17
Tc(MIN.) = 11.43
SUBAREA AREA(ACRES) = 34.50 SUBAREA RUNOFF(CFS) = 59.82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.340
TOTAL AREA(ACRES) = 36.3 PEAK ELOW RATE(CFS) = 63.05

```

```

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 FLOW VELOCITY(FEET/SEC.) = 10.65
LONGEST ELOWPATH FROM NODE 460.00 TO NODE 462.00 = 2900.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 458.00 TO NODE 462.00 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.) = 11.43
RAINFALL INTENSITY(INCH/HR) = 5.10
TOTAL STREAM AREA(ACRES) = 36.31
PEAK ELOW RATE(CFS) AT CONFLUENCE = 63.05

```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	71.61	10.69	5.327	38.85
2	63.05	11.43	5.099	36.31

```

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

```

** PEAK ELOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	130.54	10.69	5.327
2	131.60	11.43	5.099

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

```

PEAK FLOW RATE(CFS) = 131.60 Tc(MIN.) = 11.43
TOTAL AREA(ACRES) = 75.2
LONGEST ELOWPATH FROM NODE 460.00 TO NODE 462.00 = 2900.00 FEET.

```

```

*****
ELOW PROCESS FROM NODE 462.00 TO NODE 400.00 IS CODE = S1

```

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 618.00 DOWNSTREAM(FEET) = 606.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 170.00 CHANNEL SLOPE = 0.0706
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.012
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
S.C.S. CURVE NUMBER (AMC II) = 88
TRAVEL TIME COMPUTED USING ESTIMATED ELOW(CFS) = 132.34
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.14
AVERAGE ELOW DEPTH(FEET) = 0.97 TRAVEL TIME(MIN.) = 0.31
Tc(MIN.) = 11.74
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.48
AREA-AVERAGE RUNOFF COEFFICIENT = 0.343
TOTAL AREA(ACRES) = 76.1 PEAK FLOW RATE(CFS) = 131.60

```

```

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.97 ELOW VELOCITY(FEET/SEC.) = 9.11
LONGEST ELOWPATH FROM NODE 460.00 TO NODE 400.00 = 3070.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 400.00 TO NODE 400.00 IS CODE = 81

```

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

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=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.012
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3429

```

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SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00
TOTAL AREA(ACRES) = 76.1 TOTAL RUNOFF(CFS) = 131.60
TC(MIN.) = 11.74

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 76.1 TC(MIN.) = 11.74

PEAK FLOW RATE(CFS) = 131.60

=====

END OF RATIONAL METHOD ANALYSIS

B

RATIDNAL METHDD HYDROLOGY CDMPUTER PRDGRAM PACKAGE

Reference: SAN DIEGO COUNTY FLOOD CONTRDL DISTRICT

2003,1985,1981 HYDRDLGY MANUAL

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Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****

* HARMONY GROVE VILLAGE SDUTH *

* JN 409S *

* BASIN 500 - PROPDSED CONDITIDN - 100-YEAR STDRM EVENT *

FILE NAME: S500P100.DAT
TIME/DATE OF STUDY: 10:58 11/11/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MDDEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLDPE = 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIDNAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CRDSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
ND. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====

1	30.0	20.0	0.018/0.018/0.020	0.50	2.00	0.0313	0.167	0.0150
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GLOBAL STREET FLOW-DEPTH CDNSTRAINTS:

1. Relative Flow-Depth = 0.40 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 0.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 506.00 TO NODE 504.00 IS CODE = 21

>>>>RATIDNAL METHDD INITIAL SUBAREA ANALYSIS<<<<

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF CDEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 90

INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 589.00
DOWNSTREAM ELEVATION(FEET) = 586.00
ELEVATION DIFFERENCE(FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.568
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 80.00
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.38
TOTAL AREA(ACRES) = 0.05 TOTAL RUNOFF(CFS) = 0.38

FLOW PROCESS FROM NODE 504.00 TO NODE 502.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 586.00 DOWNSTREAM ELEVATION(FEET) = 574.00
STREET LENGTH(FEET) = 740.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.09
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOW WIDTH(FEET) = 8.28
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.59
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.80
STREET FLOW TRAVEL TIME(MIN.) = 4.76 Tc(MIN.) = 7.33
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.795
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF CDEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 90
AREA-AVERAGE RUNOFF CDEFFICIENT = 0.870
SUBAREA AREA(ACRES) = 0.57 SUBAREA RUNOFF(CFS) = 3.37
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 3.67

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.36 HALFSTREET FLOW WIDTH(FEET) = 10.90
FLOW VELOCITY(FEET/SEC.) = 2.92 DEPTH*VELOCITY(FT*FT/SEC.) = 1.04
LONGEST FLOWPATH FROM NODE 506.00 TO NODE 502.00 = 840.00 FEET.

FLOW PROCESS FROM NODE 504.00 TO NODE 502.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.33
RAINFALL INTENSITY(INCH/HR) = 6.80
TOTAL STREAM AREA(ACRES) = 0.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.67

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*****
FLOW PROCESS FROM NODE 514.00 TO NODE 512.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

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=====
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
INITIAL SUBAREA ELONG-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 589.00
DOWNSTREAM ELEVATION(FEET) = 586.00
ELEVATION DIFFERENCE(FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.568
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 80.00
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.45
TOTAL AREA(ACRES) = 0.06 TOTAL RUNOFF(CFS) = 0.45

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```

*****
FLOW PROCESS FROM NODE 512.00 TO NODE 510.00 IS CODE = 62

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```

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

```

```

=====
UPSTREAM ELEVATION(FEET) = 586.00 DOWNSTREAM ELEVATION(FEET) = 574.00
STREET LENGTH(FEET) = 740.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00

```

```

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

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```

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

```

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.72
STREET FLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALESTREET FLOOD WIDTH(FEET) = 9.47
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.74
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.91
STREET FLOW TRAVEL TIME(MIN.) = 4.51 Tc(MIN.) = 7.07
100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.951

```

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STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
SUBAREA AREA(ACRES) = 0.74 SUBAREA RUNOFF(CFS) = 4.47
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 4.84

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.38 HALESTREET FLOOD WIDTH(FEET) = 12.38
FLOW VELOCITY(FEET/SEC.) = 3.09 DEPTH*VELOCITY(FT*FT/SEC.) = 1.19
LONGEST FLOWPATH FROM NODE 514.00 TO NODE 510.00 = 840.00 FEET.

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*****
FLOW PROCESS FROM NODE 510.00 TO NODE 502.00 IS CODE = 31

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```

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

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 570.00 DOWNSTREAM(FEET) = 569.40
FLOW LENGTH(FEET) = 61.50 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.54
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.84
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 7.26
LONGEST FLOWPATH FROM NODE 514.00 TO NODE 502.00 = 901.50 FEET.

```

```

*****
FLOW PROCESS FROM NODE 512.00 TO NODE 510.00 IS CODE = 1

```

```

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

```

```

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.26
RAINFALL INTENSITY(INCH/HR) = 6.84
TOTAL STREAM AREA(ACRES) = 0.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.84

```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HR)	AREA (ACRE)
1	3.67	7.33	6.795	0.62
2	4.84	7.26	6.836	0.80

```

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

```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HR)
1	8.47	7.26	6.836
2	8.47	7.33	6.795

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```


S500P100.RES

Printed: 12/21/2015

Modified: 11/11/2015 10:58:57 AM AM

PEAK FLOW RATE(CFS) = 8.47 TC(MIN.) = 7.33
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE S14.00 TO NODE S10.00 = 901.50 FEET.

FLOW PROCESS FROM NODE S02.00 TO NODE S00.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USTNG COMPUTER-ESTMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 569.40 DOWNSTREAM(Feet) = 566.00

FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.5 INCHES

PIPE-FLOW VELOCITY(Feet/Sec.) = 18.31

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 8.47

PIPE TRAVEL TIME(MIN.) = 0.02 TC(MIN.) = 7.35

LONGEST FLOWPATH FROM NODE S14.00 TO NODE S00.00 = 921.50 FEET.

FLOW PROCESS FROM NODE S00.00 TO NODE S00.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.785

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .3700

SOTL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 98

AREA-AVERAGE RUNOFF COEFFICIENT = 0.3700

SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00

TOTAL AREA(ACRES) = 1.4 TOTAL RUNOFF(CFS) = 8.47

TC(MIN.) = 7.35

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.4 TC(MIN.) = 7.35

PEAK FLOW RATE(CFS) = 8.47

END OF RATIONAL METHOD ANALYSIS

0



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APPENDIX 4

100-year Proposed Conditions Rational Method Computer Output

RATIONAL METHOO HYOROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN OIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL

(c) Copyright 1982-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License IO 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* HARMONY GROVE *
* JN 4095 *
* BASIN 100-PROPOSED CONDITION-100-YEAR STORM EVENT *

FILE NAME: S100P100.DAT
TIME/DATE OF STUDY: 15:13 11/10/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN OIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRAOIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
SAN OIEGO HYOROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOO
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIOTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 108.00 TO NODE 106.00 IS CODE = 21

>>>>RATIONAL METHOO INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85

INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00
UPSTREAM ELEVATION(FEET) = 1020.00
DOWNSTREAM ELEVATION(FEET) = 966.00
ELEVATION DIFFERENCE(FEET) = 54.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.210
SUBAREA RUNOFF(CFS) = 2.16
TOTAL AREA(ACRES) = 1.00 TOTAL RUNOFF(CFS) = 2.16

FLOW PROCESS FROM NODE 106.00 TO NODE 104.00 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 966.00 DOWNSTREAM(FEET) = 720.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1400.00 CHANNEL SLOPE = 0.1757
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.356
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.31
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.97
AVERAGE FLOW DEPTH(FEET) = 0.22 TRAVEL TIME(MIN.) = 3.91
Tc(MIN.) = 10.60
SUBAREA AREA(ACRES) = 14.80 SUBAREA RUNOFF(CFS) = 23.78
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 15.8 PEAK FLOW RATE(CFS) = 25.39

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.30 FLOW VELOCITY(FEET/SEC.) = 7.35
LONGEST FLOWPATH FROM NODE 108.00 TO NODE 104.00 = 1600.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 102.00 IS CODE = S1

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

ELEVATION DATA: UPSTREAM(FEET) = 720.00 DOWNSTREAM(FEET) = 682.00
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.43
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 25.39
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 10.77
LONGEST FLOWPATH FROM NODE 108.00 TO NODE 102.00 = 1850.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 100.00 IS CODE = S1

```

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 682.00 DOWNSTREAM(FEET) = 390.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 125.00 CHANNEL SLOPE = 2.3360
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.260
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.64
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 16.78
AVERAGE FLOW DEPTH(Feet) = 0.15 TRAVEL TIME(MIN.) = 0.12
TC(MIN.) = 10.90
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 2.49
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 17.4 PEAK FLOW RATE(CFS) = 27.43

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.15 FLOW VELOCITY(Feet/Sec.) = 17.28
LONGEST FLOWPATH FROM NODE 108.00 TO NODE 100.00 = 1975.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 81

```

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

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100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.260
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00
TOTAL AREA(ACRES) = 17.4 TOTAL RUNOFF(CFS) = 27.43
TC(MIN.) = 10.90
=====

```

```

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 17.4 TC(MIN.) = 10.90
PEAK FLOW RATE(CFS) = 27.43
=====

```

```

END OF RATIONAL METHOD ANALYSIS

```

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003, 1985, 1981 HYDROLOGY MANUAL

(c) Copyright 1982-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License IO 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* HARMONY GROVE *
* JN 409S *
* BASIN 200 - PROPOSED CONDITION - 100-YR STORM EVENT *

FILE NAME: S200P100.DAT
TIME/DATE OF STUDY: 09:15 11/11/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
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) (n)

1 30.0 20.0 0.018/0.018/0.020 0.50 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.40 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 0.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 286.00 TO NODE 284.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (14.5 OI/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86

INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.00
UPSTREAM ELEVATION(FEET) = 697.00
DOWNSTREAM ELEVATION(FEET) = 696.00
ELEVATION DIFFERENCE(FEET) = 1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.408
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.747
SUBAREA RUNOFF(CFS) = 0.85
TOTAL AREA(ACRES) = 0.21 TOTAL RUNOFF(CFS) = 0.85

FLOW PROCESS FROM NODE 284.00 TO NODE 282.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 696.00 DOWNSTREAM ELEVATION(FEET) = 690.00
STREET LENGTH(FEET) = 190.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.29
HALFSTREET FLOOD WIDTH(FEET) = 7.22
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.46
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.01
STREET FLOW TRAVEL TIME(MIN.) = 0.92 Tc(MIN.) = 8.32
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.258
RESIDENTIAL (14.5 OI/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
SUBAREA AREA(ACRES) = 0.76 SUBAREA RUNOFF(CFS) = 2.85
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 3.64

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.28
FLOW VELOCITY(FEET/SEC.) = 3.78 DEPTH*VELOCITY(FT*FT/SEC.) = 1.24
LONGEST FLOWPATH FROM NODE 286.00 TO NODE 282.00 = 310.00 FEET.

FLOW PROCESS FROM NODE 282.00 TO NODE 280.00 IS CODE = 31

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

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 687.00 DOWNSTREAM(FEET) = 686.00
FLOW LENGTH(FEET) = 5.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.20
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.64
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.33
LONGEST FLOWPATH FROM NODE 286.00 TO NODE 280.00 = 315.00 FEET,

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```

*****
FLOW PROCESS FROM NODE 280.00 TO NODE 266.00 IS CODE = 31

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

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 686.00 DOWNSTREAM(FEET) = 673.00
FLOW LENGTH(FEET) = 350.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.35
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.64
PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 9.03
LONGEST FLOWPATH FROM NODE 286.00 TO NODE 266.00 = 665.00 FEET.

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*****
FLOW PROCESS FROM NODE 280.00 TO NODE 266.00 IS CODE = 1

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-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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```

=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.03
RAINFALL INTENSITY(INCH/HR) = 5.94
TOTAL STREAM AREA(ACRES) = 0.97
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.64

```

```

*****
FLOW PROCESS FROM NODE 272.00 TO NODE 270.00 IS CODE = 21

```

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-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

```

```

=====
RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 697.50
DOWNSTREAM ELEVATION(FEET) = 696.00
ELEVATION DIFFERENCE(FEET) = 1.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.695
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 72.50
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.203

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```

SUBAREA RUNOFF(CFS) = 0.65
TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CFS) = 0.65

```

```

*****
FLOW PROCESS FROM NODE 270.00 TO NODE 268.00 IS CODE = 62

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-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

```

```

=====
UPSTREAM ELEVATION(FEET) = 696.00 DOWNSTREAM ELEVATION(FEET) = 677.00
STREET LENGTH(FEET) = 460.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00

```

```

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

```

```

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.71
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.29
HALFSTREET FLOOD WIDTH(FEET) = 7.41
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.17
STREET FLOW TRAVEL TIME(MIN.) = 1.93 Tc(MIN.) = 8.63
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.116
RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
SUBAREA AREA(ACRES) = 1.12 SUBAREA RUNOFF(CFS) = 4.11
TOTAL AREA(ACRES) = 1.3 PEAK FLOW RATE(CFS) = 4.66

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 9.78
FLOW VELOCITY(FEET/SEC.) = 4.45 DEPTH*VELOCITY(FT*FT/SEC.) = 1.50
LONGEST FLOWPATH FROM NODE 272.00 TO NODE 268.00 = 560.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 268.00 TO NODE 266.00 IS CODE = 31

```

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

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 673.00
FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.97
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.66
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 8.66
LONGEST FLOWPATH FROM NODE 272.00 TO NODE 266.00 = 580.00 FEET.

```

 FLOW PROCESS FROM NODE 268.00 TO NODE 266.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MTN.) = 8.66
 RAINFALL INTENSITY(INCH/HR) = 6.10
 TOTAL STREAM AREA(ACRES) = 1.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.66

 FLOW PROCESS FROM NODE 278.00 TO NODE 276.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 150.00
 UPSTREAM ELEVATION(Feet) = 688.00
 DOWNSTREAM ELEVATION(Feet) = 687.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.640
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 55.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN TC CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.614
 SUBAREA RUNOFF(CFS) = 1.03
 TOTAL AREA(ACRES) = 0.26 TOTAL RUNOFF(CFS) = 1.03

 FLOW PROCESS FROM NODE 276.00 TO NODE 274.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(Feet) = 687.00 DOWNSTREAM ELEVATION(Feet) = 677.00
 STREET LENGTH(Feet) = 330.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.11
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.34
 HAILESTREET ELDOO WTDTH(Feet) = 9.91

AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.84
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.30
 STREET FLOW TRAVEL TIME(MTN.) = 1.43 TC(MTN.) = 9.07
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.920
 RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 1.73 SUBAREA RUNOFF(CFS) = 6.15
 TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 7.07

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.39 HALFSTREET ELDOO WTDTH(Feet) = 12.77
 FLOW VELOCITY(Feet/Sec.) = 4.28 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.67
 LONGEST FLOWPATH FROM NODE 278.00 TO NODE 274.00 = 480.00 FEET.

 FLOW PROCESS FROM NODE 274.00 TO NODE 266.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 674.00 DOWNSTREAM(Feet) = 673.00
 FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.8 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 18.43
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-ELDOO(CFS) = 7.07
 PIPE TRAVEL TIME(MIN.) = 0.00 TC(MTN.) = 9.08
 LONGEST FLOWPATH FROM NODE 278.00 TO NODE 266.00 = 485.00 FEET.

 FLOW PROCESS FROM NODE 274.00 TO NODE 266.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MTN.) = 9.08
 RAINFALL INTENSITY(INCH/HR) = 5.92
 TOTAL STREAM AREA(ACRES) = 1.99
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.07

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	TC (MIN.)	INTENSITY (INCH/HR)	AREA (ACRE)
1	3.64	9.03	5.939	0.97
2	4.66	8.66	6.100	1.27
3	7.07	9.08	5.918	1.99

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

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	TC	INTENSITY
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NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	14.90	8.66	6.100
2	15.21	9.03	5.939
3	15.22	9.08	5.918

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CES) = 15.22 Tc(MIN.) = 9.08
 TOTAL AREA(ACRES) = 4.2
 LONGEST FLOWPATH FROM NODE 286.00 TO NODE 266.00 = 665.00 FEET.

FLOW PROCESS FROM NODE 266.00 TO NODE 252.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 673.00 DOWNSTREAM(Feet) = 657.00
 FLOW LENGTH(Feet) = 350.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.2 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 13.10
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 15.22
 PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 9.52
 LONGEST FLOWPATH FROM NODE 286.00 TO NODE 252.00 = 1015.00 FEET.

FLOW PROCESS FROM NODE 266.00 TO NODE 252.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.52
 RAINFALL INTENSITY(INCH/HR) = 5.74
 TOTAL STREAM AREA(ACRES) = 4.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.22

FLOW PROCESS FROM NODE 258.00 TO NODE 256.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

RESIDENTIAL (14.5 OU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 677.00
 DOWNSTREAM ELEVATION(FEET) = 675.00
 ELEVATION DIFFERENCE(FEET) = 2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.389
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 80.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.423
 SUBAREA RUNOFF(CFS) = 0.89
 TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CES) = 0.89

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FLOW PROCESS FROM NODE 256.00 TO NODE 254.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 675.00 DOWNSTREAM ELEVATION(FEET) = 661.00
 STREET LENGTH(FEET) = 260.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.27

STREET FLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.27
 LAKESTREET FLOOD WIDTH(FEET) = 6.09
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.32
 PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 1.17
 STREET FLOW TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 7.39
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.757
 RESIDENTIAL (14.5 OU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 0.68 SUBAREA RUNOFF(CFS) = 2.76
 TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CES) = 3.57

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30 HALFSTREET FLOOD WIDTH(FEET) = 7.97
 FLOW VELOCITY(FEET/SEC.) = 4.69 DEPTH*VELOCITY(Ft*Ft/Sec.) = 1.43
 LONGEST FLOWPATH FROM NODE 258.00 TO NODE 254.00 = 360.00 FEET.

FLOW PROCESS FROM NODE 254.00 TO NODE 252.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 658.00 DOWNSTREAM(FEET) = 657.00
 FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.24
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.57
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 7.43
 LONGEST FLOWPATH FROM NODE 258.00 TO NODE 252.00 = 380.00 FEET.

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FLOW PROCESS FROM NODE 254.00 TO NODE 252.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.43
 RAINFALL INTENSITY(INCH/HR) = 6.74
 TOTAL STREAM AREA(ACRES) = 0.88
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.57

FLOW PROCESS FROM NODE 264.00 TO NODE 262.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

RESTDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 160.00
 UPSTREAM ELEVATION(Feet) = 675.00
 DOWNSTREAM ELEVATION(Feet) = 674.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.717
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 53.75
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.572
 SUBAREA RUNOFF(CFS) = 1.06
 TOTAL AREA(ACRES) = 0.27 TOTAL RUNOFF(CFS) = 1.06

FLOW PROCESS FROM NODE 262.00 TO NODE 260.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(Feet) = 674.00 DOWNSTREAM ELEVATION(Feet) = 661.00
 STREET LENGTH(Feet) = 330.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.24
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.33
 HALFSTREET FLOOD WIDTH(Feet) = 9.47
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.27
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.42

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STREET FLOW TRAVEL TIME(MIN.) = 1.29 Tc(MIN.) = 9.01
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.949
 RESTDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 1.78 SUBAREA RUNOFF(CFS) = 6.35
 TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 7.32

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.38 HALFSTREET FLOOD WIDTH(Feet) = 12.23
 FLOW VELOCITY(Feet/Sec.) = 4.79 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.82
 LONGEST FLOWPATH FROM NODE 264.00 TO NODE 260.00 = 490.00 FEET.

=====

FLOW PROCESS FROM NODE 260.00 TO NODE 252.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 658.00 DOWNSTREAM(Feet) = 657.00
 FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.9 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 18.62
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.32
 PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 9.01
 LONGEST FLOWPATH FROM NODE 264.00 TO NODE 252.00 = 495.00 FEET.

=====

FLOW PROCESS FROM NODE 260.00 TO NODE 252.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.01
 RAINFALL INTENSITY(INCH/HR) = 5.95
 TOTAL STREAM AREA(ACRES) = 2.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.32

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HR)	AREA (ACRE)
1	15.22	9.52	5.738	4.23
2	3.57	7.43	6.735	0.88
3	7.32	9.01	5.947	2.05

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HR)
1	22.57	7.43	6.735

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2	25.15	9.01	5.947
3	25.32	9.52	5.738

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 25.32 Tc(MTN.) = 9.52
 TOTAL AREA(ACRES) = 7.2
 LONGEST FLOWPATH FROM NODE 286.00 TO NODE 252.00 = 1015.00 FEET.

 FLOW PROCESS FROM NODE 252.00 TO NODE 238.00 TS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 657.00 DOWNSTREAM(Feet) = 639.00
 FLOW LENGTH(Feet) = 336.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.3 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 15.78
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 25.32
 PIPE TRAVEL TIME(MTN.) = 0.35 Tc(MTN.) = 9.88
 LONGEST FLOWPATH FROM NODE 286.00 TO NODE 238.00 = 1351.00 FEET.

 FLOW PROCESS FROM NODE 252.00 TO NODE 238.00 TS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MTN.) = 9.88
 RAINFALL INTENSITY(INCH/HR) = 5.60
 TOTAL STREAM AREA(ACRES) = 7.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 25.32

 FLOW PROCESS FROM NODE 244.00 TO NODE 242.00 TS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RAINFALL INTENSITY(14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW LENGTH(Feet) = 165.00
 UPSTREAM ELEVATION(Feet) = 655.00
 DOWNSTREAM ELEVATION(Feet) = 654.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MTN.) = 7.756
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 53.18
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.551
 SUBAREA RUNOFF(CFS) = 1.81
 TOTAL AREA(ACRES) = 0.46 TOTAL RUNOFF(CFS) = 1.81

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FLOW PROCESS FROM NODE 242.00 TO NODE 240.00 TS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSTREAM ELEVATION(Feet) = 654.00 DOWNSTREAM ELEVATION(Feet) = 643.00
 STREET LENGTH(Feet) = 150.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
 INSTANT STREET CROSSFALL(DECIMAL) = 0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.28
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.29
 HALFSTREET FLOOD WIDTH(Feet) = 6.97
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 5.23
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.50
 STREET FLOW TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 8.23
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.303
 RAINFALL INTENSITY(14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 0.78 SUBAREA RUNOFF(CFS) = 2.95
 TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 4.69

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.31 HALFSTREET FLOOD WIDTH(Feet) = 8.53
 FLOW VELOCITY(Feet/Sec.) = 5.56 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.75
 LONGEST FLOWPATH FROM NODE 244.00 TO NODE 240.00 = 315.00 FEET.

 FLOW PROCESS FROM NODE 240.00 TO NODE 238.00 TS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 640.00 DOWNSTREAM(Feet) = 639.00
 FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.00
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.9 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 16.37
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.69
 PIPE TRAVEL TIME(MTN.) = 0.01 Tc(MTN.) = 8.24
 LONGEST FLOWPATH FROM NODE 244.00 TO NODE 238.00 = 320.00 FEET.

 FLOW PROCESS FROM NODE 240.00 TO NODE 238.00 TS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.24
 RAINFALL INTENSITY(INCH/HR) = 6.30
 TOTAL STREAM AREA(ACRES) = 1.24
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.69

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	25.32	9.88	5.604	7.16
2	4.69	8.24	6.300	1.24

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	27.21	8.24	6.300
2	29.49	9.88	5.604

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 29.49 Tc(MIN.) = 9.88
 TOTAL AREA(ACRES) = 8.4
 LONGEST FLOWPATH FROM NODE 286.00 TO NODE 238.00 = 1351.00 FEET.

=====

FLOW PROCESS FROM NODE 240.00 TO NODE 238.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

=====

FLOW PROCESS FROM NODE 240.00 TO NODE 238.00 IS CODE = 13

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

=====

FLOW PROCESS FROM NODE 250.00 TO NODE 248.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 140.00
 UPSTREAM ELEVATION(FEET) = 716.00
 DOWNSTREAM ELEVATION(FEET) = 660.00
 ELEVATION DIFFERENCE(FEET) = 56.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.183
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00

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(Reference: Table 3-18 of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.582
 SUBAREA RUNOFF(CFS) = 0.38
 TOTAL AREA(ACRES) = 0.14 TOTAL RUNOFF(CFS) = 0.38

=====

FLOW PROCESS FROM NODE 248.00 TO NODE 246.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 660.00 DOWNSTREAM ELEVATION(FEET) = 643.00
 STREET LENGTH(FEET) = 290.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.71
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.25
 HALFSTREET FLOOD WIDTH(FEET) = 4.66
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.41
 PRODUCT OF DEPTH*VELOCITY(FT*FT/SEC.) = 1.08
 STREET FLOW TRAVEL TIME(MIN.) = 1.10 Tc(MIN.) = 7.28
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.824
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.747
 SUBAREA AREA(ACRES) = 0.44 SUBAREA RUNOFF(CFS) = 2.61
 TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 2.96

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29 HALFSTREET FLOOD WIDTH(FEET) = 7.03
 FLOW VELOCITY(FEET/SEC.) = 4.65 DEPTH*VELOCITY(FT*FT/SEC.) = 1.34
 LONGEST FLOWPATH FROM NODE 250.00 TO NODE 246.00 = 430.00 FEET.

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FLOW PROCESS FROM NODE 248.00 TO NODE 246.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.28
 RAINFALL INTENSITY(INCH/HR) = 6.82
 TOTAL STREAM AREA(ACRES) = 0.58
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.96

 FLOW PROCESS FROM NODE 249.00 TO NODE 247.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 180.00
 UPSTREAM ELEVATION(Feet) = 640.00
 DOWNSTREAM ELEVATION(Feet) = 639.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 11.709
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 52.22
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.022
 SUBAREA RUNOFF(CFS) = 0.14
 TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.14

FLOW PROCESS FROM NODE 247.00 TO NODE 246.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 639.00 DOWNSTREAM(Feet) = 638.00
 CHANNEL LENGTH THRU SUBAREA(Feet) = 325.00 CHANNEL SLOPE = 0.0031
 CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.385
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.65
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 0.55
 AVERAGE FLOW DEPTH(Feet) = 0.11 TRAVEL TIME(MIN.) = 9.88
 Tc(MIN.) = 21.59
 SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 0.97
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.360
 TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 1.07

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.16 FLOW VELOCITY(Feet/Sec.) = 0.64
 LONGEST FLOWPATH FROM NODE 249.00 TO NODE 246.00 = 505.00 FEET.

 FLOW PROCESS FROM NODE 247.00 TO NODE 246.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 21.59
 RAINFALL INTENSITY(INCH/HR) = 3.38

TOTAL STREAM AREA(ACRES) = 0.88
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.07

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	2.96	7.28	6.824	0.58
2	1.07	21.59	3.385	0.88

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	3.32	7.28	6.824
2	2.54	21.59	3.385

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.32 Tc(MIN.) = 7.28
 TOTAL AREA(ACRES) = 1.5
 LONGEST FLOWPATH FROM NODE 249.00 TO NODE 246.00 = 505.00 FEET.

 FLOW PROCESS FROM NODE 246.00 TO NODE 238.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 635.00 DOWNSTREAM(Feet) = 634.00
 FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.7 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 9.05
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.32
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 7.32
 LONGEST FLOWPATH FROM NODE 249.00 TO NODE 238.00 = 525.00 FEET.

 FLOW PROCESS FROM NODE 246.00 TO NODE 238.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	3.32	7.32	6.802	1.46

LONGEST FLOWPATH FROM NODE 249.00 TO NODE 238.00 = 525.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	29.49	9.88	5.604	8.40

LONGEST FLOWPATH FROM NODE 286.00 TO NODE 238.00 = 1351.00 FEET.

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** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	25.16	7.32	6.802
2	32.22	9.88	5.604

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 32.22 Tc(MIN.) = 9.88
 TOTAL AREA(ACRES) = 9.9

 FLOW PROCESS FROM NODE 246.00 TO NODE 238.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

 FLOW PROCESS FROM NODE 238.00 TO NODE 232.00 TS CODE = 31

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

ELEVATION DATA: UPSTREAM(Feet) = 634.00 DOWNSTREAM(Feet) = 633.00
 FLOW LENGTH(Feet) = 80.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.7 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 9.42
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PTSES = 1
 PIPE-FLOW(CFS) = 32.22
 PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 10.02
 LONGEST FLOWPATH FROM NODE 286.00 TO NODE 232.00 = 1431.00 FEET.

 FLOW PROCESS FROM NODE 238.00 TO NODE 232.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.02
 RAINFALL INTENSITY(INCH/HR) = 5.55
 TOTAL STREAM AREA(ACRES) = 9.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 32.22

 FLOW PROCESS FROM NODE 236.00 TO NODE 234.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOTL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 85.00
 UPSTREAM ELEVATION(Feet) = 646.50
 DOWNSTREAM ELEVATION(Feet) = 644.00
 ELEVATION DIFFERENCE(Feet) = 2.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.575
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

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THE MAXIMUM OVERLAND FLOW LENGTH = 79.41
 (Reference: Table 3-18 of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.45
 TOTAL AREA(ACRES) = 0.06 TOTAL RUNOFF(CFS) = 0.45

 FLOW PROCESS FROM NODE 235.00 TO NODE 234.00 TS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 RESIDENTIAL (1.00/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOTL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4050
 SUBAREA AREA(ACRES) = 0.62 SUBAREA RUNOFF(CFS) = 1.94
 TOTAL AREA(ACRES) = 0.7 TOTAL RUNOFF(CFS) = 2.39
 Tc(MIN.) = 2.58

 FLOW PROCESS FROM NODE 234.00 TO NODE 232.00 TS CODE = 31

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

ELEVATION DATA: UPSTREAM(Feet) = 641.00 DOWNSTREAM(Feet) = 633.00
 FLOW LENGTH(Feet) = 195.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.2 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 7.68
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PTSES = 1
 PIPE-FLOW(CFS) = 2.39
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 3.00
 LONGEST FLOWPATH FROM NODE 236.00 TO NODE 232.00 = 280.00 FEET.

 FLOW PROCESS FROM NODE 234.00 TO NODE 232.00 TS 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.) = 3.00
 RAINFALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 0.68
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.39

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	32.22	10.02	5.553	9.86
2	2.39	3.00	8.695	0.68

RATNFALL INTENSTTY AND TTIME OF CONCENTRATTON RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	12.04	3.00	8.695
2	33.75	10.02	5.553

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 33.75 Tc(MIN.) = 10.02
TOTAL AREA(ACRES) = 10.5
LONGEST FLOWPATH FROM NODE 286.00 TO NOOE 232.00 = 1431.00 FEET.

FLOW PROCESS FROM NOOE 232.00 TO NODE 218.00 TS CODE = 31

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

ELEVATION DATA: UPSTREAM(Feet) = 633.00 DOWNSTREAM(Feet) = 609.00
FLOW LENGTH(Feet) = 560.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.6 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 15.56
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 33.75
PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 10.62
LONGEST FLOWPATH FROM NODE 286.00 TO NOOE 218.00 = 1991.00 FEET.

FLOW PROCESS FROM NODE 232.00 TO NODE 218.00 TS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 10.62
RAINFALL INTENSITY(INCH/HR) = 5.35
TOTAL STREAM AREA(ACRES) = 10.54
PEAK FLOW RATE(CFS) AT CONFLUENCE = 33.75

FLOW PROCESS FROM NODE 230.00 TO NODE 228.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
INITIAL SUBAREA FLOW-LENGTH(Feet) = 100.00
UPSTREAM ELEVATION(Feet) = 646.50
DOWNSTREAM ELEVATION(Feet) = 642.00
ELEVATION DIFFERENCE(Feet) = 4.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.346
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 87.50

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.91
TOTAL AREA(ACRES) = 0.12 TOTAL RUNOFF(CFS) = 0.91

FLOW PROCESS FROM NODE 228.00 TO NODE 226.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USE0)<<<<

UPSTREAM ELEVATION(Feet) = 642.00 DOWNSTREAM ELEVATION(Feet) = 613.00
STREET LENGTH(Feet) = 600.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.95
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.29
HALFSTREET FLOOD WIDTH(Feet) = 7.41
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.32
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.27
STREET FLOW TRAVEL TIME(MIN.) = 2.32 Tc(MIN.) = 4.66
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
SUBAREA AREA(ACRES) = 0.54 SUBAREA RUNOFF(CFS) = 4.08
TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 4.99

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.34 HALFSTREET FLOOD WIDTH(Feet) = 9.78
FLOW VELOCITY(Feet/Sec.) = 4.76 DEPTH*VELOCITY(FT*FT/SEC.) = 1.61
LONGEST FLOWPATH FROM NOOE 230.00 TO NOOE 226.00 = 700.00 FEET.

FLOW PROCESS FROM NODE 226.00 TO NODE 218.00 TS CODE = 31

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

ELEVATION DATA: UPSTREAM(Feet) = 610.00 DOWNSTREAM(Feet) = 609.00
FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.8 INCHES

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PIPE-FLOW VELOCITY(Feet/Sec.) = 10.16
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.99
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 4.70
 LONGEST FLOWPATH FROM NODE 230.00 TO NODE 218.00 = 720.00 FEET.

 FLOW PROCESS FROM NODE 226.00 TO NODE 218.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 4.70
 RAINFALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 0.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.99

 FLOW PROCESS FROM NODE 224.00 TO NODE 222.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 90.00
 UPSTREAM ELEVATION(Feet) = 646.50
 DOWNSTREAM ELEVATION(Feet) = 642.00
 ELEVATION DIFFERENCE(Feet) = 4.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.297
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.76
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.76

 FLOW PROCESS FROM NODE 222.00 TO NODE 220.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(Feet) = 642.00 DOWNSTREAM ELEVATION(Feet) = 613.00
 STREET LENGTH(Feet) = 530.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.19
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

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STREET FLOW DEPTH(Feet) = 0.27
 HALFSTREET FLOOD WIDTH(Feet) = 5.91
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.34
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.16
 STREET FLOW TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 4.33
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
 SUBAREA AREA(ACRES) = 0.38 SUBAREA RUNOFF(CFS) = 2.87
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 3.63

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.31 HALFSTREET FLOOD WIDTH(Feet) = 8.03
 FLOW VELOCITY(Feet/Sec.) = 4.72 DEPTH*VELOCITY(FT*FT/SEC.) = 1.44
 LONGEST FLOWPATH FROM NODE 224.00 TO NODE 220.00 = 620.00 FEET.

 FLOW PROCESS FROM NODE 220.00 TO NODE 218.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 610.00 DOWNSTREAM(Feet) = 609.00
 FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.5 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 15.17
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.63
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 4.34
 LONGEST FLOWPATH FROM NODE 224.00 TO NODE 218.00 = 625.00 FEET.

 FLOW PROCESS FROM NODE 220.00 TO NODE 218.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 4.34
 RAINFALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 0.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.63

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HR)	AREA (ACRE)
1	33.75	10.62	5.349	10.54
2	4.99	4.70	8.695	0.66
3	3.63	4.34	8.695	0.48

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

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** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	29.01	4.34	8.695
2	29.39	4.70	8.695
3	39.06	10.62	5.349

COMPUTED CONEULENCE ESTIMATES ARE AS EOLLOWS:

PEAK FLOW RATE(CFS) = 39.06 Tc(MIN.) = 10.62
 TOTAL AREA(ACRES) = 11.7
 LONGEST FLOWPATH FROM NOOE 286.00 TO NOOE 218.00 = 1991.00 FEET.

 FLOW PROCESS FROM NOOE 218.00 TO NOOE 216.00 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(FEET) = 609.00 DOWNSTREAM(FEET) = 606.00
 ELOW LENGTH(FEET) = 65.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.46
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-ELOW(CES) = 39.06
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 10.69
 LONGEST FLOWPATH FROM NOOE 286.00 TO NOOE 216.00 = 2056.00 FEET.

FLOW PROCESS FROM NOOE 218.00 TO NOOE 216.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

 ELOW PROCESS FROM NOOE 218.00 TO NOOE 216.00 IS CODE = 13

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

 ELOW PROCESS FROM NOOE 216.00 TO NOOE 214.60 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "0"
 S.C.S. CURVE NUMBER (AMC II) = 88
 INITIAL SUBAREA ELOW-LENGTH(FEET) = 150.00
 UPSTREAM ELEVATION(FEET) = 876.00
 DOWNSTREAM ELEVATION(FEET) = 816.00
 ELEVATION DIFFERENCE(FEET) = 60.00
 SUBAREA OVERLAND TIME OF ELOW(MIN.) = 6.267
 WARNING: INITIAL SUBAREA ELOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND ELOW LENGTH = 100.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

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100 YEAR RAINEALL INTENSITY(INCH/HOUR) = 7.516
 SUBAREA RUNOFF(CFS) = 0.24
 TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.24

 FLOW PROCESS FROM NOOE 214.60 TO NOOE 212.60 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 816.00 DOWNSTREAM(FEET) = 746.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 270.00 CHANNEL SLOPE = 0.2593
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINEALL INTENSITY(INCH/HOUR) = 6.271
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "0"
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED ELOW(CFS) = 0.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.21
 AVERAGE FLOW DEPTH(FEET) = 0.04 TRAVEL TIME(MIN.) = 2.03
 Tc(MIN.) = 8.30
 SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CES) = 1.10
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.350
 TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 1.29

END OF SUBAREA CHANNEL ELOW HYDRAULICS:
 DEPTH(FEET) = 0.05 FLOW VELOCITY(FEET/SEC.) = 2.60
 LONGEST FLOWPATH FROM NOOE 216.00 TO NOOE 212.60 = 420.00 FEET.

ELOW PROCESS FROM NOOE 212.60 TO NOOE 210.60 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL ELOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 746.00 DOWNSTREAM(FEET) = 722.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 120.00 CHANNEL SLOPE = 0.2000
 CHANNEL BASE(FEET) = 1.00 "Z" FACTOR = 1.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINEALL INTENSITY(INCH/HOUR) = 6.194
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "0"
 S.C.S. CURVE NUMBER (AMC II) = 82
 TRAVEL TIME COMPUTED USING ESTIMATED ELOW(CES) = 2.79
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.51
 AVERAGE ELOW DEPTH(FEET) = 0.19 TRAVEL TIME(MIN.) = 0.16
 Tc(MIN.) = 8.46
 SUBAREA AREA(ACRES) = 1.18 SUBAREA RUNOFF(CES) = 3.00
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.390
 TOTAL AREA(ACRES) = 1.8 PEAK ELOW RATE(CES) = 4.28

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.24 ELOW VELOCITY(FEET/SEC.) = 14.28
 LONGEST FLOWPATH FROM NOOE 216.00 TO NOOE 210.60 = 540.00 FEET.

FLOW PROCESS FROM NODE 210.60 TO NODE 292.40 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(EFEET) = 722.00 DOWNSIREAM(EFEET) = 705.00
FLOW LENGTH(EFEET) = 290.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.1 INCHES
PIPE-FLOW VELOCITY(EFEET/SEC.) = 10.30
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.28
PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 8.93
LONGEST FLOWPATH FROM NODE 216.60 TO NODE 292.40 = 830.00 FEET.

FLOW PROCESS FROM NODE 292.40 TO NODE 210.60 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.93
RAINFALL INTENSITY(INCH/HR) = 5.98
TOTAL STREAM AREA(ACRES) = 1.77
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.28

FLOW PROCESS FROM NODE 298.40 TO NODE 296.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
INITIAL SUBAREA FLOW-LENGTH(Feet) = 100.00
UPSTREAM ELEVATION(EFEET) = 744.00
DOWNSTREAM ELEVATION(FEET) = 718.00
ELEVATION DIFFERENCE(EFEET) = 26.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.25
TOTAL AREA(ACRES) = 0.24 TOTAL RUNOFF(CFS) = 1.25

FLOW PROCESS FROM NODE 296.40 TO NODE 294.40 IS CODE = 62

>>>>COMPUTE STREAM FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREAM TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(EFEET) = 718.00 DOWNSTREAM ELEVATION(FEET) = 709.00
STREAM LENGTH(EFEET) = 170.00 CURB HEIGHT(INCHES) = 6.0
STREAM HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(EFEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.21
STREET FLOW MODEL RESULTS USING ESTIMATED FLOW:
STREAM FLOW DEPTH(EFEET) = 0.30
HALFSTREAM FLOOD WIDTH(Feet) = 7.59
AVERAGE FLOW VELOCITY(EFEET/SEC.) = 4.53
PRODUCT OF DEPTH&VELOCITY(ET*ET/SEC.) = 1.35
STREET FLOW TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 4.80
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
SUBAREA AREA(ACRES) = 0.75 SUBAREA RUNOFF(CFS) = 3.91
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 5.16

END OF SUBAREA STREAM FLOW HYDRAULICS:
DEPTH(FEET) = 0.34 HALFSTREAM FLOOD WIDTH(Feet) = 9.72
FLOW VELOCITY(EFEET/SEC.) = 4.98 DEPTH*VELOCITY(ET*ET/SEC.) = 1.67
LONGEST FLOWPATH FROM NODE 298.40 TO NODE 294.40 = 270.00 FEET.

FLOW PROCESS FROM NODE 294.40 TO NODE 292.40 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(EFEET) = 706.00 DOWNSTREAM(EFEET) = 705.00
FLOW LENGTH(EFEET) = 5.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.1 INCHES
PIPE-FLOW VELOCITY(EFEET/SEC.) = 16.83
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.16
PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 4.81
LONGEST FLOWPATH FROM NODE 298.40 TO NODE 292.40 = 275.00 FEET.

FLOW PROCESS FROM NODE 294.40 TO NODE 292.40 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 4.81
RAINFALL INTENSITY(INCH/HR) = 8.69
TOTAL STREAM AREA(ACRES) = 0.99
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.16

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** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRES)
1	4.28	8.93	5.982	1.77
2	5.16	4.81	8.695	0.99

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	7.47	4.81	8.695
2	7.83	8.93	5.982

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 7.83 Tc(MIN.) = 8.93
TOTAL AREA(ACRES) = 2.8
LONGEST FLOWPATH FROM NODE 216.60 TO NODE 292.40 = 830.00 FEET.

FLOW PROCESS FROM NODE 294.40 TO NODE 292.40 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<

FLOW PROCESS FROM NODE 294.40 TO NODE 292.40 IS CODE = 13

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

FLOW PROCESS FROM NODE 206.60 TO NODE 204.60 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 994.50
DOWNSTREAM ELEVATION(FEET) = 956.00
ELEVATION DIFFERENCE(FEET) = 38.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
SUBAREA RUNOFF(CFS) = 0.47
TOTAL AREA(ACRES) = 0.18 TOTAL RUNOFF(CFS) = 0.47

FLOW PROCESS FROM NODE 204.60 TO NODE 202.60 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 956.00 DOWNSTREAM(FEET) = 726.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 570.00 CHANNEL SLOPE = 0.4035
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.353
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.29
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.09
AVERAGE FLOW DEPTH(FEET) = 0.08 TRAVEL TIME(MIN.) = 2.87
Tc(MIN.) = 8.13
SUBAREA AREA(ACRES) = 3.41 SUBAREA RUNOFF(CFS) = 7.58
AREA-AVERAGE RUNOFF COEFFICIENT = 0.350
TOTAL AREA(ACRES) = 3.6 PEAK FLOW RATE(CFS) = 7.98

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.12 FLOW VELOCITY(FEET/SEC.) = 6.32
LONGEST FLOWPATH FROM NODE 206.60 TO NODE 202.60 = 670.00 FEET.

FLOW PROCESS FROM NODE 202.60 TO NODE 200.60 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 726.00 DOWNSTREAM(FEET) = 706.00
FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.80
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.98
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.14
LONGEST FLOWPATH FROM NODE 206.60 TO NODE 200.60 = 690.00 FEET.

FLOW PROCESS FROM NODE 202.60 TO NODE 200.60 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.14
RAINFALL INTENSITY(INCH/HR) = 6.35
TOTAL STREAM AREA(ACRES) = 3.59
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.98

FLOW PROCESS FROM NODE 208.80 TO NODE 208.60 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (14.5 OU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00

UPSTREAM ELEVATION(FEET) = 758.00
 DOWNSTREAM ELEVATION(FEET) = 718.00
 ELEVATION DIFFERENCE(FEET) = 40.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.73
 TOTAL AREA(ACRES) = 0.14 TOTAL RUNOFF(CFS) = 0.73

 FLOW PROCESS FROM NODE 208.60 TO NODE 200.60 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 718.00 DOWNSTREAM ELEVATION(FEET) = 709.00
 STREET LENGTH(FEET) = 175.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.57
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.24
 HALFSTREET FLOOD WIDTH(FEET) = 4.59
 AVERAGE FLOW VELOCITY(FT/SEC.) = 4.09
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.00
 STREET FLOW TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 4.89
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 0.32 SUBAREA RUNOFF(CFS) = 1.67
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 2.40

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28 HALFSTREET FLOOD WIDTH(FEET) = 6.41
 FLOW VELOCITY(FT/SEC.) = 4.28 DEPTH*VELOCITY(FT*FT/SEC.) = 1.19
 LONGEST FLOWPATH FROM NODE 208.80 TO NODE 200.60 = 275.00 FEET.

 FLOW PROCESS FROM NODE 208.60 TO NODE 200.60 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.) = 4.89
 RAINFALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 0.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.40

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	7.98	8.14	6.348	3.59
2	2.40	4.89	8.695	0.46

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	7.19	4.89	8.695
2	9.73	8.14	6.348

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.73 Tc(MIN.) = 8.14
 TOTAL AREA(ACRES) = 4.1
 LONGEST FLOWPATH FROM NODE 206.60 TO NODE 200.60 = 690.00 FEET.

 FLOW PROCESS FROM NODE 200.60 TO NODE 292.40 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 706.00 DOWNSTREAM(FEET) = 705.00
 FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.00
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.3 INCHES
 PIPE-FLOW VELOCITY(FT/SEC.) = 12.18
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.73
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 8.17
 LONGEST FLOWPATH FROM NODE 206.60 TO NODE 292.40 = 710.00 FEET.

 FLOW PROCESS FROM NODE 200.60 TO NODE 292.40 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	9.73	8.17	6.334	4.05

LONGEST FLOWPATH FROM NODE 206.60 TO NODE 292.40 = 710.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
------------------	-----------------	--------------	--------------------------	----------------

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1 7.83 8.93 S.982 2.76
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 292.40 = 830.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	16.90	8.17	6.334
2	17.02	8.93	5.982

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 17.02 Tc(MIN.) = 8.93
 TOTAL AREA(ACRES) = 6.8

=====

ELOW PROCESS FROM NODE 200.60 TO NODE 292.40 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

=====

=====

FLOW PROCESS FROM NODE 292.40 TO NODE 284.40 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(EFEET) = 705.00 DOWNSTREAM(EFEET) = 692.00
 ELOW LENGTH(EFEET) = 235.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.4 INCHES
 PIPE-FLOW VELOCITY(EFEET/SEC.) = 14.46
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 17.02
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 9.20
 LONGEST ELOWPATH FROM NODE 216.60 TO NODE 284.40 = 1065.00 FEET.

=====

FLOW PROCESS FROM NODE 292.40 TO NODE 284.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.20
 RAINFALL INTENSITY(INCH/HR) = 5.87
 TOTAL STREAM AREA(ACRES) = 6.81
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.02

=====

ELOW PROCESS FROM NODE 290.40 TO NODE 288.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "0"
 S.C.S. CURVE NUMBER (AMC II) = 88
 INITIAL SUBAREA ELOW-LENGTH(FEET) = 162.00
 UPSTREAM ELEVATION(FEET) = 958.00
 DOWNSTREAM ELEVATION(FEET) = 894.00

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ELEVATION DIFFERENCE(EFEET) = 64.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
 SUBAREA RUNOFF(CFS) = 0.21
 TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.21

=====

ELOW PROCESS FROM NODE 288.40 TO NODE 286.40 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL ELOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(EFEET) = 894.00 DOWNSTREAM(FEET) = 728.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 420.00 CHANNEL SLOPE = 0.3952
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.383
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3400
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED ELOW(CFS) = 2.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.87
 AVERAGE FLOW DEPTH(EFEET) = 0.05 TRAVEL TIME(MIN.) = 1.81
 Tc(MIN.) = 8.07
 SUBAREA AREA(ACRES) = 1.65 SUBAREA RUNOFF(CFS) = 3.58
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.340
 TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 3.76

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.08 ELOW VELOCITY(FEET/SEC.) = 4.57
 LONGEST FLOWPATH FROM NODE 290.40 TO NODE 286.40 = 582.00 FEET.

=====

FLOW PROCESS FROM NODE 286.40 TO NODE 284.40 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 728.00 DOWNSTREAM(FEET) = 692.00
 FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.40
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-ELOW(CFS) = 3.76
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 8.14
 LONGEST ELOWPATH FROM NODE 290.40 TO NODE 284.40 = 662.00 FEET.

=====

ELOW PROCESS FROM NODE 286.40 TO NODE 284.40 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.14
 RAINFALL INTENSITY(INCH/HR) = 6.35
 TOTAL STREAM AREA(ACRES) = 1.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.76

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	17.82	9.20	5.868	6.81
2	3.76	8.14	6.350	1.73

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	18.82	8.14	6.350
2	20.50	9.20	5.868

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 20.50 Tc(MIN.) = 9.20
 TOTAL AREA(ACRES) = 8.5
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 284.40 = 1065.00 FEET.

ELOW PROCESS FROM NODE 284.40 TO NODE 270.40 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 692.00 DOWNSTREAM(FEET) = 686.00
 FLOW LENGTH(FEET) = 120.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.31
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 20.50
 PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 9.34
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 270.40 = 1185.00 FEET.

ELOW PROCESS FROM NODE 284.40 TO NODE 270.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.34
 RAINFALL INTENSITY(INCH/HR) = 5.81
 TOTAL STREAM AREA(ACRES) = 8.54
 PEAK FLOW RATE(CES) AT CONFLUENCE = 20.50

ELOW PROCESS FROM NODE 276.40 TO NODE 274.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

RESIDENTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA ELOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 725.00
 DOWNSTREAM ELEVATION(FEET) = 722.50
 ELEVATION DIFFERENCE(FEET) = 2.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.114
 WARNING: INITIAL SUBAREA ELOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND ELOW LENGTH = 85.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND ELOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.637
 SUBAREA RUNOFF(CES) = 1.01
 TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CES) = 1.01

ELOW PROCESS FROM NODE 274.40 TO NODE 272.40 IS CODE = 62

>>>>COMPUTE STREET ELOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 722.50 DOWNSTREAM ELEVATION(FEET) = 691.00
 STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED ELOW(CFS) = 6.64
 STREETFLOW MODEL RESULTS USING ESTIMATED ELOW:
 STREET ELOW DEPTH(FEET) = 0.34
 HALFPSTREET FLOOD WIDTH(FEET) = 10.20
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.92
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.04
 STREET FLOW TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 7.38
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.763
 RESIDENTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 2.77 SUBAREA RUNOFF(CFS) = 11.24
 TOTAL AREA(ACRES) = 3.0 PEAK FLOW RATE(CES) = 12.13

END OF SUBAREA STREET ELOW HYDRAULICS:
 DEPTH(FEET) = 0.40 HALFPSTREET FLOOD WIDTH(FEET) = 13.40
 ELOW VELOCITY(FEET/SEC.) = 6.75 DEPTH*VELOCITY(FT*FT/SEC.) = 2.71
 LONGEST FLOWPATH FROM NODE 276.40 TO NODE 272.40 = 550.00 FEET.

 FLOW PROCESS FROM NODE 272.40 TO NODE 270.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(Feet) = 689.00 DOWNSTREAM(Feet) = 686.00
 FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.9 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 19.34
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 12.13
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 7.40
 LONGEST FLOWPATH FROM NODE 276.40 TO NODE 270.40 = 570.00 FEET.

 FLOW PROCESS FROM NODE 272.40 TO NODE 270.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.40
 RAINFALL INTENSITY(INCH/HR) = 6.75
 TOTAL STREAM AREA(ACRES) = 2.99
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.13

 FLOW PROCESS FROM NODE 282.40 TO NODE 280.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 100.00
 UPSTREAM ELEVATION(Feet) = 725.00
 DOWNSTREAM ELEVATION(Feet) = 722.50
 ELEVATION DIFFERENCE(Feet) = 2.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.642
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 75.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.61
 TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.61

 FLOW PROCESS FROM NODE 280.40 TO NODE 278.40 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(Feet) = 722.50 DOWNSTREAM ELEVATION(Feet) = 691.00
 STREET LENGTH(Feet) = 425.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.46

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(Feet) = 0.33

HALFSTREET FLOOD WIDTH(Feet) = 9.16

AVERAGE FLOW VELOCITY(Feet/Sec.) = 5.79

PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 1.89

STREET FLOW TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 3.87

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 86

AREA-AVERAGE RUNOFF COEFFICIENT = 0.611

SUBAREA AREA(ACRES) = 1.86 SUBAREA RUNOFF(CFS) = 9.70

TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 10.31

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(Feet) = 0.38 HALFSTREET FLOOD WIDTH(Feet) = 12.38

FLOW VELOCITY(Feet/Sec.) = 6.59 DEPTH*VELOCITY(Ft*Ft/Sec.) = 2.53

LONGEST FLOWPATH FROM NODE 282.40 TO NODE 278.40 = 525.00 FEET.

 FLOW PROCESS FROM NODE 278.40 TO NODE 270.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(Feet) = 689.00 DOWNSTREAM(Feet) = 686.00
 FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.4 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 30.38
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.31
 PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 3.87
 LONGEST FLOWPATH FROM NODE 282.40 TO NODE 270.40 = 530.00 FEET.

 FLOW PROCESS FROM NODE 278.40 TO NODE 270.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:

TIME OF CONCENTRATION(MIN.) = 3.87
 RAINFALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 1.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.31

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	20.50	9.34	5.811	8.54
2	12.13	7.40	6.753	2.99
3	10.31	3.87	8.695	1.94

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	30.35	3.87	8.695
2	37.78	7.40	6.753
3	37.83	9.34	5.811

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CES) = 37.83 Tc(MIN.) = 9.34
 TOTAL AREA(ACRES) = 13.5
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 270.40 = 1185.00 FEET.

 FLOW PROCESS FROM NODE 270.40 TO NODE 244.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 686.00 DOWNSTREAM(FEET) = 673.00
 FLOW LENGTH(FEET) = 370.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.56
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 37.83
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 9.76
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 244.40 = 1555.00 FEET.

 FLOW PROCESS FROM NODE 270.40 TO NODE 244.40 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<

 FLOW PROCESS FROM NODE 270.40 TO NODE 244.40 IS CODE = 13

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

 FLOW PROCESS FROM NODE 266.80 TO NODE 266.60 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 88
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 150.00
 UPSTREAM ELEVATION(FEET) = 786.00
 DOWNSTREAM ELEVATION(FEET) = 750.00
 ELEVATION DIFFERENCE(FEET) = 36.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
 SUBAREA RUNOFF(CFS) = 0.24
 TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.24

 FLOW PROCESS FROM NODE 266.60 TO NODE 266.40 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 320.00 CHANNEL SLOPE = 0.1437
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.064
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3200
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.07
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.16
 AVERAGE FLOW DEPTH(FEET) = 0.05 TRAVEL TIME(MIN.) = 2.47
 Tc(MIN.) = 8.74
 SUBAREA AREA(ACRES) = 0.85 SUBAREA RUNOFF(CFS) = 1.65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.323
 TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CES) = 1.84

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.07 FLOW VELOCITY(FEET/SEC.) = 2.71
 LONGEST FLOWPATH FROM NODE 266.80 TO NODE 266.40 = 470.00 FEET.

 FLOW PROCESS FROM NODE 266.40 TO NODE 259.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 704.00 DOWNSTREAM(FEET) = 676.00
 FLOW LENGTH(FEET) = 225.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.52
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

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PIPE-FLOW(CFS) = 1.84
 PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 9.10
 LONGEST FLOWPATH FROM NODE 266.40 TO NODE 259.40 = 695.00 FEET.

 FLOW PROCESS FROM NODE 266.40 TO NODE 259.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.10
 RAINFALL INTENSITY(INCH/HR) = 5.91
 TOTAL STREAM AREA(ACRES) = 0.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.84

 FLOW PROCESS FROM NODE 264.40 TO NODE 262.40 IS CODE = 2I

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

*USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3300
 S.C.S. CURVE NUMBER (AMC II) = 88
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 170.00
 UPSTREAM ELEVATION(Feet) = 828.00
 DOWNSTREAM ELEVATION(Feet) = 808.00
 ELEVATION DIFFERENCE(Feet) = 20.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.434
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.390
 SUBAREA RUNOFF(CFS) = 1.17
 TOTAL AREA(ACRES) = 0.48 TOTAL RUNOFF(CFS) = 1.17

 FLOW PROCESS FROM NODE 262.40 TO NODE 260.40 IS CODE = 5I

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(Feet) = 808.00 DOWNSTREAM(Feet) = 678.00
 CHANNEL LENGTH THRU SUBAREA(Feet) = 710.00 CHANNEL SLOPE = 0.1831
 CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.201

*USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.04
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.89
 AVERAGE FLOW DEPTH(Feet) = 0.20 TRAVEL TIME(MIN.) = 2.01
 Tc(MIN.) = 8.44
 SUBAREA AREA(ACRES) = 12.60 SUBAREA RUNOFF(CFS) = 23.44
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.301

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TOTAL AREA(ACRES) = 13.1 PEAK FLOW RATE(CFS) = 24.42

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.29 FLOW VELOCITY(Feet/SEC.) = 7.28
 LONGEST FLOWPATH FROM NODE 264.40 TO NODE 259.40 = 880.00 FEET.

 FLOW PROCESS FROM NODE 260.40 TO NODE 259.40 IS CODE = 3I

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 678.00 DOWNSTREAM(Feet) = 676.00
 FLOW LENGTH(Feet) = 45.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.8 INCHES
 PIPE-FLOW VELOCITY(Feet/SEC.) = 14.54
 ESTIMATE PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 24.42
 PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 8.50
 LONGEST FLOWPATH FROM NODE 264.40 TO NODE 259.40 = 925.00 FEET.

 FLOW PROCESS FROM NODE 260.40 TO NODE 259.40 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.50
 RAINFALL INTENSITY(INCH/HR) = 6.18
 TOTAL STREAM AREA(ACRES) = 13.08
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 24.42

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	1.84	9.10	5.910	0.94
2	24.42	8.50	6.177	13.08

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	26.14	8.50	6.177
2	25.21	9.10	5.910

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 26.14 Tc(MIN.) = 8.50
 TOTAL AREA(ACRES) = 14.0
 LONGEST FLOWPATH FROM NODE 264.40 TO NODE 259.40 = 925.00 FEET.

 FLOW PROCESS FROM NODE 259.40 TO NODE 246.40 IS CODE = 3I

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(ELEV) = 676.00 DOWNSTREAM(ELEV) = 674.00
FLOW LENGTH(Feet) = 200.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.35
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.14
PIPE TRAVEL TIME(MIN.) = 0.40  $I_c$ (MIN.) = 8.90
LONGEST FLOWPATH FROM NODE 259.40 TO NODE 246.40 = 1125.00 FEET.

*****
FLOW PROCESS FROM NODE 259.40 TO NODE 246.40 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.90
RAINFALL INTENSITY(INCH/HR) = 6.00
TOTAL STREAM AREA(ACRES) = 14.02
PEAK FLOW RATE(CFS) AT CONFLUENCE = 26.14

*****
FLOW PROCESS FROM NODE 258.40 TO NODE 256.40 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00
UPSTREAM ELEVATION(Feet) = 714.00
DOWNSTREAM ELEVATION(Feet) = 685.10
ELEVATION DIFFERENCE(Feet) = 28.90
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN  $I_c$  CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON  $I_c$  = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.94
TOTAL AREA(ACRES) = 0.18 TOTAL RUNOFF(CFS) = 0.94

*****
FLOW PROCESS FROM NODE 256.40 TO NODE 254.40 IS CODE = 62
-----
>>>>COMPUTE STREAM FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREAM TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(Feet) = 685.10 DOWNSTREAM ELEVATION(Feet) = 678.00
STREAM LENGTH(Feet) = 260.00 CURB HEIGHT(INCHES) = 6.0
STREAM HALF-WIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00

```

```

INSIDE STREAM CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREAM CROSSFALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.34
STREAMFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREAM FLOW DEPTH(Feet) = 0.35
HALF-STREAM FLOOD WIDTH(Feet) = 10.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.73
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/SEC.) = 1.30
STREAM FLOW TRAVEL TIME(MIN.) = 1.16  $T_c$ (MIN.) = 5.34
100 YEAR RAINFALL INTENSITY(INCH/HR) = 8.333
RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
SUBAREA AREA(ACRES) = 1.36 SUBAREA RUNOFF(CFS) = 6.80
TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 7.70

END OF SUBAREA STREAM FLOW HYDRAULICS:
DEPTH(Feet) = 0.40 HALF-STREAM FLOOD WIDTH(Feet) = 13.55
FLOW VELOCITY(FEET/SEC.) = 4.20 DEPTH*VELOCITY(Feet*Feet/SEC.) = 1.70
LONGEST FLOWPATH FROM NODE 258.40 TO NODE 254.40 = 380.00 FEET.

*****
FLOW PROCESS FROM NODE 254.40 TO NODE 246.40 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(ELEV) = 675.00 DOWNSTREAM(Feet) = 674.00
FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.45
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.70
PIPE TRAVEL TIME(MIN.) = 0.03  $I_c$ (MIN.) = 5.37
LONGEST FLOWPATH FROM NODE 258.40 TO NODE 246.40 = 400.00 FEET.

*****
FLOW PROCESS FROM NODE 254.40 TO NODE 246.40 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.37
RAINFALL INTENSITY(INCH/HR) = 8.30
TOTAL STREAM AREA(ACRES) = 1.54
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.70

*****

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FLOW PROCESS FROM NODE 252.40 TO NODE 250.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 86

INITIAL SUBAREA FLOW-LENGTH(FEET) = 80.00

UPSTREAM ELEVATION(FEET) = 683.00

DOWNSTREAM ELEVATION(FEET) = 682.30

ELEVATION DIFFERENCE(FEET) = 0.70

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.364

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 61.25

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.773

SUBAREA RUNOFF(CFS) = 0.61

TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CFS) = 0.61

FLOW PROCESS FROM NODE 250.40 TO NODE 248.40 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 682.30 DOWNSTREAM ELEVATION(FEET) = 678.00

STREET LENGTH(FEET) = 155.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSEALL(DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSEALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.84

STREET FLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.28

HALFSTREET FLOOD WIDTH(FEET) = 6.59

AVERAGE FLOW VELOCITY(FT/SEC.) = 3.17

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.89

STREET FLOW TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 8.19

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.330

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 86

AREA-AVERAGE RUNOFF COEFFICIENT = 0.600

SUBAREA AREA(ACRES) = 0.65 SUBAREA RUNOFF(CFS) = 2.47

TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 3.04

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 8.72

FLOW VELOCITY(FT/SEC.) = 3.48 DEPTH*VELOCITY(FT*FT/SEC.) = 1.11

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LONGEST FLOWPATH FROM NODE 252.40 TO NODE 248.40 = 235.00 FEET.

FLOW PROCESS FROM NODE 248.40 TO NODE 246.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 675.00 DOWNSTREAM(FEET) = 674.00

FLOW LENGTH(FEET) = 5.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.2 INCHES

PIPE-FLOW VELOCITY(FT/SEC.) = 14.41

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.04

PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.19

LONGEST FLOWPATH FROM NODE 252.40 TO NODE 246.40 = 240.00 FEET.

FLOW PROCESS FROM NODE 248.40 TO NODE 246.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCE STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:

TIME OF CONCENTRATION(MIN.) = 8.19

RAINFALL INTENSITY(INCH/HR) = 6.33

TOTAL STREAM AREA(ACRES) = 0.80

PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.04

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	26.14	8.90	5.996	14.02
2	7.70	5.37	8.304	1.54
3	3.04	8.19	6.327	0.80

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	28.57	5.37	8.304
2	33.68	8.19	6.327
3	34.58	8.90	5.996

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 34.58 Tc(MIN.) = 8.90

TOTAL AREA(ACRES) = 16.4

LONGEST FLOWPATH FROM NODE 264.40 TO NODE 246.40 = 1125.00 FEET.

FLOW PROCESS FROM NODE 246.40 TO NODE 244.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 673.00
FLOW LENGTH(FEET) = 65.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PTPE TS 21.0 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 10.43
ESTMATED PIPE DIAMETER(TNCH) = 27.00 NUMBER OF PTPEs = 1
PIPE-FLOW(CFS) = 34.58
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 9.00
LONGEST FLOWPATH FROM NODE 264.40 TO NODE 244.40 = 1190.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 246.40 TO NODE 244.40 TS CODE = 11

```

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/ HOUR)	AREA (ACRE)
1	34.58	9.00	5.952	16.36

LONGEST FLOWPATH FROM NODE 264.40 TO NODE 244.40 = 1190.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/ HOUR)	AREA (ACRE)
1	37.83	9.76	5.647	13.47

LONGEST FLOWPATH FROM NODE 216.60 TO NODE 244.40 = 1555.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/ HOUR)
1	69.45	9.00	5.952
2	70.64	9.76	5.647

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 70.64 Tc(MIN.) = 9.76
 TOTAL AREA(ACRES) = 29.8

```

*****
FLOW PROCESS FROM NODE 246.40 TO NODE 244.40 IS CODE = 12

```

>>>>CLEAR MEMORY BANK # 2 <<<<

```

*****
FLOW PROCESS FROM NODE 244.40 TO NODE 236.40 TS CODE = 31

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FeET) = 673.00 DOWNSTREAM(FeET) = 670.00
FLOW LENGTH(FeET) = 175.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 TNCH PTPE TS 25.6 TNCHES
PIPE-FLOW VELOCITY(FeET/SEC.) = 13.16
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PTPE-FLOW(CFS) = 70.64

```

PTPE TRAVEL TIME(MIN.) = 0.22 Tc(MTN.) = 9.98
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 236.40 = 1730.00 FEET.

```

*****
FLOW PROCESS FROM NODE 244.40 TO NODE 236.40 IS CODE = 1

```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

```

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MTN.) = 9.98
RAINFALL INTENSITY(INCH/HR) = 5.57
TOTAL STREAM AREA(ACRES) = 29.83
PEAK FLOW RATE(CFS) AT CONFLUENCE = 70.64

```

```

*****
FLOW PROCESS FROM NODE 242.40 TO NODE 240.40 IS CODE = 21

```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

```

=====
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
INITIAL SUBAREA FLOW-LENGTH(FeET) = 155.00
UPSTREAM ELEVATION(FeET) = 996.00
DOWNSTREAM ELEVATION(FeET) = 922.00
ELEVATION DIFFERENCE(FeET) = 74.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
         THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
         (Reference: Table 3-18 of Hydrology Manual)
         THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(TNCH/HOUR) = 7.210
SUBAREA RUNOFF(CFS) = 0.48
TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CFS) = 0.48

```

```

*****
FLOW PROCESS FROM NODE 240.40 TO NODE 238.40 TS CODE = 51

```

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FeET) = 922.00 DOWNSTREAM(FeET) = 691.00
CHANNEL LENGTH THRU SUBAREA(FeET) = 750.00 CHANNEL SLOPE = 0.3000
CHANNEL BASE(FeET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FeET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.630
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.72
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FeET/SEC.) = 4.00
AVERAGE FLOW DEPTH(FeET) = 0.07 TRAVEL TIME(MIN.) = 3.12
Tc(MTN.) = 9.81
SUBAREA AREA(ACRES) = 2.65 SUBAREA RUNOFF(CFS) = 4.48
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 2.9 PEAK FLOW RATE(CFS) = 4.85

```

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 0.10 FLOW VELOCITY(Feet/Sec.) = 4.80
 LONGEST FLOWPATH FROM NODE 242.40 TO NODE 238.40 = 905.00 FEET.

 FLOW PROCESS FROM NODE 238.40 TO NODE 236.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 691.00 DOWNSTREAM(Feet) = 670.00
 FLOW LENGTH(Feet) = 90.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.9 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 17.46
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.85
 PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 9.89
 LONGEST FLOWPATH FROM NODE 242.40 TO NODE 236.40 = 995.00 FEET.

 FLOW PROCESS FROM NODE 238.40 TO NODE 236.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.89
 RAINFALL INTENSITY(INCH/HR) = 5.60
 TOTAL STREAM AREA(ACRES) = 2.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.85

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	70.64	9.98	5.566	29.83
2	4.85	9.89	5.599	2.87

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	74.85	9.89	5.599
2	75.46	9.98	5.566

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 75.46 Tc(MIN.) = 9.98
 TOTAL AREA(ACRES) = 32.7
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 236.40 = 1730.00 FEET.

 FLOW PROCESS FROM NODE 236.40 TO NODE 228.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 670.00 DOWNSTREAM(Feet) = 669.00
 FLOW LENGTH(Feet) = 50.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.3 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 14.19
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 75.46
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 10.04
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 228.40 = 1780.00 FEET.

 FLOW PROCESS FROM NODE 236.40 TO NODE 228.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.04
 RAINFALL INTENSITY(INCH/HR) = 5.55
 TOTAL STREAM AREA(ACRES) = 32.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 75.46

 FLOW PROCESS FROM NODE 234.40 TO NODE 232.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RESIDENTIAL (14.5 OU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 100.00
 UPSTREAM ELEVATION(Feet) = 694.00
 DOWNSTREAM ELEVATION(Feet) = 688.00
 ELEVATION DIFFERENCE(Feet) = 6.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.953
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.37
 TOTAL AREA(ACRES) = 0.07 TOTAL RUNOFF(CFS) = 0.37

 FLOW PROCESS FROM NODE 232.40 TO NODE 230.40 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSTREAM ELEVATION(Feet) = 688.00 DOWNSTREAM ELEVATION(Feet) = 673.00
 STREET LENGTH(Feet) = 500.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

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STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.61
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.27
 HALFSTREET FLOOD WIDTH(FEET) = 5.84
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.23
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.86
 STREET FLOW TRAVEL TIME(MIN.) = 2.58 Tc(MIN.) = 7.54
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.674
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.832
 SUBAREA AREA(ACRES) = 0.43 SUBAREA RUNOFF(CFS) = 2.50
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 2.78

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 8.16
 FLOW VELOCITY(FEET/SEC.) = 3.52 DEPTH*VELOCITY(FT*FT/SEC.) = 1.09
 LONGEST FLOWPATH FROM NODE 234.40 TO NODE 228.40 = 600.00 FEET.

 FLOW PROCESS FROM NODE 230.40 TO NODE 228.40 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(FEET) = 670.00 DOWNSTREAM(FEET) = 669.00
 FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.59
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.78
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 7.57
 LONGEST FLOWPATH FROM NODE 234.40 TO NODE 228.40 = 620.00 FEET.

 FLOW PROCESS FROM NODE 230.40 TO NODE 228.40 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.57
 RAINFALL INTENSITY(INCH/HR) = 6.65
 TOTAL STREAM AREA(ACRES) = 0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.78

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	75.46	10.04	5.545	32.70

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2 2.78 7.57 6.652 0.50

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	65.69	7.57	6.652
2	77.78	10.04	5.545

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 77.78 Tc(MIN.) = 10.04
 TOTAL AREA(ACRES) = 33.2
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 228.40 = 1780.00 FEET.

 FLOW PROCESS FROM NODE 228.40 TO NODE 214.40 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 669.00 DOWNSTREAM(FEET) = 662.00
 FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.04
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 77.78
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 10.22
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 214.40 = 1970.00 FEET.

 FLOW PROCESS FROM NODE 228.40 TO NODE 216.40 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<

 FLOW PROCESS FROM NODE 228.40 TO NODE 216.40 IS CODE = 13

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

 FLOW PROCESS FROM NODE 226.40 TO NODE 224.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00
 UPSTREAM ELEVATION(FEET) = 734.00
 DOWNSTREAM ELEVATION(FEET) = 703.00
 ELEVATION DIFFERENCE(FEET) = 31.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

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THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.210
 SUBAREA RUNOFF(CFS) = 0.28
 TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.28

 FLOW PROCESS FROM NODE 224.40 TO NODE 222.40 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
 =====
 ELEVATION DATA: UPSTREAM(Feet) = 703.00 DOWNSTREAM(FFFT) = 676.00
 CHANNEL LENGTH THRU SUBAREA(Feet) = 250.00 CHANNEL SLOPE = 0.1080
 CHANNEL BASF(FFFT) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FFFT) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.915
 NATURAL OUTFERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 1.73
 AVERAGE FLOW DEPTH(FFFT) = 0.04 TRAVEL TIME(MIN.) = 2.40
 Tc(MIN.) = 9.09
 SUBAREA AREA(ACRES) = 0.54 SUBAREA RUNOFF(CFS) = 0.96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
 TOTAL AREA(ACRES) = 0.7 PFAK FLOW RATE(CFS) = 1.19

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.06 FLOW VELOCITY(FFFT/SFC.) = 2.06
 LONGEST FLOWPATH FROM NODE 226.40 TO NODE 222.40 = 450.00 FFFT.

 FLOW PROCESS FROM NODE 222.40 TO NODE 216.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTED-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 ELEVATION DATA: UPSTREAM(FFFT) = 676.00 DOWNSTREAM(FFFT) = 663.00
 FLOW LENGTH(FFFT) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 1.5 INCHES
 PIPE-FLOW VELOCITY(Feet/SFC.) = 16.43
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.19
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 9.11
 LONGEST FLOWPATH FROM NODE 226.40 TO NODE 216.40 = 470.00 FFFT.

 FLOW PROCESS FROM NODE 222.40 TO NODE 216.40 IS CODE = 1

>>>>DESIGNATE INOFPFNOFNT STRAM FOR CONFLUENCE<<<<
 =====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INOFPFNOFNT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.11

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RAINFALL INTENSITY(INCH/HR) = 5.91
 TOTAL STRAM AREA(ACRES) = 0.67
 PFAK FLOW RATE(CFS) AT CONFLUENCE = 1.19

 FLOW PROCESS FROM NODE 220.40 TO NODE 218.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 =====

RFSIOFNTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(FFFT) = 105.00
 UPSTREAM ELEVATION(Feet) = 695.00
 DOWNSTREAM ELEVATION(Feet) = 688.00
 ELEVATION DIFFERENCE(FFFT) = 7.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.782
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.42
 TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.42

 FLOW PROCESS FROM NODE 218.40 TO NODE 216.40 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USFO)<<<<
 =====

UPSTREAM ELEVATION(Feet) = 688.00 DOWNSTREAM ELEVATION(FFET) = 667.00
 STREET LENGTH(FFFT) = 800.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.22
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.35
 HALFSTREET FLOOD WIDTH(FFFT) = 10.43
 AVERAGE FLOW VELOCITY(FFFT/SFC.) = 3.62
 PRODUCT OF DEPTH&VELOCITY(Feet/Sec.) = 1.26
 STREET FLOW TRAVEL TIME(MIN.) = 3.68 Tc(MIN.) = 8.46
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.192
 RFSIOFNTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600

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SUBAREA AREA(ACRES) = 2.01 SUBAREA RUNOFF(CFS) = 7.47
 TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 7.76

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(Feet) = 0.41 HALFSTREET FLOOD WIDTH(Feet) = 13.71
 FLOW VELOCITY(Feet/Sec.) = 4.15 DEPTH*VELOCITY(Ft*Ft/Sec.) = 1.69
 LONGEST FLOWPATH FROM NODE 220.40 TO NODE 216.40 = 905.00 FEET.

 FLOW PROCESS FROM NODE 218.40 TO NODE 216.40 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.46
 RAINFALL INTENSITY(INCH/HR) = 6.19
 TOTAL STREAM AREA(ACRES) = 2.09
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.76

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	1.19	9.11	5.906	0.67
2	7.76	8.46	6.192	2.09

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	8.87	8.46	6.192
2	8.59	9.11	5.906

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 8.87 Tc(MIN.) = 8.46
 TOTAL AREA(ACRES) = 2.8
 LONGEST FLOWPATH FROM NODE 220.40 TO NODE 216.40 = 905.00 FEET.

 FLOW PROCESS FROM NODE 216.40 TO NODE 214.40 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 663.00 DOWNSTREAM(Feet) = 662.00
 FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.4 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 19.66
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 8.87
 PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 8.47
 LONGEST FLOWPATH FROM NODE 220.40 TO NODE 214.40 = 910.00 FEET.

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 FLOW PROCESS FROM NODE 216.40 TO NODE 214.40 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	8.87	8.47	6.190	2.76

LONGEST FLOWPATH FROM NODE 220.40 TO NODE 214.40 = 910.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	77.78	10.22	5.484	33.20

LONGEST FLOWPATH FROM NODE 216.60 TO NODE 214.40 = 1970.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	73.32	8.47	6.190
2	85.63	10.22	5.484

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 85.63 Tc(MIN.) = 10.22
 TOTAL AREA(ACRES) = 36.0

 FLOW PROCESS FROM NODE 216.40 TO NODE 214.40 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<

 FLOW PROCESS FROM NODE 214.40 TO NODE 276.20 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 662.00 DOWNSTREAM(Feet) = 661.00
 FLOW LENGTH(Feet) = 52.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.8 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 14.15
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 85.63
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 10.28
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 276.20 = 2022.00 FEET.

 FLOW PROCESS FROM NODE 214.40 TO NODE 276.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.28

RAINFALL INTENSITY(INCH/HR) = 5.46
 TOTAL STREAM AREA(ACRES) = 35.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 85.63

 FLOW PROCESS FROM NODE 282.20 TO NODE 280.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 RESTOINTAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOTL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 195.00
 UPSTREAM ELEVATION(Feet) = 669.00
 DOWNSTREAM ELEVATION(Feet) = 668.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.293
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 63.57
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.815
 SUBAREA RUNOFF(CFS) = 0.49
 TOTAL AREA(ACRES) = 0.12 TOTAL RUNOFF(CFS) = 0.49

 FLOW PROCESS FROM NODE 280.20 TO NODE 278.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

 UPSTREAM ELEVATION(Feet) = 668.00 DOWNSTREAM ELEVATION(Feet) = 665.50
 STREET LENGTH(Feet) = 250.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.26
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.37
 HALFSTREET FLOOD WIDTH(Feet) = 11.52
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.36
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.87
 STREET FLOW TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 9.06
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.926
 RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOTL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 1.55 SUBAREA RUNOFF(CFS) = 5.51

TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 5.94

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.43 HALFSTREET FLOOD WIDTH(Feet) = 14.96
 FLOW VELOCITY(Feet/Sec.) = 2.71 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.16
 LONGEST FLOWPATH FROM NODE 282.20 TO NODE 278.20 = 355.00 FEET.

 FLOW PROCESS FROM NODE 278.20 TO NODE 276.20 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(Feet) = 663.00 DOWNSTREAM(Feet) = 661.00
 FLOW LENGTH(Feet) = 195.00 MANNING'S N = 0.013
 ESTIMATED PTPE OTAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PTPE IS 9.9 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 5.94
 ESTIMATED PTPE OTAMETER(INCH) = 18.00 NUMBER OF PTPEs = 1
 PIPE-FLOW(CFS) = 5.94
 PTPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 9.61
 LONGEST FLOWPATH FROM NODE 282.20 TO NODE 276.20 = 550.00 FEET.

 FLOW PROCESS FROM NODE 278.20 TO NODE 276.20 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.61
 RAINFALL INTENSITY(INCH/HR) = 5.71
 TOTAL STREAM AREA(ACRES) = 1.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.94

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	85.63	10.28	5.462	35.96
2	5.94	9.61	5.706	1.67

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	85.97	9.61	5.706
2	91.32	10.28	5.462

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 91.32 Tc(MIN.) = 10.28
 TOTAL AREA(ACRES) = 37.6
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 276.20 = 2022.00 FEET.

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ELOW PROCESS FROM NODE 278.20 TO NODE 276.20 IS CODE = 10

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ELOW PROCESS FROM NODE 278.20 TO NODE 276.20 IS CODE = 13

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

ELOW PROCESS FROM NODE 212.40 TO NODE 210.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 86

INITIAL SUBAREA FLOW-LENGTH(Feet) = 90.00

UPSTREAM ELEVATION(Feet) = 724.00

DOWNSTREAM ELEVATION(Feet) = 723.00

ELEVATION DIFFERENCE(Feet) = 1.00

SUBAREA OVERLAND TIME OF FLOW(Min.) = 7.09S

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 66.67

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN I_c CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.938

SUBAREA RUNOFF(CFS) = 0.42

TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.42

ELOW PROCESS FROM NODE 210.40 TO NODE 208.40 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(Feet) = 723.00 DOWNSTREAM ELEVATION(Feet) = 720.00

STREET LENGTH(Feet) = 225.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSEAL GRADEBREAK(Feet) = 20.00

INSIDE STREET CROSSEAL(DECIMAL) = 0.018

OUTSIDE STREET CROSSEAL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALESTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSEAL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.44

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(Feet) = 0.33

HALFSTREET FLOOD WIDTH(Feet) = 9.41

AVERAGE FLOW VELOCITY(Feet/SEC.) = 2.48

PRODUCT OF DEPTH&VELOCITY(Feet*Feet/SEC.) = 0.82

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STREET FLOW TRAVEL TIME(Min.) = 1.51 I_c (Min.) = 8.61

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.126

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 86

AREA-AVERAGE RUNOFF COEFFICIENT = 0.600

SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CFS) = 4.04

TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 4.41

ENO OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(Feet) = 0.38 HALFSTREET FLOOD WIDTH(Feet) = 12.38

FLOW VELOCITY(Feet/SEC.) = 2.82 DEPTH*VELOCITY(Feet*Feet/SEC.) = 1.08

LONGEST FLOWPATH FROM NODE 212.40 TO NODE 208.40 = 315.00 FEET.

FLOW PROCESS FROM NODE 208.40 TO NODE 200.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 717.00 DOWNSTREAM(Feet) = 713.00

FLOW LENGTH(Feet) = 360.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.1 INCHES

PIPE-FLOW VELOCITY(Feet/SEC.) = 5.68

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 4.41

PIPE TRAVEL TIME(Min.) = 1.06 I_c (Min.) = 9.66

LONGEST FLOWPATH FROM NODE 212.40 TO NODE 208.40 = 675.00 FEET.

ELOW PROCESS FROM NODE 208.40 TO NODE 200.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(Min.) = 9.66

RAINFALL INTENSITY(INCH/HR) = 5.68

TOTAL STREAM AREA(ACRES) = 1.20

PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.41

ELOW PROCESS FROM NODE 206.40 TO NODE 204.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 86

INITIAL SUBAREA FLOW-LENGTH(Feet) = 130.00

UPSTREAM ELEVATION(Feet) = 724.00

DOWNSTREAM ELEVATION(Feet) = 723.00

ELEVATION DIFFERENCE(Feet) = 1.00

SUBAREA OVERLAND TIME OF FLOW(Min.) = 7.486

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 58.08

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(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN TC CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.702

SUBAREA RUNOFF(CFS) = 0.72

TOTAL AREA(ACRES) = 0.18 TOTAL RUNOFF(CFS) = 0.72

FLOW PROCESS FROM NODE 204.40 TO NODE 202.40 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(Feet) = 723.00 DOWNSTREAM ELEVATION(Feet) = 721.00

STREET LENGTH(Feet) = 70.00 CURB HEIGHT(INCHES) = 6.0

STREET MALEWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSEAL GRADEBREAK(Feet) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF MALESTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.02

STREET FLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(Feet) = 0.23

HALFSTREET FLOOD WIDTH(Feet) = 3.91

AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.08

PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 0.72

STREET FLOW TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 7.86

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.492

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 86

AREA-AVERAGE RUNOFF COEFFICIENT = 0.600

SUBAREA AREA(ACRES) = 0.15 SUBAREA RUNOFF(CFS) = 0.58

TOTAL AREA(ACRES) = 0.3 PEAK FLOW RATE(CFS) = 1.29

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(Feet) = 0.25 MALESTREET FLOOD WIDTH(Feet) = 5.03

FLOW VELOCITY(Feet/Sec.) = 3.06 DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.77

LONGEST FLOWPATH FROM NODE 206.40 TO NODE 202.40 = 200.00 FEET.

FLOW PROCESS FROM NODE 202.40 TO NODE 200.40 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSIDEAM(Feet) = 717.00 DOWNSTREAM(Feet) = 713.00

FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 1.5 INCHES

PIPE-FLOW VELOCITY(Feet/Sec.) = 18.05

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

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PIPE-ELON(CFS) = 1.29

PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 7.87

LONGEST FLOWPATH FROM NODE 206.40 TO NODE 200.40 = 205.00 FEET.

FLOW PROCESS FROM NODE 202.40 TO NODE 200.40 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 7.87

RAINFALL INTENSITY(INCH/HR) = 6.49

TOTAL STREAM AREA(ACRES) = 0.33

PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.29

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRES)
1	4.41	9.66	5.685	1.20
2	1.29	7.87	6.490	0.33

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	4.88	7.87	6.490
2	5.54	9.66	5.685

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.54 Tc(MIN.) = 9.66

TOTAL AREA(ACRES) = 1.5

LONGEST FLOWPATH FROM NODE 212.40 TO NODE 200.40 = 675.00 FEET.

FLOW PROCESS FROM NODE 200.40 TO NODE 292.20 IS CODE = 31

>>>>COMPUTE PIPE-ELON TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSIDEAM(Feet) = 713.00 DOWNSTREAM(Feet) = 704.00

FLOW LENGTH(Feet) = 200.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.3 INCHES

PIPE-ELON VELOCITY(Feet/Sec.) = 10.07

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-ELON(CFS) = 5.54

PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 9.99

LONGEST FLOWPATH FROM NODE 212.40 TO NODE 292.20 = 875.00 FEET.

FLOW PROCESS FROM NODE 200.40 TO NODE 292.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

```

=====
TOTAL NUMBER OF STREAMS = 2
CONUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.99
RAINFALL INTENSITY(INCH/HR) = 5.56
TOTAL STREAM AREA(ACRES) = 1.53
PEAK FLOW RATE(CFS) AT CONUENCE = 5.54

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*****
FLOW PROCESS FROM NODE 298.20 TO NODE 296.20 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

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=====
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
INITIAL SUBAREA FLOW-LENGTH(EET) = 240.00
UPSTREAM ELEVATION(Feet) = 804.00
DOWNSTREAM ELEVATION(Feet) = 778.00
ELEVATION DIFFERENCE(EET) = 26.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HR) = 7.210
SUBAREA RUNOFF(CFS) = 0.61
TOTAL AREA(ACRES) = 0.28 TOTAL RUNOFF(CFS) = 0.61

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*****
FLOW PROCESS FROM NODE 296.20 TO NODE 294.20 IS CODE = S1

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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

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=====
ELEVATION DATA: UPSTREAM(EET) = 778.00 DOWNSTREAM(EET) = 708.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 310.00 CHANNEL SLOPE = 0.2250
CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(EET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.117
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.33
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 2.66
AVERAGE FLOW DEPTH(EET) = 0.05 TRAVEL TIME(MIN.) = 1.94
Tc(MIN.) = 8.63
SUBAREA AREA(ACRES) = 0.78 SUBAREA RUNOFF(CFS) = 1.43
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 1.95

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(EET) = 0.06 FLOW VELOCITY(Feet/Sec.) = 2.95
LONGEST FLOWPATH FROM NODE 298.20 TO NODE 294.20 = 550.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 294.20 TO NODE 292.20 IS CODE = 31

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```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(EET) = 708.00 DOWNSTREAM(EET) = 704.00
FLOW LENGTH(EET) = 20.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.6 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 32.62
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.95
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 8.65
LONGEST FLOWPATH FROM NODE 298.20 TO NODE 292.20 = 570.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 294.20 TO NODE 292.20 IS CODE = 1

```

```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONUENCE<<<<
>>>>AND COMPUTE VARIOUS CONUENCE STREAM VALUES<<<<

```

```

=====
TOTAL NUMBER OF STREAMS = 2
CONUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.65
RAINFALL INTENSITY(INCH/HR) = 6.10
TOTAL STREAM AREA(ACRES) = 1.06
PEAK FLOW RATE(CFS) AT CONUENCE = 1.95

```

```

** CONUENCE DATA **

```

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HR)	AREA (ACRE)
1	5.54	9.99	5.563	1.53
2	1.95	8.65	6.105	1.06

```

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

```

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** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HR)
1	6.99	8.65	6.105
2	7.31	9.99	5.563

```

COMPUTED CONUENCE ESTIMATES ARE AS FOLLOWS:

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```

PEAK FLOW RATE(CFS) = 7.31 Tc(MIN.) = 9.99
TOTAL AREA(ACRES) = 2.6
LONGEST FLOWPATH FROM NODE 212.40 TO NODE 292.20 = 875.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 292.20 TO NODE 284.20 IS CODE = 31

```

```

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

```

```

=====
ELEVATION DATA: UPSTREAM(EET) = 704.00 DOWNSTREAM(EET) = 674.00
FLOW LENGTH(EET) = 150.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.9 INCHES

```

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PIPE-FLOW VELOCITY(FEET/SEC.) = 18.60
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.31
 PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 10.13
 LONGEST FLOWPATH FROM NODE 212.40 TO NODE 284.20 = 1025.00 FEET.

 FLOW PROCESS FROM NODE 292.20 TO NODE 284.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.13
 RAINFALL INTENSITY(INCH/HR) = 5.52
 TOTAL STREAM AREA(ACRES) = 2.59
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.31

 FLOW PROCESS FROM NODE 290.20 TO NODE 288.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 150.00
 UPSTREAM ELEVATION(FEET) = 880.00
 DOWNSTREAM ELEVATION(FEET) = 826.00
 ELEVATION DIFFERENCE(FEET) = 54.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.210
 SUBAREA RUNOFF(CFS) = 0.56
 TOTAL AREA(ACRES) = 0.26 TOTAL RUNOFF(CFS) = 0.56

 FLOW PROCESS FROM NODE 288.20 TO NODE 286.20 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 826.00 DOWNSTREAM(FEET) = 680.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 600.00 CHANNEL SLOPE = 0.2433
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.980
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.49
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.45
 AVERAGE FLOW DEPTH(FEET) = 0.10 TRAVEL TIME(MIN.) = 2.25
 Tc(MIN.) = 8.93

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SUBAREA AREA(ACRES) = 4.36 SUBAREA RUNOFF(CFS) = 7.82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
 TOTAL AREA(ACRES) = 4.6 PEAK FLOW RATE(CFS) = 8.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.14 FLOW VELOCITY(FEET/SEC.) = 5.45
 LONGEST FLOWPATH FROM NODE 290.20 TO NODE 286.20 = 750.00 FEET.

 FLOW PROCESS FROM NODE 286.20 TO NODE 284.20 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 680.00 DOWNSTREAM(FEET) = 674.00
 FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.28
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 8.29
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.95
 LONGEST FLOWPATH FROM NODE 290.20 TO NODE 284.20 = 770.00 FEET.

 FLOW PROCESS FROM NODE 286.20 TO NODE 284.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.95
 RAINFALL INTENSITY(INCH/HR) = 5.97
 TOTAL STREAM AREA(ACRES) = 4.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.29

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	7.31	10.13	5.515	2.59
2	8.29	8.95	5.973	4.62

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	15.04	8.95	5.973
2	14.96	10.13	5.515

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 15.04 Tc(MIN.) = 8.95
 TOTAL AREA(ACRES) = 7.2
 LONGEST FLOWPATH FROM NODE 212.40 TO NODE 284.20 = 1025.00 FEET.

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 FLOW PROCESS FROM NODE 284.20 TO NODE 276.20 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 661.00
 FLOW LENGTH(FEET) = 155.00 MANNING'S N = 0.013
 ESTIMATE PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.50
 ESTIMATE PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 15.04
 PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 9.10
 LONGEST FLOWPATH FROM NODE 212.40 TO NODE 276.20 = 1180.00 FEET.

 FLOW PROCESS FROM NODE 284.20 TO NODE 276.20 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	15.04	9.10	5.907	7.21

LONGEST FLOWPATH FROM NODE 212.40 TO NODE 276.20 = 1180.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	91.32	10.28	5.462	37.63

LONGEST FLOWPATH FROM NODE 216.60 TO NODE 276.20 = 2022.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	95.93	9.10	5.907
2	105.22	10.28	5.462

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 105.22 Tc(MIN.) = 10.28
 TOTAL AREA(ACRES) = 44.8

 FLOW PROCESS FROM NODE 284.20 TO NODE 276.20 IS CODE = 12

 >>>>CLEAR MEMORY BANK # 2 <<<<

 FLOW PROCESS FROM NODE 276.20 TO NODE 262.20 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(FEET) = 661.00 DOWNSTREAM(FEET) = 655.00

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FLOW LENGTH(FEET) = 90.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 24.30
 ESTIMATE PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 105.22
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 10.34
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 262.20 = 2112.00 FEET.

 FLOW PROCESS FROM NODE 276.20 TO NODE 262.20 IS CODE = 1

 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.34
 RAINFALL INTENSITY(INCH/HR) = 5.44
 TOTAL STREAM AREA(ACRES) = 44.84
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 105.22

 FLOW PROCESS FROM NODE 274.20 TO NODE 272.20 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RESIDENTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 669.00
 DOWNSTREAM ELEVATION(FEET) = 668.00
 ELEVATION DIFFERENCE(FEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.256
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 65.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.838
 SUBAREA RUNOFF(CFS) = 0.37
 TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.37

 FLOW PROCESS FROM NODE 272.20 TO NODE 270.20 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSTREAM ELEVATION(FEET) = 668.00 DOWNSTREAM ELEVATION(FEET) = 659.00
 STREET LENGTH(FEET) = 385.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACIOR for Streetflow Section(curb-to-curb) = 0.0150
 Manning's FRICTION FACIOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.47
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.31
 HALFSTREET FLOOD WIDTH(FEET) = 8.22
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.10
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.96
 STREET FLOW TRAVEL TIME(MIN.) = 2.07 T_c (MIN.) = 9.32
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.817
 RESIDENTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 4.19
 TOTAL AREA(ACRES) = 1.3 PEAK FLOW RATE(CFS) = 4.50

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.05
 FLOW VELOCITY(FEET/SEC.) = 3.50 $DEPTH*VELOCITY(FI*FI/SEC.) = 1.26$
 LONGEST FLOWPATH FROM NODE 274.20 TO NODE 270.20 = 485.00 FEET.

 FLOW PROCESS FROM NODE 270.20 TO NODE 262.20 IS CODE = 3I

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

 ELEVATION DATA: UPSIREAM(FEET) = 656.00 DOWNSIREAM(FEET) = 655.00
 FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.88
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.50
 PIPE TRAVEL TIME(MIN.) = 0.03 T_c (MIN.) = 9.36
 LONGEST FLOWPATH FROM NODE 274.20 TO NODE 262.20 = 505.00 FEET.

 FLOW PROCESS FROM NODE 270.20 TO NODE 262.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.36
 RAINFALL INTENSITY(INCH/HR) = 5.80
 TOTAL STREAM AREA(ACRES) = 1.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.50

 FLOW PROCESS FROM NODE 268.20 TO NODE 266.20 IS CODE = 2I

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RESIDENTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 722.50
 DOWNSIREAM ELEVATION(FEET) = 721.00
 ELEVATION DIFFERENCE(FEET) = 1.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.695
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 72.50
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN T_c CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.203
 SUBAREA RUNOFF(CFS) = 0.99
 TOTAL AREA(ACRES) = 0.23 TOTAL RUNOFF(CFS) = 0.99

 FLOW PROCESS FROM NODE 266.20 TO NODE 264.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # I USED)<<<<

 UPSTREAM ELEVATION(FEET) = 721.00 DOWNSIREAM ELEVATION(FEET) = 659.00
 STREET LENGTH(FEET) = 640.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.37
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.28
 HALFSTREET FLOOD WIDTH(FEET) = 6.47
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.94
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.65
 STREET FLOW TRAVEL TIME(MIN.) = 1.00 T_c (MIN.) = 8.49
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.179
 RESIDENTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 1.28 SUBAREA RUNOFF(CFS) = 4.75
 TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 5.60

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 8.66
 FLOW VELOCITY(FEET/SEC.) = 6.49 $DEPTH*VELOCITY(FI*FI/SEC.) = 2.06$
 LONGEST FLOWPATH FROM NODE 268.20 TO NODE 264.20 = 740.00 FEET.

 FLOW PROCESS FROM NODE 264.20 TO NODE 262.20 IS CODE = 3I

```

>>>>COMPUTE PIPE-ELOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION QAIA: UPSTREAM(FEET) = 656.00 DOWNSTREAM(FEET) = 655.00
FLOW LENGTH(FEET) = 5.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.24
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.60
PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 0.50
LONGEST FLOWPATH FROM NODE 268.20 TO NODE 262.20 = 745.00 FEET.

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*****
FLOW PROCESS FROM NODE 264.20 TO NODE 262.20 IS CODE = 1

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

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=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 8.50
RAINFALL INTENSITY(INCH/HR) = 6.18
TOTAL STREAM AREA(ACRES) = 1.51
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.60

```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRES)
1	105.22	10.34	5.441	44.84
2	4.50	9.36	5.803	1.29
3	5.60	8.50	6.177	1.51

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	96.14	8.50	6.177
2	104.98	9.36	5.803
3	114.38	10.34	5.441

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 114.38 Tc(MIN.) = 10.34
TOTAL AREA(ACRES) = 47.6
LONGEST FLOWPATH FROM NODE 216.60 TO NODE 262.20 = 2112.00 FEET.

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*****
FLOW PROCESS FROM NODE 262.20 TO NODE 256.20 IS CODE = 31

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>>>>COMPUTE PIPE-ELOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION QAIA: UPSTREAM(FEET) = 655.00 DOWNSTREAM(FEET) = 644.00
FLOW LENGTH(FEET) = 210.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.9 INCHES

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PIPE-FLOW VELOCITY(FEET/SEC.) = 22.04
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 114.38
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 10.50
LONGEST FLOWPATH FROM NODE 216.60 TO NODE 256.20 = 2322.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 262.20 TO NODE 256.20 IS CODE = 1

```

```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 10.50
RAINFALL INTENSITY(INCH/HR) = 5.39
TOTAL STREAM AREA(ACRES) = 47.64
PEAK FLOW RATE(CFS) AT CONFLUENCE = 114.38

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*****
FLOW PROCESS FROM NODE 262.20 TO NODE 260.20 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

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=====
RESIDENTIAL (14.5 CU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = B6
INITIAL SUBAREA FLOW-LENGTH(FEET) = 90.00
UPSTREAM ELEVATION(EEEE) = 654.00
DOWNSTREAM ELEVATION(EEEE) = 653.00
ELEVATION DIFFERENCE(EEEE) = 1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.095
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH = 66.67
          (Reference: Table 3-18 of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.930
SUBAREA RUNOFF(CFS) = 0.46
TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.46

```

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*****
FLOW PROCESS FROM NODE 260.20 TO NODE 258.20 IS CODE = 62

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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

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=====
UPSTREAM ELEVATION(EEEE) = 653.00 DOWNSTREAM ELEVATION(EEEE) = 650.00
STREET LENGTH(FEET) = 240.00 CURB HEIGHT(INCHES) = 6.0
STREET HALF-WIDTH(FEET) = 30.00

```

```

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

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

```


**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.21
 STREET FLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.36
 HALF STREET FLOOD WIDTH(Feet) = 10.90
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.56
 PRODUCT OF DEPTH*VELOCITY(Feet*Feet/Sec.) = 0.91
 STREET FLOW TRAVEL TIME(Min.) = 1.56 T_c (Min.) = 8.66
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.102
 RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 5.49
 TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 5.89

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(Feet) = 0.42 HALF STREET FLOOD WIDTH(Feet) = 14.26
 FLOW VELOCITY(Feet/Sec.) = 2.93 T_c DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.22
 LONGEST FLOWPATH FROM NODE 262.20 TO NODE 256.20 = 330.00 FEET.

 FLOW PROCESS FROM NODE 258.20 TO NODE 256.20 IS CODE = 31

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

 ELEVATION DATA: UPSIDEAM(Feet) = 646.00 DOWNSIDEAM(Feet) = 644.00
 FLOW LENGTH(Feet) = 215.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.2 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 5.72
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.89
 PIPE TRAVEL TIME(Min.) = 0.63 T_c (Min.) = 9.28
 LONGEST FLOWPATH FROM NODE 262.20 TO NODE 256.20 = 545.00 FEET.

 FLOW PROCESS FROM NODE 258.20 TO NODE 256.20 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(Min.) = 9.28
 RAINFALL INTENSITY(INCH/HR) = 5.83
 TOTAL STREAM AREA(ACRES) = 1.61
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.89

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	T_c (Min.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	114.38	10.50	5.388	47.64
2	5.89	9.28	5.833	1.61

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	T_c (Min.)	INTENSITY (INCH/HOUR)
1	111.55	9.28	5.833
2	119.82	10.50	5.388

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 119.82 T_c (Min.) = 10.50
 TOTAL AREA(ACRES) = 49.2
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 256.20 = 2322.00 FEET.

 FLOW PROCESS FROM NODE 256.20 TO NODE 242.20 IS CODE = 31

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

 ELEVATION DATA: UPSIDEAM(Feet) = 644.00 DOWNSIDEAM(Feet) = 628.00
 FLOW LENGTH(Feet) = 235.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.8 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 24.99
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 119.82
 PIPE TRAVEL TIME(Min.) = 0.16 T_c (Min.) = 10.66
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 242.20 = 2557.00 FEET.

 FLOW PROCESS FROM NODE 256.20 TO NODE 242.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(Min.) = 10.66
 RAINFALL INTENSITY(INCH/HR) = 5.34
 TOTAL STREAM AREA(ACRES) = 49.25
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 119.82

 FLOW PROCESS FROM NODE 248.20 TO NODE 246.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 100.00
 UPSIDEAM ELEVATION(Feet) = 654.00
 DOWNSIDEAM ELEVATION(Feet) = 653.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(Min.) = 7.256
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 65.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN T_c CALCULATION!

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100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.838
 SUBAREA RUNOFF(CFS) = 0.41
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CES) = 0.41

 FLDW PROCESS FROM NODE 246.20 TO NODE 244.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSTREAM ELEVATION(FEET) = 653.00 DOWNSTREAM ELEVATION(FEET) = 633.00
 STREET LENGTH(EEET) = 550.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(EEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLDW(CFS) = 2.90
 STREETFLOW MODEL RESULTS USING ESTIMATED FLDW:
 STREET ELWD DEPTH(EEET) = 0.30
 HALFSTREET FLDW WIDTH(EEET) = 7.97
 AVERAGE FLDW VELOCITY(EEET/SEC.) = 3.81
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.16
 STREET FLDW TRAVEL TIME(MIN.) = 2.41 Tc(MIN.) = 9.66
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.685
 RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 1.45 SUBAREA RUNOFF(CFS) = 4.95
 TOTAL AREA(ACRES) = 1.6 PEAK FLDW RATE(CES) = 5.29

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(EEET) = 0.35 HALFSTREET ELWD WIDTH(EEET) = 10.74
 FLDW VELOCITY(EEET/SEC.) = 4.32 DEPTH*VELOCITY(EEET*EEET/SEC.) = 1.53
 LONGEST FLDWPATH FROM NODE 248.20 TO NODE 244.20 = 650.00 FEET.

 FLDW PROCESS FROM NODE 244.20 TO NODE 242.20 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(EEET) = 629.00 DOWNSTREAM(EEET) = 628.00
 FLOW LENGTH(EEET) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.0 INCHES
 PIPE-FLDW VELOCITY(EEET/SEC.) = 10.33
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLDW(CES) = 5.29
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 9.69

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LONGEST FLOWPATH FROM NODE 248.20 TO NODE 242.20 = 670.00 FEET.

 ELDW PROCESS FROM NODE 244.20 TO NODE 242.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.69
 RAINFALL INTENSITY(INCH/HR) = 5.67
 TOTAL STREAM AREA(ACRES) = 1.55
 PEAK ELDW RATE(CFS) AT CONFLUENCE = 5.29

 ELDW PROCESS FROM NODE 254.20 TO NODE 252.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(EEET) = 85.00
 UPSTREAM ELEVATION(EEET) = 654.00
 DOWNSTREAM ELEVATION(EEET) = 653.00
 ELEVATION DIFFERENCE(EEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.012
 WARNING: INITIAL SUBAREA FLDW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLDW LENGTH = 67.65
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLDW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.991
 SUBAREA RUNOFF(CFS) = 0.42
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CES) = 0.42

 FLDW PROCESS FROM NODE 252.20 TO NODE 250.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSTREAM ELEVATION(EEET) = 653.00 DOWNSTREAM ELEVATION(EEET) = 633.00
 STREET LENGTH(EEET) = 390.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(EEET) = 30.00

DISTANCE FROM CROWN TO CROSSEALL GRADEBREAK(EEET) = 20.00
 INSIDE STREET CROSSEALL(DECIMAL) = 0.018
 OUTSIDE STREET CROSSEALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED ELDW(CFS) = 3.80
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET ELDW DEPTH(EEET) = 0.31

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HALFSTREET FLOOD WIDTH(EET) = 8.34
 AVERAGE FLOW VELOCITY(EET/SEC.) = 4.66
 PRODUCT OF DEPTH&VELOCITY(ET*ET/SEC.) = 1.45
 STREET FLOW TRAVEL TIME(MIN.) = 1.39 Tc(MTN.) = 8.41
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.219
 RESTDENTTAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 1.81 SUBAREA RUNOFF(CES) = 6.75
 TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 7.13

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(Feet) = 0.37 HALFSTREET FLOOD WIDTH(EET) = 11.37
 FLOW VELOCITY(EET/SEC.) = 5.29 DEPTH*VELOCITY(ET*ET/SEC.) = 1.93
 LONGEST FLOWPATH FROM NODE 254.20 TO NODE 250.20 = 475.00 FEET.

 FLOW PROCESS FROM NODE 250.20 TO NODE 242.20 TS CODE = 31

>>>>COMPUTE PTPE-ELOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTMATED PTPE SIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(EET) = 629.00 DOWNSTREAM(EET) = 628.00
 FLOW LENGTH(EET) = 5.00 MANNING'S N = 0.013
 ESTIMATE PIPE DIAMETER(TNCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 TNCH PIPE IS 4.9 TNCHES
 PTPE-ELOW VELOCITY(Feet/SEC.) = 18.47
 ESTMATED PTPE DIAMETER(TNCH) = 18.00 NUMBER OF PIPES = 1
 PTPE-FLOW(CES) = 7.13
 PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MTN.) = 8.41
 LONGEST FLOWPATH FROM NODE 254.20 TO NODE 242.20 = 480.00 FEET.

 FLOW PROCESS FROM NODE 250.20 TO NODE 242.20 TS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MTN.) = 8.41
 RAINEALL INTENSITY(TNCH/HR) = 6.22
 TOTAL STREAM AREA(ACRES) = 1.91
 PEAK FLOW RATE(CES) AT CONFLUENCE = 7.13

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	119.82	10.66	5.337	49.25
2	5.29	9.69	5.673	1.55
3	7.13	8.41	6.217	1.91

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

** PEAK FLOW RATE TABLE **

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STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (TNCH/HOUR)
1	114.58	8.41	6.217
2	124.52	9.69	5.673
3	130.91	10.66	5.337

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 130.91 Tc(MIN.) = 10.66
 TOTAL AREA(ACRES) = 52.7
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 242.20 = 2557.00 FEET.

 FLOW PROCESS FROM NODE 242.20 TO NODE 214.20 IS CODE = 31

>>>>COMPUTE PTPE-ELOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTMATED PTPE SIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(EET) = 628.00 DOWNSTREAM(EET) = 625.00
 FLOW LENGTH(Feet) = 60.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.3 INCHES
 PTPE-ELOW VELOCITY(EET/SEC.) = 22.72
 ESTMATED PTPE DIAMETER(TNCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-ELOW(CES) = 130.91
 PTPE TRAVEL TIME(MIN.) = 0.04 Tc(MTN.) = 10.70
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 214.20 = 2617.00 FEET.

 FLOW PROCESS FROM NODE 252.20 TO NODE 214.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.70
 RAINEALL INTENSITY(TNCH/HR) = 5.32
 TOTAL STREAM AREA(ACRES) = 52.71
 PEAK FLOW RATE(CES) AT CONFLUENCE = 130.91

 FLOW PROCESS FROM NODE 240.20 TO NODE 238.20 TS CODE = 21

>>>>RATONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RESTDENTTAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(EET) = 98.00
 UPSTREAM ELEVATION(EET) = 634.00
 DOWNSTREAM ELEVATION(EET) = 633.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.224
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 65.31
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.857
 SUBAREA RUNOFF(CES) = 0.41

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TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.41

FLOW PROCESS FROM NODE 238.20 TO NODE 236.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(Feet) = 633.00 DOWNSTREAM ELEVATION(Feet) = 630.00
STREET LENGTH(Feet) = 310.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018SPECIFIED NUMBER OF HALFSSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.80
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.36
HALFSTREET FLOOD WIDTH(Feet) = 10.82
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.26
PRODUCT OF DEPTH&VELOCITY(Ft*EI/Sec.) = 0.80
STREET FLOW TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 9.51
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.743
RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
SUBAREA AREA(ACRES) = 1.38 SUBAREA RUNOFF(CFS) = 4.76
TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 5.10END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.42 HALFSTREET FLOOD WIDTH(Feet) = 14.18
FLOW VELOCITY(Feet/Sec.) = 2.56 DEPTH*VELOCITY(Ft*EI/Sec.) = 1.07
LONGEST FLOWPATH FROM NODE 240.20 TO NODE 236.20 = 408.00 FEET.*****
FLOW PROCESS FROM NODE 236.20 TO NODE 230.20 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 627.00 DOWNSTREAM(Feet) = 626.00
FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 10.22
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.10
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 9.54
LONGEST FLOWPATH FROM NODE 240.20 TO NODE 230.20 = 428.00 FEET.

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FLOW PROCESS FROM NODE 230.20 TO NODE 214.20 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 626.00 DOWNSTREAM(Feet) = 625.00
FLOW LENGTH(Feet) = 100.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.1 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 5.67
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.10
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 9.84
LONGEST FLOWPATH FROM NODE 240.20 TO NODE 214.20 = 528.00 FEET.*****
FLOW PROCESS FROM NODE 230.20 TO NODE 214.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.84
RAINFALL INTENSITY(INCH/HR) = 5.62
TOTAL STREAM AREA(ACRES) = 1.48
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.10

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	130.91	10.70	5.323	52.71
2	5.10	9.84	5.619	1.48

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	129.11	9.84	5.619
2	135.74	10.70	5.323

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 135.74 Tc(MIN.) = 10.70
TOTAL AREA(ACRES) = 54.2
LONGEST FLOWPATH FROM NODE 216.60 TO NODE 214.20 = 2617.00 FEET.*****
FLOW PROCESS FROM NODE 230.20 TO NODE 214.20 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<

FLOW PROCESS FROM NODE 230.20 TO NODE 214.20 IS CODE = 13

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

FLOW PROCESS FROM NODE 229.20 TO NODE 227.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 100.00
 UPSTREAM ELEVATION(Feet) = 708.00
 DOWNSTREAM ELEVATION(Feet) = 694.00
 ELEVATION DIFFERENCE(Feet) = 14.00
 SUBAREA OVERLAND TIME OF FLOW(Min.) = 6.684
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.210
 SUBAREA RUNOFF(CFS) = 0.19
 TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.19

FLOW PROCESS FROM NODE 227.20 TO NODE 225.20 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 694.00 DOWNSTREAM(Feet) = 673.00
 CHANNEL LENGTH THRU SUBAREA(Feet) = 180.00 CHANNEL SLOPE = 0.1167
 CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.296
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.96
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 1.92
 AVERAGE FLOW DEPTH(Feet) = 0.05 TRAVEL TIME(Min.) = 1.56
 Tc(Min.) = 8.25
 SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.51
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
 TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 1.68

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 0.07 FLOW VELOCITY(Feet/Sec.) = 2.47
 LONGEST FLOWPATH FROM NODE 229.20 TO NODE 225.20 = 280.00 FEET.

FLOW PROCESS FROM NODE 225.20 TO NODE 224.20 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 673.00 DOWNSTREAM(Feet) = 629.00
 FLOW LENGTH(Feet) = 245.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.5 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 11.62
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.68
 PIPE TRAVEL TIME(Min.) = 0.35 Tc(Min.) = 8.60
 LONGEST FLOWPATH FROM NODE 229.20 TO NODE 224.20 = 525.00 FEET.

FLOW PROCESS FROM NODE 225.20 TO NODE 224.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(Min.) = 8.60
 RAINFALL INTENSITY(INCH/HR) = 6.13
 TOTAL STREAM AREA(ACRES) = 0.89
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.68

FLOW PROCESS FROM NODE 228.20 TO NODE 226.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (10.0 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 80.00
 UPSTREAM ELEVATION(Feet) = 635.00
 DOWNSTREAM ELEVATION(Feet) = 634.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(Min.) = 7.343
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 68.75
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.786
 SUBAREA RUNOFF(CFS) = 0.27
 TOTAL AREA(ACRES) = 0.07 TOTAL RUNOFF(CFS) = 0.27

FLOW PROCESS FROM NODE 226.20 TO NODE 224.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(Feet) = 634.00 DOWNSTREAM ELEVATION(Feet) = 632.00
 STREET LENGTH(Feet) = 115.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.54
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.28
 HALFSTREET FLOOD WIDTH(Feet) = 6.84
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.52
 PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 0.72
 STREET FLOW TRAVEL TIME(Min.) = 0.76 Tc(Min.) = 8.10
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.368
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.570
 SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 2.54
 TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 2.79

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.33 HALFSTREET FLOOD WIDTH(Feet) = 9.41
 FLOW VELOCITY(Feet/Sec.) = 2.84 DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.94
 LONGEST FLOWPATH FROM NODE 228.20 TO NODE 224.20 = 195.00 FEET.

 FLOW PROCESS FROM NODE 226.20 TO NODE 224.20 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(Min.) = 8.10
 RAINFALL INTENSITY(INCH/HR) = 6.37
 TOTAL STREAM AREA(ACRES) = 0.77
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.79

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (Min.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	1.68	8.60	6.129	0.89
2	2.79	8.10	6.368	0.77

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (Min.)	INTENSITY (INCH/HOUR)
1	4.38	8.10	6.368
2	4.37	8.60	6.129

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 4.38 Tc(Min.) = 8.10
 TOTAL AREA(ACRES) = 1.7
 LONGEST FLOWPATH FROM NODE 229.20 TO NODE 224.20 = 525.00 FEET.

 FLOW PROCESS FROM NODE 224.20 TO NODE 216.20 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(Feet) = 629.00 DOWNSTREAM(Feet) = 628.00
 FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.4 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 9.80
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.38
 PIPE TRAVEL TIME(Min.) = 0.03 Tc(Min.) = 8.14
 LONGEST FLOWPATH FROM NODE 229.20 TO NODE 216.20 = 545.00 FEET.

 FLOW PROCESS FROM NODE 224.20 TO NODE 216.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(Min.) = 8.14
 RAINFALL INTENSITY(INCH/HR) = 6.35
 TOTAL STREAM AREA(ACRES) = 1.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.38

 FLOW PROCESS FROM NODE 222.20 TO NODE 220.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 80.00
 UPSTREAM ELEVATION(Feet) = 636.00
 DOWNSTREAM ELEVATION(Feet) = 635.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(Min.) = 7.343
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 68.75
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.786
 SUBAREA RUNOFF(CFS) = 0.27
 TOTAL AREA(ACRES) = 0.07 TOTAL RUNOFF(CFS) = 0.27

 FLOW PROCESS FROM NODE 220.20 TO NODE 218.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSTREAM ELEVATION(Feet) = 635.00 DOWNSTREAM ELEVATION(Feet) = 632.00
 STREET LENGTH(Feet) = 150.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.97
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(EEET) = 0.24
 HALESIREET FLOOD WIDTH(EEET) = 4.53
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.56
 PRODUCT OF DEPTH&VELOCITY(FI*FI/SEC.) = 0.62
 STREET FLOW TRAVEL TIME(MIN.) = 0.98 Ic(MIN.) = 8.32
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.261
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.570
 SUBAREA AREA(ACRES) = 0.39 SUBAREA RUNOFF(CES) = 1.39
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CES) = 1.64

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28 HALESIREET FLOOD WIDTH(EEET) = 5.78
 FLOW VELOCITY(FEET/SEC.) = 2.72 DEPTH*VELOCITY(EI*FT/SEC.) = 0.77
 LONGEST FLOWPATH FROM NODE 222.20 TO NODE 218.20 = 230.00 FEET.

 FLOW PROCESS FROM NODE 218.20 TO NODE 216.20 IS CODE = 31

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

 ELEVATION DATA: UPSIREAM(FEET) = 629.00 DOWNSIREAM(FEET) = 628.00
 FLOW LENGTH(FEET) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.00
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.02
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.64
 PIPE TRAVEL TIME(MIN.) = 0.01 Ic(MIN.) = 8.33
 LONGEST FLOWPATH FROM NODE 222.20 TO NODE 216.20 = 235.00 FEET.

 FLOW PROCESS FROM NODE 218.20 TO NODE 216.20 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.33
 RAINFALL INTENSITY(INCH/HR) = 6.26
 TOTAL STREAM AREA(ACRES) = 0.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.64

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** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Ic (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	4.38	8.14	6.351	1.66
2	1.64	8.33	6.258	0.46

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Ic (MIN.)	INTENSITY (INCH/HOUR)
1	5.98	8.14	6.351
2	5.96	8.33	6.258

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.98 Ic(MIN.) = 8.14
 TOTAL AREA(ACRES) = 2.1
 LONGEST FLOWPATH FROM NODE 229.20 TO NODE 216.20 = 545.00 FEET.

 FLOW PROCESS FROM NODE 216.20 TO NODE 214.20 IS CODE = 31

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

 ELEVATION DATA: UPSIREAM(FEET) = 628.00 DOWNSIREAM(FEET) = 625.00
 FLOW LENGTH(FEET) = 115.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.00
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.44
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.98
 PIPE TRAVEL TIME(MIN.) = 0.23 Ic(MIN.) = 8.37
 LONGEST FLOWPATH FROM NODE 229.20 TO NODE 214.20 = 660.00 FEET.

 FLOW PROCESS FROM NODE 216.20 TO NODE 214.20 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Ic (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	5.98	8.37	6.239	2.12

LONGEST FLOWPATH FROM NODE 229.20 TO NODE 214.20 = 660.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Ic (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	135.74	10.70	5.323	54.19

LONGEST FLOWPATH FROM NODE 216.60 TO NODE 214.20 = 2617.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Ic	INTENSITY
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NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	112.11	8.37	6.239
2	140.85	10.70	5.323

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CES) = 140.85 I_c (MIN.) = 10.70
 TOTAL AREA(ACRES) = 56.3

 FLOW PROCESS FROM NODE 216.20 TO NODE 214.20 IS CODE = 12

 >>>>CLEAR MEMORY BANK # 2 <<<<

 FLOW PROCESS FROM NODE 214.20 TO NODE 200.20 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 625.00 DOWNSTREAM(FEET) = 608.00
 FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 26.67
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CES) = 140.85
 PIPE TRAVEL TIME(MIN.) = 0.15 T_c (MIN.) = 10.85
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 200.20 = 2857.00 FEET.

 FLOW PROCESS FROM NODE 214.20 TO NODE 200.20 IS CODE = 1

 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.85
 RAINFALL INTENSITY(INCH/HR) = 5.28
 TOTAL STREAM AREA(ACRES) = 56.31
 PEAK FLOW RATE(CES) AT CONFLUENCE = 140.85

 FLOW PROCESS FROM NODE 206.20 TO NODE 204.20 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 115.00
 UPSTREAM ELEVATION(FEET) = 632.00
 DOWNSTREAM ELEVATION(FEET) = 629.50
 ELEVATION DIFFERENCE(FEET) = 2.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.707
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 71.74
 (Reference: Table 3-1B of Hydrology Manual)

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THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN T_c CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695

NOTE: RAINFALL INTENSITY IS BASED ON T_c = 5-MINUTE.

SUBAREA RUNOFF(CES) = 1.13

TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CES) = 1.13

 FLOW PROCESS FROM NODE 204.20 TO NODE 202.20 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSTREAM ELEVATION(FEET) = 629.50 DOWNSTREAM ELEVATION(FEET) = 612.00
 STREET LENGTH(FEET) = 280.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.018

OUTSIDE STREET CROSSEALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF LANE STREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSEALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150

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

 **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.23

STREET FLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.26

HALFSTREET FLOOD WIDTH(FEET) = 5.72

AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.59

PRODUCT OF DEPTH&VELOCITY(FEET/SEC.) = 1.22

STREET FLOW TRAVEL TIME(MIN.) = 1.02 I_c (MIN.) = 3.72

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695

NOTE: RAINFALL INTENSITY IS BASED ON T_c = 5-MINUTE.

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 98

AREA-AVERAGE RUNOFF COEFFICIENT = 0.870

SUBAREA AREA(ACRES) = 0.29 SUBAREA RUNOFF(CES) = 2.19

TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CES) = 3.33

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.29 HALFSTREET FLOOD WIDTH(FEET) = 7.34

FLOW VELOCITY(FEET/SEC.) = 4.93 DEPTH*VELOCITY(FEET/SEC.) = 1.45

LONGEST FLOWPATH FROM NODE 206.20 TO NODE 202.20 = 395.00 FEET.

 FLOW PROCESS FROM NODE 202.20 TO NODE 202.20 IS CODE = 81

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

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695

NOTE: RAINFALL INTENSITY IS BASED ON I_c = 5-MINUTE.

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 76

AREA-AVERAGE RUNOFF COEFFICIENT = 0.5844

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SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.75
 TOTAL AREA(ACRES) = 1.0 TOTAL RUNOFF(CES) = 5.08
 TC(MIN.) = 3.72

ELOW PROCESS FROM NODE 202.20 TO NODE 200.20 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(EEET) = 609.00 DOWNSTREAM(EEET) = 608.00
 ELOW LENGTH(EEET) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF ELOW IN 18.0 INCH PIPE IS 4.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.75
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-ELOW(CES) = 5.08
 PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 3.73
 LONGEST ELOWPATH FROM NODE 206.20 TO NODE 200.20 = 400.00 FEET.

ELOW PROCESS FROM NODE 202.20 TO NODE 200.20 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONEULNCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 3.73
 RAINEALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 1.00
 PEAK FLOW RATE(CFS) AT CONEULNCE = 5.08

** CONEULNCE DATA **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HR)	AREA (ACRE)
1	140.85	10.85	5.275	56.31
2	5.08	3.73	8.695	1.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HR)
1	53.48	3.73	8.695
2	143.93	10.85	5.275

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK ELOW RATE(CFS) = 143.93 Tc(MIN.) = 10.85
 TOTAL AREA(ACRES) = 57.3
 LONGEST ELOWPATH FROM NODE 216.60 TO NODE 200.20 = 2857.00 FEET.

ELOW PROCESS FROM NODE 202.20 TO NODE 200.20 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<

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ELOW PROCESS FROM NODE 202.20 TO NODE 200.20 IS CODE = 13

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

ELOW PROCESS FROM NODE 212.20 TO NODE 210.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA ELOW-LENGTH(EEET) = 163.00
 UPSTREAM ELEVATION(FEET) = 633.00
 DOWNSTREAM ELEVATION(EEET) = 632.50
 ELEVATION DIFFERENCE(EEET) = 0.50
 SUBAREA OVERLAND TIME OF ELOW(MIN.) = 3.688
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND ELOW LENGTH = 50.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HR) = 8.695
 NOTE: RAINEALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 2.42
 TOTAL AREA(ACRES) = 0.32 TOTAL RUNOFF(CES) = 2.42

ELOW PROCESS FROM NODE 210.20 TO NODE 208.20 IS CODE = 62

>>>>COMPUTE STREET ELOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 632.50 DOWNSTREAM ELEVATION(FEET) = 612.00
 STREET LENGTH(EEET) = 460.00 CURB HEIGHT(INCHES) = 6.0
 STREET WALKWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSEALL GRADESREAK(EEET) = 20.00
 INSIDE STREET CROSSEALL(DECIMAL) = 0.018
 OUTSIDE STREET CROSSEALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CES) = 4.45
 STREETFLOW MODEL RESULTS USING ESTIMATED ELOW:
 STREET FLOW DEPTH(FEET) = 0.33
 SIDE STREET ELOW WIDTH(EEET) = 9.41
 AVERAGE ELOW VELOCITY(EEET/SEC.) = 4.52
 PRODUCT OF DEPTH&VELOCITY(ET*ET/SEC.) = 1.50
 STREET ELOW TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 5.38
 100 YEAR RAINEALL INTENSITY(INCH/HR) = 8.291

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RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.676
 SUBAREA AREA(ACRES) = 0.81 SUBAREA RUNOFF(CES) = 4.03
 TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 6.34

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.13
 FLOW VELOCITY(FEET/SEC.) = 4.87 DEPTH*VELOCITY(FT*ET/SEC.) = 1.76
 LONGEST FLOWPATH FROM NODE 212.20 TO NODE 209.20 = 623.00 FEET.

 FLOW PROCESS FROM NODE 210.20 TO NODE 208.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.38
 RAINFALL INTENSITY(INCH/HR) = 8.29
 TOTAL STREAM AREA(ACRES) = 1.13
 PEAK FLOW RATE(CES) AT CONFLUENCE = 6.34

 FLOW PROCESS FROM NODE 213.20 TO NODE 211.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 60.00
 UPSTREAM ELEVATION(FEET) = 646.00
 DOWNSTREAM ELEVATION(FEET) = 645.00
 ELEVATION DIFFERENCE(FEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.880
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.831
 SUBAREA RUNOFF(CES) = 0.89
 TOTAL AREA(ACRES) = 0.19 TOTAL RUNOFF(CFS) = 0.89

 FLOW PROCESS FROM NODE 211.20 TO NODE 209.20 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 615.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 670.00 CHANNEL SLOPE = 0.0448
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.557
 RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.70

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AVERAGE FLOW DEPTH(FEET) = 0.18 TRAVEL TIME(MIN.) = 4.13
 Tc(MIN.) = 10.01
 SUBAREA AREA(ACRES) = 2.55 SUBAREA RUNOFF(CES) = 8.50
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CES) = 9.14

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25 FLOW VELOCITY(FEET/SEC.) = 3.29
 LONGEST FLOWPATH FROM NODE 213.20 TO NODE 209.20 = 730.00 FEET.

FLOW PROCESS FROM NODE 211.20 TO NODE 209.20 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.01
 RAINFALL INTENSITY(INCH/HR) = 5.56
 TOTAL STREAM AREA(ACRES) = 2.74
 PEAK FLOW RATE(CES) AT CONFLUENCE = 9.14

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	6.34	5.38	8.291	1.13
2	9.14	10.01	5.557	2.74

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	11.25	5.38	8.291
2	13.38	10.01	5.557

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 13.38 Tc(MIN.) = 10.01
 TOTAL AREA(ACRES) = 3.9
 LONGEST FLOWPATH FROM NODE 213.20 TO NODE 209.20 = 730.00 FEET.

FLOW PROCESS FROM NODE 211.20 TO NODE 209.20 IS CODE = 11

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

=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	13.38	10.01	5.557	3.87

LONGEST FLOWPATH FROM NODE 213.20 TO NODE 209.20 = 730.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
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NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	143.93	10.85	5.275	57.31

LONGEST FLOWPATH FROM NODE 216.60 TO NODE 209.20 = 2857.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	146.16	10.01	5.557
2	156.64	10.85	5.275

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 156.64 Tc(MIN.) = 10.85
 TOTAL AREA(ACRES) = 61.2

 FLOW PROCESS FROM NODE 211.20 TO NODE 209.20 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<

 FLOW PROCESS FROM NODE 200.20 TO NODE 216.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 606.00 DOWNSTREAM(Feet) = 606.00
 FLOW LENGTH(Feet) = 98.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.2 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 16.89
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 156.64
 PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 10.95
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 216.00 = 2955.00 FEET.

 FLOW PROCESS FROM NODE 200.20 TO NODE 216.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	156.64	10.95	5.245	61.18

LONGEST FLOWPATH FROM NODE 216.60 TO NODE 216.00 = 2955.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	39.06	10.69	5.328	11.68

LONGEST FLOWPATH FROM NODE 286.00 TO NODE 216.00 = 2056.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	191.95	10.69	5.328

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2	195.09	10.95	5.245
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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 195.09 Tc(MIN.) = 10.95
 TOTAL AREA(ACRES) = 72.9

FLOW PROCESS FROM NODE 200.20 TO NODE 216.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<

FLOW PROCESS FROM NODE 216.00 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) = 606.00 DOWNSTREAM(Feet) = 583.00
 FLOW LENGTH(Feet) = 472.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.9 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 24.86
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 195.09
 PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 11.26
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 202.00 = 3427.00 FEET.

FLOW PROCESS FROM NODE 216.00 TO NODE 202.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 11.26
 RAINFALL INTENSITY(INCH/HR) = 5.15
 TOTAL STREAM AREA(ACRES) = 72.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 195.09

FLOW PROCESS FROM NODE 214.00 TO NODE 212.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW LENGTH(Feet) = 100.00
 UPSTREAM ELEVATION(Feet) = 617.00
 DOWNSTREAM ELEVATION(Feet) = 611.00
 ELEVATION DIFFERENCE(Feet) = 6.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.185
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 92.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695

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NOTE: RAINFALL INTENSITY IS BASED ON $I_c = 5$ -MINUTE.
 SUBAREA RUNOFF(CFS) = 0.76
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.76

 FLOW PROCESS FROM NODE 212.00 TO NODE 210.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSIDEAM ELEVATION(Feet) = 611.00 DOWNSIDEAM ELEVATION(Feet) = 587.00
 STREET LENGTH(Feet) = 510.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.65
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.29
 HALFSTREET FLOOD WIDTH(Feet) = 7.03
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.17
 PRODUCT OF DEPTH&VELOCITY(FI*FI/SEC.) = 1.20
 STREET FLOW TRAVEL TIME(MIN.) = 2.04 I_c (MIN.) = 4.23
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON $I_c = 5$ -MINUTE.
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = 0.8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
 SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 3.78
 TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 4.54

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.33 HALFSTREET FLOOD WIDTH(Feet) = 9.34
 FLOW VELOCITY(Feet/Sec.) = 4.66 DEPTH*VELOCITY(FI*FI/SEC.) = 1.54
 LONGEST FLOWPATH FROM NODE 214.00 TO NODE 210.00 = 610.00 FEET.

 FLOW PROCESS FROM NODE 210.00 TO NODE 202.00 IS CODE = 31

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

 ELEVATION DATA: UPSIDEAM(Feet) = 584.00 DOWNSIDEAM(Feet) = 583.00
 FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.5 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 9.90
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.54

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PIPE TRAVEL TIME(MIN.) = 0.03 I_c (MIN.) = 4.26
 LONGEST FLOWPATH FROM NODE 214.00 TO NODE 202.00 = 630.00 FEET.

 FLOW PROCESS FROM NODE 210.00 TO NODE 202.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 4.26
 RAINFALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.54

 FLOW PROCESS FROM NODE 208.00 TO NODE 206.00 IS CODE = 21

>>>>RAIIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = 0.8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 100.00
 UPSIDEAM ELEVATION(Feet) = 617.00
 DOWNSIDEAM ELEVATION(Feet) = 611.00
 ELEVATION DIFFERENCE(Feet) = 6.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.185
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 92.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN I_c CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON $T_c = 5$ -MINUTE.
 SUBAREA RUNOFF(CFS) = 0.38
 TOTAL AREA(ACRES) = 0.05 TOTAL RUNOFF(CFS) = 0.38

 FLOW PROCESS FROM NODE 206.00 TO NODE 204.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSIDEAM ELEVATION(Feet) = 611.00 DOWNSIDEAM ELEVATION(Feet) = 587.00
 STREET LENGTH(Feet) = 500.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.66

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.25
 HALFSTREET FLOOD WIDTH(FEET) = 5.03
 AVERAGE FLOW VELOCITY(FT/SEC.) = 3.96
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.00
 STREET FLOW TRAVEL TIME(MIN.) = 2.10 I_c (MIN.) = 4.29
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON I_c = 5-MINUTE.
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
 SUBAREA AREA(ACRES) = 0.34 SUBAREA RUNOFF(CES) = 2.57
 TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CES) = 2.95

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FT) = 0.29 HALFSTREET FLOOD WIDTH(FT) = 7.41
 FLOW VELOCITY(FT/SEC.) = 4.32 $DEPTH \times VELOCITY(FT^2/SEC.)$ = 1.27
 LONGEST FLOWPATH FROM NODE 208.00 TO NODE 204.00 = 600.00 FEET.

 FLOW PROCESS FROM NODE 204.00 TO NODE 202.00 IS CODE = 31

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

 ELEVATION DATA: UPSIDEAM(FT) = 584.00 DOWNSIDEAM(FT) = 583.00
 FLOW LENGTH(FT) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.1 INCHES
 PIPE-FLOW VELOCITY(FT/SEC.) = 14.29
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.95
 PIPE TRAVEL TIME(MIN.) = 0.01 T_c (MIN.) = 4.29
 LONGEST FLOWPATH FROM NODE 208.00 TO NODE 202.00 = 605.00 FEET.

 FLOW PROCESS FROM NODE 204.00 TO NODE 202.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 4.29
 RAINFALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 0.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.95

 ** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	T_c (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	195.09	11.26	5.150	72.86
2	4.54	4.26	8.695	0.60
3	2.95	4.29	8.695	0.39

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 3 STREAMS.

 ** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	T_c (MIN.)	INTENSITY (INCH/HOUR)
1	81.23	4.26	8.695
2	81.86	4.29	8.695
3	199.53	11.26	5.150

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 199.53 I_c (MIN.) = 11.26
 TOTAL AREA(ACRES) = 73.8
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 202.00 = 3427.00 FEET.

 FLOW PROCESS FROM NODE 202.00 TO NODE 201.00 IS CODE = 31

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

 ELEVATION DATA: UPSIDEAM(FT) = 583.00 DOWNSIDEAM(FT) = 580.00
 FLOW LENGTH(FT) = 100.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 33.9 INCHES
 PIPE-FLOW VELOCITY(FT/SEC.) = 21.06
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 199.53
 PIPE TRAVEL TIME(MIN.) = 0.08 T_c (MIN.) = 11.34
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 201.00 = 3527.00 FEET.

 FLOW PROCESS FROM NODE 202.00 TO NODE 201.00 IS CODE = 81

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

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.126
 RESIDENTIAL (1.00/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4826
 SUBAREA AREA(ACRES) = 1.96 SUBAREA RUNOFF(CES) = 3.62
 TOTAL AREA(ACRES) = 75.8 TOTAL RUNOFF(CES) = 199.53
 T_c (MIN.) = 11.34
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSIDEAM VALUE

 FLOW PROCESS FROM NODE 201.00 TO NODE 201.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 11.34
 RAINFALL INTENSITY(INCH/HR) = 5.13
 TOTAL STREAM AREA(ACRES) = 75.81
 PEAK FLOW RATE(CES) AT CONFLUENCE = 199.53

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FLOW PROCESS FROM NODE 231.60 TO NODE 231.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

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=====
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
INITIAL SUBAREA FLOW LENGTH(FEET) = 110.00
UPSTREAM ELEVATION(FEET) = 625.00
DOWNSTREAM ELEVATION(FEET) = 619.00
ELEVATION DIFFERENCE(FEET) = 6.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.243
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH = 90.91
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.30
TOTAL AREA(ACRES) = 0.04 TOTAL RUNOFF(CFS) = 0.30
=====

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FLOW PROCESS FROM NODE 231.40 TO NODE 231.20 IS CODE = 62

```

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====

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UPSTREAM ELEVATION(FEET) = 619.00 DOWNSTREAM ELEVATION(FEET) = 582.00
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00
=====

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.76
STREET FLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.20
HALFSTREET FLOOD WIDTH(FEET) = 2.00
AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.40
STREET FLOW TRAVEL TIME(MIN.) = 0.83 Tc(MIN.) = 3.07
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
SUBAREA AREA(ACRES) = 0.12 SUBAREA RUNOFF(CFS) = 0.91
TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 1.21
=====

```

END OF SUBAREA STREET FLOW HYDRAULICS:

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DEPTH(FEET) = 0.20 HALFSTREET FLOOD WIDTH(FEET) = 2.00
FLOW VELOCITY(FEET/SEC.) = 7.06 DEPTH*VELOCITY(FT*FT/SEC.) = 1.40
LONGEST FLOWPATH FROM NODE 231.60 TO NODE 231.20 = 460.00 FEET.
=====

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FLOW PROCESS FROM NODE 231.20 TO NODE 231.00 IS CODE = 31

```

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

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ELEVATION DATA: UPSTREAM(FEET) = 228.00 DOWNSTREAM(FEET) = 227.80
FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.82
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.21
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 3.16
LONGEST FLOWPATH FROM NODE 231.60 TO NODE 231.00 = 480.00 FEET.
=====

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FLOW PROCESS FROM NODE 231.00 TO NODE 231.00 IS CODE = 81

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

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=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
SUBAREA AREA(ACRES) = 0.14 SUBAREA RUNOFF(CFS) = 1.06
TOTAL AREA(ACRES) = 0.3 TOTAL RUNOFF(CFS) = 2.27
Tc(MIN.) = 3.16
=====

```

FLOW PROCESS FROM NODE 231.00 TO NODE 230.80 IS CODE = 31

```

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

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ELEVATION DATA: UPSTREAM(FEET) = 227.80 DOWNSTREAM(FEET) = 226.60
FLOW LENGTH(FEET) = 125.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.50
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.27
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 3.62
LONGEST FLOWPATH FROM NODE 231.60 TO NODE 230.80 = 605.00 FEET.
=====

```

FLOW PROCESS FROM NODE 230.80 TO NODE 230.80 IS CODE = 81

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

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=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
=====

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NOTE: RAINFALL INTENSITY IS BASED ON $T_c = 5$ -MINUTE.
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8100
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8302
 SUBAREA AREA(ACRES) = 0.59 SUBAREA RUNOFF(CFS) = 4.16
 TOTAL AREA(ACRES) = 0.9 TOTAL RUNOFF(CFS) = 6.42
 T_c (MIN.) = 3.62

 FLOW PROCESS FROM NODE 230.80 TO NODE 201.00 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:
 T_c OF CONCENTRATION(MIN.) = 3.62
 RAINFALL INTENSITY(INCH/HR) = 8.69
 TOTAL STREAM AREA(ACRES) = 0.89
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.42

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	T_c (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	199.53	11.34	5.126	75.81
2	6.42	3.62	8.695	0.89

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	T_c (MIN.)	INTENSITY (INCH/HOUR)
1	124.07	3.62	8.695
2	203.31	11.34	5.126

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 203.31 T_c (MIN.) = 11.34
 TOTAL AREA(ACRES) = 76.7
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 201.00 = 3527.00 FEET.

 FLOW PROCESS FROM NODE 201.00 TO NODE 201.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

 FLOW PROCESS FROM NODE 201.00 TO NODE 201.00 IS CODE = 13

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

 FLOW PROCESS FROM NODE 220.80 TO NODE 216.80 IS CODE = 21

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 RESIDENTIAL (10.9 OU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 110.00
 UPSTREAM ELEVATION(FEET) = 635.00
 DOWNSTREAM ELEVATION(FEET) = 634.00
 ELEVATION DIFFERENCE(FEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.771
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 62.27
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN T_c CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.542
 SUBAREA RUNOFF(CFS) = 0.45
 TOTAL AREA(ACRES) = 0.12 TOTAL RUNOFF(CFS) = 0.45

 FLOW PROCESS FROM NODE 218.80 TO NODE 216.80 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSTREAM ELEVATION(FEET) = 634.00 DOWNSTREAM ELEVATION(FEET) = 629.00
 STREET LENGTH(FEET) = 285.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.43
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.32
 HALFSTREET FLOOD WIDTH(FEET) = 8.78
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.76
 PRODUCT OF DEPTH*VELOCITY(FI*FI/SEC.) = 0.88
 STREET FLOW TRAVEL TIME(MIN.) = 1.72 T_c (MIN.) = 9.49
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.750
 RESIDENTIAL (10.9 OU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.570
 SUBAREA AREA(ACRES) = 1.21 SUBAREA RUNOFF(CFS) = 3.97
 TOTAL AREA(ACRES) = 1.3 PEAK FLOW RATE(CFS) = 4.36

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.60
 FLOW VELOCITY(FEET/SEC.) = 3.12 DEPTH*VELOCITY(FI*FI/SEC.) = 1.15
 LONGEST FLOWPATH FROM NODE 220.80 TO NODE 216.80 = 395.00 FEET.

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*****
FLOW PROCESS FROM NODE 218.80 TO NODE 216.80 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.49
RAINFALL INTENSITY(INCH/HR) = 5.75
TOTAL STREAM AREA(ACRES) = 1.33
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.36

*****
FLOW PROCESS FROM NODE 226.80 TO NODE 224.80 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
INITIAL SUBAREA FLOW-LENGTH(FEET) = 110.00
UPSTREAM ELEVATION(EEET) = 726.00
DOWNSTREAM ELEVATION(EEET) = 696.00
ELEVATION DIFFERENCE(EEET) = 30.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
          (Reference: Table 3-18 of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.210
SUBAREA RUNOFF(CFS) = 0.30
TOTAL AREA(ACRES) = 0.14 TOTAL RUNOFF(CFS) = 0.30

*****
FLOW PROCESS FROM NODE 224.80 TO NODE 222.80 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(EEET) = 696.00 DOWNSTREAM(EEET) = 666.00
CHANNEL LENGTH THRU SUBAREA(EEET) = 180.00 CHANNEL SLOPE = 0.1667
CHANNEL BASE(EEET) = 1.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(EEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.970
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.04
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(EEET/SEC.) = 8.35
AVERAGE FLOW DEPTH(EEET) = 0.11 TRAVEL TIME(MIN.) = 0.36
Tc(MIN.) = 7.04
SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 1.46
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 1.76

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(EEET) = 0.15 FLOW VELOCITY(EEET/SEC.) = 10.20

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LONGEST FLOWPATH FROM NODE 226.80 TO NODE 222.80 = 290.00 FEET.
*****
FLOW PROCESS FROM NODE 222.80 TO NODE 216.80 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(EEET) = 666.00 DOWNSTREAM(EEET) = 626.00
FLOW LENGTH(EEET) = 190.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.4 INCHES
PIPE-FLOW VELOCITY(EEET/SEC.) = 12.45
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.76
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 7.30
LONGEST FLOWPATH FROM NODE 226.80 TO NODE 216.80 = 480.00 FEET.

*****
FLOW PROCESS FROM NODE 222.80 TO NODE 216.80 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCE STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.30
RAINFALL INTENSITY(INCH/HR) = 6.81
TOTAL STREAM AREA(ACRES) = 0.84
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.76

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRES)
1 4.36 9.49 5.750 1.33
2 1.76 7.30 6.813 0.84

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 5.11 7.30 6.813
2 5.84 9.49 5.750

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 5.84 Tc(MIN.) = 9.49
TOTAL AREA(ACRES) = 2.2
LONGEST FLOWPATH FROM NODE 226.80 TO NODE 216.80 = 480.00 FEET.

*****
FLOW PROCESS FROM NODE 216.80 TO NODE 208.80 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

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ELEVATION DATA: UPSTREAM(FEET) = 626.00 DOWNSTREAM(FEET) = 625.00
 FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.62
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.84
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 9.52
 LONGEST FLOWPATH FROM NODE 226.80 TO NODE 208.80 = 500.00 FEET.

FLOW PROCESS FROM NODE 216.80 TO NODE 208.80 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.52
 RAINFALL INTENSITY(INCH/HR) = 5.74
 TOTAL STREAM AREA(ACRES) = 2.17
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.84

FLOW PROCESS FROM NODE 214.80 TO NODE 212.80 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 85.00
 UPSTREAM ELEVATION(FEET) = 634.00
 DOWNSTREAM ELEVATION(FEET) = 633.00
 ELEVATION DIFFERENCE(FEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.433
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 67.65
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.733
 SUBAREA RUNOFF(CFS) = 0.35
 TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.35

FLOW PROCESS FROM NODE 212.80 TO NODE 210.80 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 633.00 DOWNSTREAM ELEVATION(FEET) = 629.00
 STREET LENGTH(FEET) = 230.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.70
 STREETELOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.29
 HALFSTREET FLOOD WIDTH(FEET) = 7.22
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.57
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.75
 STREET FLOW TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 8.92
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.984
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.570
 SUBAREA AREA(ACRES) = 0.79 SUBAREA RUNOFF(CFS) = 2.69
 TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 3.00

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 9.78
 FLOW VELOCITY(FEET/SEC.) = 2.86 DEPTH*VELOCITY(FT*FT/SEC.) = 0.97
 LONGEST FLOWPATH FROM NODE 214.80 TO NODE 210.80 = 315.00 FEET.

FLOW PROCESS FROM NODE 210.80 TO NODE 208.80 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 626.00 DOWNSTREAM(FEET) = 625.00
 FLOW LENGTH(FEET) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.36
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.00
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.93
 LONGEST FLOWPATH FROM NODE 214.80 TO NODE 208.80 = 320.00 FEET.

FLOW PROCESS FROM NODE 210.80 TO NODE 208.80 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCE STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.93
 RAINFALL INTENSITY(INCH/HR) = 5.98
 TOTAL STREAM AREA(ACRES) = 0.88
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.00

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	3.00	8.93	5.98	0.88
2	0.35	7.43	6.73	0.09

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1	5.84	9.52	5.738	2.17
2	3.00	8.93	5.982	0.88

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	8.60	8.93	5.982
2	8.72	9.52	5.738

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CES) = 8.72 Tc(MIN.) = 9.52
TOTAL AREA(ACRES) = 3.1
LONGEST FLOWPATH FROM NODE 226.80 TO NODE 208.80 = 500.00 FEET.

FLOW PROCESS FROM NODE 208.80 TO NODE 202.80 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 625.00 DOWNSTREAM(EET) = 620.00
FLOW LENGTH(FEET) = 220.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.8 INCHES
PIPE-FLOW VELOCITY(EET/SEC.) = 8.81
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CES) = 8.72
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 9.94
LONGEST FLOWPATH FROM NODE 226.80 TO NODE 202.80 = 720.00 FEET.

FLOW PROCESS FROM NODE 202.80 TO NODE 202.80 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.94
RAINFALL INTENSITY(INCH/HR) = 5.58
TOTAL STREAM AREA(ACRES) = 3.05
PEAK FLOW RATE(CES) AT CONFLUENCE = 8.72

FLOW PROCESS FROM NODE 206.80 TO NODE 204.80 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
INITIAL SUBAREA FLOW-LENGTH(FEET) = 85.00
UPSTREAM ELEVATION(EET) = 630.00
DOWNSTREAM ELEVATION(FEET) = 629.00
ELEVATION DIFFERENCE(FEET) = 1.00

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SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.433
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 67.65
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.733
SUBAREA RUNOFF(CES) = 0.35
TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CES) = 0.35

FLOW PROCESS FROM NODE 204.80 TO NODE 202.80 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 629.00 DOWNSTREAM ELEVATION(EET) = 623.00
STREET LENGTH(EET) = 280.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.66
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(EET) = 0.32
HALFSTREET FLOW WIDTH(FEET) = 8.72
AVERAGE FLOW VELOCITY(EET/SEC.) = 3.05
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.97
STREET FLOW TRAVEL TIME(MIN.) = 1.53 Tc(MIN.) = 8.96
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.967
RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
AREA-AVERAGE RUNOFF COEFFICIENT = 0.570
SUBAREA AREA(ACRES) = 1.36 SUBAREA RUNOFF(CFS) = 4.63
TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CES) = 4.93

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(EET) = 0.37 HALFSTREET FLOW WIDTH(FEET) = 11.76
FLOW VELOCITY(FEET/SEC.) = 3.45 DEPTH*VELOCITY(FT*FT/SEC.) = 1.29
LONGEST FLOWPATH FROM NODE 206.80 TO NODE 202.80 = 365.00 FEET.

FLOW PROCESS FROM NODE 204.80 TO NODE 202.80 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.96

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RAINFALL INTENSITY(TNCH/HR) = 5.97
 TOTAL STREAM AREA(ACRES) = 1.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.93

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (TNCH/HOUR)	AREA (ACRE)
1	8.72	9.94	5.582	3.05
2	4.93	8.96	5.967	1.45

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MTN.)	INTENSITY (INCH/HOUR)
1	13.09	8.96	5.967
2	13.33	9.94	5.582

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 13.33 Tc(MIN.) = 9.94
 TOTAL AREA(ACRES) = 4.5
 LONGEST FLOWPATH FROM NODE 226.80 TO NODE 202.80 = 720.00 FEET.

 FLOW PROCESS FROM NODE 202.80 TO NODE 200.00 IS CODE = 31

>>>>COMPUTE PIPE-ELW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 620.00 DOWNSTREAM(Feet) = 580.00
 FLOW LENGTH(Feet) = 90.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 TNCH PIPE IS 5.5 TNCHES
 PIPE-ELW VELOCITY(Feet/Sec.) = 29.39
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PTES = 1
 PIPE-ELW(CFS) = 13.33
 PIPE TRAVEL TIME(MTN.) = 0.05 Tc(MIN.) = 9.99
 LONGEST FLOWPATH FROM NODE 226.80 TO NODE 200.00 = 810.00 FEET.

 FLOW PROCESS FROM NODE 202.80 TO NODE 200.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MTN.)	INTENSITY (TNCH/HOUR)	AREA (ACRE)
1	13.33	9.99	5.563	4.50

LONGEST FLOWPATH FROM NODE 226.80 TO NODE 200.00 = 810.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CES)	Tc (MTN.)	INTENSITY (TNCH/HOUR)	AREA (ACRE)
1	203.31	11.34	5.126	76.70

LONGEST FLOWPATH FROM NODE 216.60 TO NODE 200.00 = 3527.00 FEET.

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** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (TNCH/HOUR)
1	192.44	9.99	5.563
2	215.60	11.34	5.126

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 215.60 Tc(MIN.) = 11.34
 TOTAL AREA(ACRES) = 81.2

 FLOW PROCESS FROM NODE 202.80 TO NODE 201.00 TS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<

 FLOW PROCESS FROM NODE 201.00 TO NODE 200.00 IS CODE = 31

>>>>COMPUTE PIPE-ELW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 580.00 DOWNSTREAM(Feet) = 576.00
 FLOW LENGTH(Feet) = 295.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 TNCH PIPE IS 43.9 TNCHES
 PIPE-ELW VELOCITY(Feet/Sec.) = 15.57
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PTES = 1
 PIPE-ELW(CFS) = 215.60
 PIPE TRAVEL TIME(MTN.) = 0.32 Tc(MTN.) = 11.66
 LONGEST FLOWPATH FROM NODE 216.60 TO NODE 200.00 = 3822.00 FEET.

 FLOW PROCESS FROM NODE 200.00 TO NODE 200.00 IS CODE = 81

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

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.036
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4884
 SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00
 TOTAL AREA(ACRES) = 81.2 TOTAL RUNOFF(CFS) = 215.60
 Tc(MIN.) = 11.66
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 81.2 Tc(MIN.) = 11.66
 PEAK FLOW RATE(CFS) = 215.60

 END OF RATIONAL METHOD ANALYSIS

□

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
 2003, 19BS, 19B1 HYDROLOGY MANUAL
 (c) Copyright 1982-2012 Advanced Engineering Software (aes)
 Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * HARMONAY GROVE *
 * JN 4095.01 *
 * BASIN 300 - PROPOSED CONDITION - 100-YEAR STORM EVENT *

FILE NAME: S300P100.DAT
 TIME/DATE OF STUDY: 16:56 11/10/2015

 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
 SPECIFIED PERCENT OF GRADE(SLOPE) TO USE FOR FRICTION SLOPE = 0.90
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
 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) (n)
 === =====
 1 30.0 20.0 0.018/0.018/0.020 0.50 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

 FLOW PROCESS FROM NODE 354.00 TO NODE 352.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 =====

*USER SPECIFIED(SUBAREA):
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 725.00
 DOWNSTREAM ELEVATION(FEET) = 723.00
 ELEVATION DIFFERENCE(FEET) = 2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.749
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 70.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.61
 TOTAL AREA(ACRES) = 0.00 TOTAL RUNOFF(CFS) = 0.61

 FLOW PROCESS FROM NODE 352.00 TO NODE 350.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<
 =====

UPSTREAM ELEVATION(FEET) = 723.00 DOWNSTREAM ELEVATION(FEET) = 710.00
 STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.11
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.31
 HALFSTREET FLOOD WIDTH(FEET) = 8.28
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.85
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.20
 STREET FLOW TRAVEL TIME(MIN.) = 1.56 Tc(MIN.) = 4.31
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 92
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.724
 SUBAREA AREA(ACRES) = 0.01 SUBAREA RUNOFF(CFS) = 5.00
 TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 5.61

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.05
 FLOW VELOCITY(FEET/SEC.) = 4.36 DEPTH*VELOCITY(FT*FT/SEC.) = 1.57
 LONGEST FLOWPATH FROM NODE 354.00 TO NODE 350.00 = 460.00 FEET.

 FLOW PROCESS FROM NODE 350.00 TO NODE 342.00 IS CODE = 31

```

>>>>COMPUTE PIPE-ELOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(EEET) = 707.00 DOWNSTREAM(EEET) = 706.00
FLOW LENGTH(FEET) = 25.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.5 INCHES
PIPE-ELOW VELOCITY(EEET/SEC.) = 9.69
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.61
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 4.35
LONGEST ELOWPATH FROM NODE 354.00 TO NODE 342.00 = 485.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 350.00 TO NODE 342.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 4.35
RAINFALL INTENSITY(INCH/HR) = 8.69
TOTAL STREAM AREA(ACRES) = 0.89
PEAK ELOW RATE(CFS) AT CONFLUENCE = 5.61

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*****
FLOW PROCESS FROM NODE 348.00 TO NODE 346.00 IS CODE = 21
-----

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
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*USER SPECIFIED(SUBAREA):
RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6100
S.C.S. CURVE NUMBER (AMC II) = 92
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 725.00
DOWNSTREAM ELEVATION(EEET) = 723.00
ELEVATION DIFFERENCE(EEET) = 2.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.262
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 80.00
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.520
SUBAREA RUNOFF(CES) = 0.87
TOTAL AREA(ACRES) = 0.19 TOTAL RUNOFF(CES) = 0.87

```

```

*****
FLOW PROCESS FROM NODE 346.00 TO NODE 344.00 IS CODE = 62
-----

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```

>>>>COMPUTE STREET ELOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====

```

```

UPSTREAM ELEVATION(FEET) = 723.00 DOWNSTREAM ELEVATION(FEET) = 710.00
STREET LENGTH(EEET) = 420.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(EEET) = 20.00

```

```

INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

```

```

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

```

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CES) = 3.35
STREETELOW MODEL RESULTS USING ESTIMATED FLOW:
STREET ELOW DEPTH(FEET) = 0.32
HALFSTREET ELOW WIDTH(FEET) = 8.97
AVERAGE ELOW VELOCITY(EEET/SEC.) = 3.67
PRODUCT OF DEPTH&VELOCITY(ET*FT/SEC.) = 1.19
STREET ELOW TRAVEL TIME(MIN.) = 1.91 Tc(MIN.) = 8.17
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.336
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
S.C.S. CURVE NUMBER (AMC II) = 92
AREA-AVERAGE RUNOFF COEFFICIENT = 0.695
SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CES) = 4.95
TOTAL AREA(ACRES) = 1.3 PEAK FLOW RATE(CES) = 5.68

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END OF SUBAREA STREET ELOW HYDRAULICS:
DEPTH(EEET) = 0.37 HALFSTREET FLOOD WIDTH(EEET) = 11.52
ELOW VELOCITY(FEET/SEC.) = 4.12 DEPTH*VELOCITY(ET*FT/SEC.) = 1.52
LONGEST FLOWPATH FROM NODE 348.00 TO NODE 344.00 = 520.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 344.00 TO NODE 342.00 IS CODE = 31
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>>>>COMPUTE PIPE-ELOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

```

```

ELEVATION DATA: UPSTREAM(FEET) = 707.00 DOWNSTREAM(EEET) = 706.00
FLOW LENGTH(FEET) = 5.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.3 INCHES
PIPE-ELOW VELOCITY(FEET/SEC.) = 17.31
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CES) = 5.68
PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 8.17
LONGEST FLOWPATH FROM NODE 348.00 TO NODE 342.00 = 525.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 344.00 TO NODE 342.00 IS CODE = 1
-----

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```

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

```

```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.17
RAINFALL INTENSITY(INCH/HR) = 6.33
TOTAL STREAM AREA(ACRES) = 1.29
PEAK ELOW RATE(CFS) AT CONFLUENCE = 5.68

```

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** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	5.61	4.35	8.695	0.89
2	5.68	8.17	6.333	1.29

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	8.63	4.35	8.695
2	9.77	8.17	6.333

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.77 Tc(MIN.) = 8.17
TOTAL AREA(ACRES) = 2.2
LONGEST FLOWPATH FROM NODE 348.00 TO NODE 342.00 = 525.00 FEET.

FLOW PROCESS FROM NODE 342.00 TO NODE 332.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 706.00 DOWNSTREAM(Feet) = 694.00
FLOW LENGTH(Feet) = 260.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.5 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 11.84
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.77
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 8.54
LONGEST FLOWPATH FROM NODE 348.00 TO NODE 332.00 = 785.00 FEET.

FLOW PROCESS FROM NODE 342.00 TO NODE 332.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.54
RAINFALL INTENSITY(INCH/HR) = 6.16
TOTAL STREAM AREA(ACRES) = 2.18
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.77

FLOW PROCESS FROM NODE 338.00 TO NODE 336.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
S.C.S. CURVE NUMBER (AMC II) = 92
INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00

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UPSTREAM ELEVATION(Feet) = 711.00
DOWNSTREAM ELEVATION(Feet) = 710.00
ELEVATION DIFFERENCE(Feet) = 1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.075
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
(Reference: Table 3-18 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.669
SUBAREA RUNOFF(CFS) = 1.64
TOTAL AREA(ACRES) = 0.31 TOTAL RUNOFF(CFS) = 1.64

FLOW PROCESS FROM NODE 336.00 TO NODE 334.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(Feet) = 710.00 DOWNSTREAM ELEVATION(Feet) = 698.00
STREET LENGTH(Feet) = 270.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.32
HALFSTREET FLOOD WIDTH(Feet) = 8.66
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.34
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.38
STREET FLOW TRAVEL TIME(MIN.) = 1.04 Tc(MIN.) = 7.11
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.928
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 90
AREA-AVERAGE RUNOFF COEFFICIENT = 0.690
SUBAREA AREA(ACRES) = 0.88 SUBAREA RUNOFF(CFS) = 4.21
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 5.69

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.35 HALFSTREET FLOOD WIDTH(Feet) = 10.59
FLOW VELOCITY(Feet/Sec.) = 4.76 DEPTH*VELOCITY(FT*FT/SEC.) = 1.67
LONGEST FLOWPATH FROM NODE 338.00 TO NODE 334.00 = 390.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 332.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 695.00 DOWNSREAM(Feet) = 694.00
 FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.3 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 17.31
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.69
 PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 7.12
 LONGEST FLOWPATH FROM NODE 338.00 TO NODE 332.00 = 395.00 FEET.

 FLOW PROCESS FROM NODE 334.00 TO NODE 332.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.12
 RAINFALL INTENSITY(INCH/HR) = 6.92
 TOTAL STREAM AREA(ACRES) = 1.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.69

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	9.77	8.54	6.157	2.18
2	5.69	7.12	6.925	2.19

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	14.37	7.12	6.925
2	14.82	8.54	6.157

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 14.82 Tc(MIN.) = 8.54
 TOTAL AREA(ACRES) = 3.4
 LONGEST FLOWPATH FROM NODE 348.00 TO NODE 332.00 = 785.00 FEET.

 FLOW PROCESS FROM NODE 332.00 TO NODE 316.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 694.00 DOWNSREAM(Feet) = 681.00
 FLOW LENGTH(Feet) = 250.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.6 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 13.70
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 14.82
 PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 8.84
 LONGEST FLOWPATH FROM NODE 348.00 TO NODE 316.00 = 1035.00 FEET.

 FLOW PROCESS FROM NODE 332.00 TO NODE 316.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.84
 RAINFALL INTENSITY(INCH/HR) = 6.02
 TOTAL STREAM AREA(ACRES) = 3.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.82

 FLOW PROCESS FROM NODE 322.00 TO NODE 320.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 90
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00
 UPSTREAM ELEVATION(Feet) = 699.00
 DOWNSREAM ELEVATION(Feet) = 698.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.075
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.669
 SUBAREA RUNOFF(CFS) = 1.64
 TOTAL AREA(ACRES) = 0.31 TOTAL RUNOFF(CFS) = 1.64

 FLOW PROCESS FROM NODE 320.00 TO NODE 318.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(Feet) = 698.00 DOWNSREAM ELEVATION(Feet) = 685.00
 STREET LENGTH(Feet) = 250.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.72
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.31
 HALFSTREET FLOOD WIDTH(Feet) = 8.28

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AVERAGE FLOW VELOCITY(EEET/SEC.) = 4.62
 PRODUCT OF DEPTH&VELOCITY(ET*FT/SEC.) = 1.43
 STREET FLOW TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 6.98
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.013
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 90
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.690
 SUBAREA AREA(ACRES) = 0.86 SUBAREA RUNOFF(CFS) = 4.16
 TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 5.66

ENO OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34 HALFSTREET ELOOO WIDTH(FEET) = 10.20
 FLOW VELOCITY(FEET/SEC.) = 5.05 DEPTH*VELOCITY(FT*ET/SEC.) = 1.74
 LONGEST FLOWPATH FROM NODE 322.00 TO NODE 318.00 = 370.00 FEET.

 FLOW PROCESS FROM NODE 318.00 TO NODE 316.00 IS CODE = 31

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

 ELEVATION DATA: UPSIREAM(EEET) = 682.00 DOWNSTREAM(EEET) = 681.00
 FLOW LENGTH(FEET) = 5.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.3 INCHES
 PIPE-FLOW VELOCITY(EEET/SEC.) = 17.29
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.66
 PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 6.98
 LONGEST FLOWPATH FROM NODE 322.00 TO NODE 316.00 = 375.00 FEET.

 FLOW PROCESS FROM NODE 318.00 TO NODE 316.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.98
 RAINFALL INTENSITY(INCH/HR) = 7.01
 TOTAL STREAM AREA(ACRES) = 1.17
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.66

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	14.82	8.84	6.019	3.37
2	5.66	6.98	7.010	1.17

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CES)	Tc (MIN.)	INTENSITY (INCH/HOUR)
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1	18.39	6.98	7.010
2	19.69	8.84	6.019

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 19.69 Tc(MIN.) = 8.84
 TOTAL AREA(ACRES) = 4.5
 LONGEST FLOWPATH FROM NODE 348.00 TO NODE 316.00 = 1035.00 FEET.

 FLOW PROCESS FROM NODE 318.00 TO NODE 316.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

 FLOW PROCESS FROM NODE 330.00 TO NODE 328.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 90
 INITIAL SUBAREA FLOW-LENGTH(EEET) = 185.00
 UPSIREAM ELEVATION(FEET) = 728.00
 DOWNSTREAM ELEVATION(EEET) = 727.00
 ELEVATION DIFFERENCE(EEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.483
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 51.22
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.353
 SUBAREA RUNOFF(CFS) = 2.69
 TOTAL AREA(ACRES) = 0.53 TOTAL RUNOFF(CFS) = 2.69

 FLOW PROCESS FROM NODE 328.00 TO NODE 326.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

 UPSIREAM ELEVATION(EEET) = 727.00 DOWNSTREAM ELEVATION(EEET) = 718.00
 STREET LENGTH(EEET) = 450.00 CURB HEIGHT(INCHES) = 6.0
 STREET WIDTH(EEET) = 30.00

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

SPECIFIED NUMBER OF ALLEYS CARRYING RUNOFF = 2
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.64
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.42

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HAEFSTREET FLOOD WIDTH(FEET) = 14.18
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.68
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.53
 STREET FLOW TRAVEL TIME(MIN.) = 2.04 Tc(MIN.) = 8.52
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.165
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
 S.C.S. CURVE NUMBER (AMC II) = 90
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.690
 SUBAREA AREA(ACRES) = 5.59 SUBAREA RUNOFF(CFS) = 23.78
 TOTAL AREA(ACRES) = 6.1 PEAK FLOW RATE(CFS) = 26.03

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.48 HAEFSTREET FLOOD WIDTH(FEET) = 17.93
 FLOW VELOCITY(FEET/SEC.) = 4.25 DEPTH*VELOCITY(FT*FT/SEC.) = 2.05
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
 AND L = 450.0 FT WITH ELEVATION-DROP = 9.0 FT, IS 33.2 CFS,
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 326.00
 LONGEST FLOWPATH FROM NODE 330.00 TO NODE 326.00 = 635.00 FEET.

FLOW PROCESS FROM NODE 326.00 TO NODE 322.00 IS CODE = 3I

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

ELEVATION DATA: UPSTREAM(FEET) = 715.00 DOWNSTREAM(FEET) = 682.00
 FLOW LENGTH(FEET) = 220.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 23.44
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 26.03
 PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 8.68
 LONGEST FLOWPATH FROM NODE 330.00 TO NODE 322.00 = 855.00 FEET.

FLOW PROCESS FROM NODE 326.00 TO NODE 322.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.68
 RAINFALL INTENSITY(INCH/HR) = 6.09
 TOTAL STREAM AREA(ACRES) = 6.12
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 26.03

FLOW PROCESS FROM NODE 325.00 TO NODE 324.00 IS CODE = 2I

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

*USER SPECIFIED(SUBAREA):
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) = 90
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.00
 UPSTREAM ELEVATION(FEET) = 706.00

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DOWNSTREAM ELEVATION(FEET) = 705.00
 ELEVATION DIFFERENCE(FEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.927
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.792
 SUBAREA RUNOFF(CFS) = 1.85
 TOTAL AREA(ACRES) = 0.34 TOTAL RUNOFF(CFS) = 1.85

FLOW PROCESS FROM NODE 324.00 TO NODE 322.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 705.00 DOWNSTREAM ELEVATION(FEET) = 685.00
 STREET LENGTH(FEET) = 380.00 CURB HEIGHT(INCHES) = 6.0
 STREET WALKWAY(FEET) = 30.00

DISTANCE FROM CURB TO CROSSFADE GRADEBREAK(FEET) = 20.00
 INSIDE STREET CROSSFADE(DECIMAL) = 0.018
 OUTSIDE STREET CROSSFADE(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.91
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.31
 HAEFSTREET FLOOD WIDTH(FEET) = 8.47
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.68
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.47
 STREET FLOW TRAVEL TIME(MIN.) = 1.35 Tc(MIN.) = 7.28
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.825
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
 S.C.S. CURVE NUMBER (AMC II) = 90
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.693
 SUBAREA AREA(ACRES) = 0.87 SUBAREA RUNOFF(CFS) = 4.10
 TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 5.72

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 10.20
 FLOW VELOCITY(FEET/SEC.) = 5.10 DEPTH*VELOCITY(FT*FT/SEC.) = 1.76
 LONGEST FLOWPATH FROM NODE 325.00 TO NODE 322.00 = 500.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 322.00 IS CODE = I

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

TOTAL NUMBER OF STREAMS = 2

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CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 7.28

RAINFALL INTENSITY(INCH/HR) = 6.82

TOTAL STREAM AREA(ACRES) = 1.21

PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.72

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	26.03	8.68	6.093	6.12
2	5.72	7.28	6.825	1.21

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	27.55	7.28	6.825
2	31.14	8.68	6.093

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 31.14 Tc(MIN.) = 8.68

TOTAL AREA(ACRES) = 7.3

LONGEST FLOWPATH FROM NODE 330.00 TO NODE 322.00 = 855.00 FEET.

FLOW PROCESS FROM NODE 322.00 TO NODE 316.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 682.00 DOWNSTREAM(Feet) = 681.00

FLOW LENGTH(Feet) = 25.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.2 INCHES

PIPE-FLOW VELOCITY(Feet/Sec.) = 14.89

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 31.14

PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 8.71

LONGEST FLOWPATH FROM NODE 330.00 TO NODE 316.00 = 880.00 FEET.

FLOW PROCESS FROM NODE 322.00 TO NODE 316.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	31.14	8.71	6.080	7.33

LONGEST FLOWPATH FROM NODE 330.00 TO NODE 316.00 = 880.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	19.69	8.84	6.019	4.54

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LONGEST FLOWPATH FROM NODE 348.00 TO NODE 316.00 = 1035.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	50.52	8.71	6.080
2	50.51	8.84	6.019

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 50.52 Tc(MIN.) = 8.71

TOTAL AREA(ACRES) = 11.9

FLOW PROCESS FROM NODE 322.00 TO NODE 316.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1<<<<

FLOW PROCESS FROM NODE 316.00 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) = 681.00 DOWNSTREAM(Feet) = 658.00

FLOW LENGTH(Feet) = 325.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.6 INCHES

PIPE-FLOW VELOCITY(Feet/Sec.) = 20.52

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 50.52

PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 8.97

LONGEST FLOWPATH FROM NODE 348.00 TO NODE 314.00 = 1360.00 FEET.

FLOW PROCESS FROM NODE 316.00 TO NODE 314.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 8.97

RAINFALL INTENSITY(INCH/HR) = 5.96

TOTAL STREAM AREA(ACRES) = 11.87

PEAK FLOW RATE(CFS) AT CONFLUENCE = 50.52

FLOW PROCESS FROM NODE 312.00 TO NODE 311.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 86

INITIAL SUBAREA FLOW-LENGTH(Feet) = 140.00

UPSTREAM ELEVATION(Feet) = 687.00

DOWNSTREAM ELEVATION(Feet) = 678.00

ELEVATION DIFFERENCE(Feet) = 9.00

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SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.841
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 1.20
 TOTAL AREA(ACRES) = 0.23 TOTAL RUNOFF(CFS) = 1.20

FLOW PROCESS FROM NODE 311.00 TO NODE 310.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(Feet) = 678.00 DOWNSTREAM ELEVATION(Feet) = 662.00
 STREET LENGTH(Feet) = 200.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
 INSTOE STREET CROSSFALL(DECIMAL) = 0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.38
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.26
 HALFSTREET FLOOD WIDTH(Feet) = 5.47
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 5.16
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.34
 STREET FLOW TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 5.49
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.189
 RESIDENTIAL (14.5 OZ/AC OR LESS) RUNOFF COEFFICIENT = .6000
 SOTL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
 SUBAREA AREA(ACRES) = 0.48 SUBAREA RUNOFF(CFS) = 2.36
 TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 3.49

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.29 HALFSTREET FLOOD WIDTH(Feet) = 7.03
 FLOW VELOCITY(Feet/Sec.) = 5.49 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.58
 LONGEST FLOWPATH FROM NODE 312.00 TO NODE 310.00 = 340.00 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 314.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 659.00 DOWNSTREAM(Feet) = 658.00
 FLOW LENGTH(Feet) = 25.00 MANNING'S N = 0.013

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ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.1 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 8.48
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.49
 PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.54
 LONGEST FLOWPATH FROM NODE 312.00 TO NODE 314.00 = 365.00 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 314.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCE STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.54
 RAINFALL INTENSITY(INCH/HR) = 8.14
 TOTAL STREAM AREA(ACRES) = 0.71
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.49

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	50.52	8.97	5.964	11.87
2	3.49	5.54	8.143	0.71

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	34.67	5.54	8.143
2	53.08	8.97	5.964

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 53.08 Tc(MIN.) = 8.97
 TOTAL AREA(ACRES) = 12.6
 LONGEST FLOWPATH FROM NODE 348.00 TO NODE 314.00 = 1360.00 FEET.

FLOW PROCESS FROM NODE 314.00 TO NODE 306.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(Feet) = 658.00 DOWNSTREAM(Feet) = 657.00
 FLOW LENGTH(Feet) = 5.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.1 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 30.98
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 53.08
 PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 8.97
 LONGEST FLOWPATH FROM NODE 348.00 TO NODE 306.00 = 1365.00 FEET.

FLOW PROCESS FROM NODE 314.00 TO NODE 306.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.97
 RAINFALL INTENSITY(INCH/HR) = 5.96
 TOTAL STREAM AREA(ACRES) = 12.58
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 53.08

FLOW PROCESS FROM NODE 308.00 TO NODE 307.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (24. OU/AC OR LESS) RUNOFF COEFFICIENT = .6900
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 90
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00
 UPSTREAM ELEVATION(Feet) = 683.00
 DOWNSTREAM ELEVATION(Feet) = 682.00
 ELEVATION DIFFERENCE(Feet) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.075
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
 (Reference: Table 3-18 of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.669
 SUBAREA RUNOFF(CFS) = 1.22
 TOTAL AREA(ACRES) = 0.23 TOTAL RUNOFF(CFS) = 1.22

FLOW PROCESS FROM NODE 307.00 TO NODE 306.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(Feet) = 682.00 DOWNSTREAM ELEVATION(Feet) = 662.00
 STREET LENGTH(Feet) = 250.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.70
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.29
 HALFSTREET FLOOD WIDTH(Feet) = 7.28
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 5.54
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.62

STREET FLOW TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 6.83
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.112
 RESIDENTIAL (24. OU/AC OR LESS) RUNOFF COEFFICIENT = .6900
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 90
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.690
 SUBAREA AREA(ACRES) = 1.01 SUBAREA RUNOFF(CFS) = 4.96
 TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 6.09

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.33 HALFSTREET FLOOD WIDTH(Feet) = 9.47
 FLOW VELOCITY(Feet/Sec.) = 6.12 DEPTH*VELOCITY(FT*FT/SEC.) = 2.03
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 306.00 = 370.00 FEET.

FLOW PROCESS FROM NODE 307.00 TO NODE 306.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.83
 RAINFALL INTENSITY(INCH/HR) = 7.11
 TOTAL STREAM AREA(ACRES) = 1.24
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.09

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	53.08	8.97	5.963	12.58
2	6.09	6.83	7.112	1.24

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	50.58	6.83	7.112
2	58.18	8.97	5.963

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 58.18 Tc(MIN.) = 8.97
 TOTAL AREA(ACRES) = 13.8
 LONGEST FLOWPATH FROM NODE 348.00 TO NODE 306.00 = 1365.00 FEET.

FLOW PROCESS FROM NODE 306.00 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) = 657.00 DOWNSTREAM(Feet) = 650.00
 FLOW LENGTH(Feet) = 25.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.3 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 36.11

ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 58.18
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.98
 LONGEST FLOWPATH FROM NODE 348.00 TO NODE 304.00 = 1390.00 FEET.

 FLOW PROCESS FROM NODE 304.00 TO NODE 300.00 IS CODE = S1

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

 ELEVATION DATA: UPSTREAM(Feet) = 650.00 DOWNSTREAM(Feet) = 648.60
 CHANNEL LENGTH THRU SUBAREA(Feet) = 140.00 CHANNEL SLOPE = 0.0100
 CHANNEL BASE(Feet) = 50.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.585
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 58.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 2.46
 AVERAGE FLOW DEPTH(Feet) = 0.45 TRAVEL TIME(MIN.) = 0.95
 Tc(MIN.) = 9.93
 SUBAREA AREA(ACRES) = 0.33 SUBAREA RUNOFF(CFS) = 0.66
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.681
 TOTAL AREA(ACRES) = 14.1 PEAK FLOW RATE(CFS) = 58.18

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.45 FLOW VELOCITY(Feet/Sec.) = 2.45
 LONGEST FLOWPATH FROM NODE 348.00 TO NODE 300.00 = 1530.00 FEET.

 FLOW PROCESS FROM NODE 300.00 TO NODE 300.00 IS CODE = S1

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

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.585
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6807
 SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00
 TOTAL AREA(ACRES) = 14.1 TOTAL RUNOFF(CFS) = 58.18
 Tc(MIN.) = 9.93
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 14.1 Tc(MIN.) = 9.93
 PEAK FLOW RATE(CFS) = 58.18

 END OF RATIONAL METHOD ANALYSIS

RAIIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
 2003,1985,1981 HYDROLOGY MANUAL
 (c) Copyright 1982-2012 Advanced Engineering Software (aes)
 Ver. 19.0 Release Date: 06/01/2012 License IO 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****

* HARMONAY GROVE *
 * JN 409S.01 *
 * BASIN 400 - PROPOSED CONDITION - 100-YEAR STORM EVENT *

FILE NAME: S400P100.OAI
 TIME/DATE OF STUDY: 17:01 11/10/2015

 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
 SPECIFIED PERCENT OF GRADIENS(DECIMAL) TO USE FOR ERICTION SLOPE = 0.90
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
 USER-DEFINED SIREET-SECTIONS FOR COUPLED PIPE BELOW AND SIREET BELOW MODEL

HALE- WIOIH NO.	CROWN TO (EI)	STREET-CROSSFALL (EI)	CURB SIOE / SIOE/ WAY	GUIER-GEOMETRIES HEIGHT (EI)	MANNING WIDTH (FI)	LIP (FI)	HIKE (EI)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.50	2.00	0.0313	0.167	0.0150

GLOBAL SIREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEEI
 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 UPSIREET TRIBUTARY PIPE.*

 FLOW PROCESS FROM NODE 472.00 TO NODE 470.00 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 88

INITIAL SUBAREA FLOW-LENGTH(FEET) = 220.00
 UPSTREAM ELEVATION(FEET) = 983.00
 DOWNSIREET ELEVATION(FEET) = 875.00
 ELEVATION DIFFERENCE(FEET) = 108.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN THE CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
 SUBAREA RUNOFF(CFS) = 3.42
 TOTAL AREA(ACRES) = 1.30 TOTAL RUNOFF(CFS) = 3.42

 FLOW PROCESS FROM NODE 470.00 TO NODE 468.00 IS CODE = 51

 >>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 875.00 DOWNSIREET(FEET) = 652.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1480.00 CHANNEL SLOPE = 0.1507
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.694

*USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 29.70
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.31
 AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 3.37
 TC(MIN.) = 9.64
 SUBAREA AREA(ACRES) = 25.90 SUBAREA RUNOFF(CFS) = 51.61
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.350
 TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 54.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49 FLOW VELOCITY(FEET/SEC.) = 8.99
 LONGEST FLOWPATH FROM NODE 472.00 TO NODE 468.00 = 1700.00 FEEI.

 FLOW PROCESS FROM NODE 470.00 TO NODE 468.00 IS CODE = 1

 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

INITIAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.64
 RAINFALL INTENSITY(INCH/HR) = 5.69
 TOTAL STREAM AREA(ACRES) = 27.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 54.20

 FLOW PROCESS FROM NODE 466.00 TO NODE 464.00 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500

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SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 88
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00
 UPSTREAM ELEVATION(FEET) = 995.00
 DOWNSTREAM ELEVATION(FEET) = 875.00
 ELEVATION DIFFERENCE(FEET) = 120.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
 SUBAREA RUNOFF(CFS) = 2.42
 TOTAL AREA(ACRES) = 0.92 TOTAL RUNOFF(CFS) = 2.42

 FLOW PROCESS FROM NODE 464.00 TO NODE 468.00 IS CODE = SI

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 875.00 DOWNSTREAM(FEET) = 652.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 750.00 CHANNEL SLOPE = 0.2973
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.247
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FT/SEC.) = 6.01
 AVERAGE FLOW DEPTH(FEET) = 0.14 TRAVEL TIME(MIN.) = 2.08
 Tc(MIN.) = 8.35
 SUBAREA AREA(ACRES) = 5.97 SUBAREA RUNOFF(CFS) = 13.05
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.350
 TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 15.06

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.19 FLOW VELOCITY(FT/SEC.) = 7.33
 LONGEST ELDPATH FROM NODE 466.00 TO NODE 468.00 = 950.00 FEET.

 FLOW PROCESS FROM NODE 464.00 TO NODE 468.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.35
 RAINFALL INTENSITY(INCH/HR) = 6.25
 TOTAL STREAM AREA(ACRES) = 6.89
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.06

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	2.42	6.267	7.516	0.92
2	13.05	8.35	6.25	6.89

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I	S4.20	9.64	S.694	27.20
2	15.06	8.35	6.247	6.89

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	62.01	8.35	6.247
2	67.93	9.64	5.694

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 67.93 Tc(MIN.) = 9.64
 TOTAL AREA(ACRES) = 34.1
 LONGEST FLOWPATH FROM NODE 472.00 TO NODE 468.00 = 1700.00 FEET.

 FLOW PROCESS FROM NODE 468.00 TO NODE 462.00 IS CODE = SI

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 652.00 DOWNSTREAM(FEET) = 618.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 480.00 CHANNEL SLOPE = 0.0708
 CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.322
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) = 88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 69.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FT/SEC.) = 7.53
 AVERAGE FLOW DEPTH(FEET) = 0.68 TRAVEL TIME(MIN.) = 1.06
 Tc(MIN.) = 10.70
 SUBAREA AREA(ACRES) = 1.46 SUBAREA RUNOFF(CFS) = 2.33
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.348
 TOTAL AREA(ACRES) = 35.5 PEAK FLOW RATE(CFS) = 67.93

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.68 FLOW VELOCITY(FT/SEC.) = 7.51
 LONGEST ELDPATH FROM NODE 472.00 TO NODE 462.00 = 2180.00 FEET.

 FLOW PROCESS FROM NODE 468.00 TO NODE 462.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.70
 RAINFALL INTENSITY(INCH/HR) = 5.32
 TOTAL STREAM AREA(ACRES) = 35.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 67.93

 FLOW PROCESS FROM NODE 460.00 TO NODE 458.00 IS CODE = 2I

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

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=====
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88
INITIAL SUBAREA FLOW-LENGTH(Feet) = 180.00
UPSTREAM ELEVATION(Feet) = 1324.00
DOWNSTREAM ELEVATION(Feet) = 1200.00
ELEVATION DIFFERENCE(Feet) = 124.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
          (Reference: Table 3-18 of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.516
SUBAREA RUNOFF(CFS) = 4.76
TOTAL AREA(ACRES) = 1.81 TOTAL RUNOFF(CFS) = 4.76

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*****
FLOW PROCESS FROM NODE 458.00 TO NODE 462.00 IS CODE = 51

```

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

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=====
ELEVATION DATA: UPSTREAM(Feet) = 1200.00 DOWNSTREAM(Feet) = 618.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 2720.00 CHANNEL SLOPE = 0.2140
CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.099
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3400
S.C.S. CURVE NUMBER (AMC II) = 88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 35.62
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 8.77
AVERAGE FLOW DEPTH(Feet) = 0.35 TRAVEL TIME(MIN.) = 5.17
Tc(MIN.) = 11.43
SUBAREA AREA(ACRES) = 34.50 SUBAREA RUNOFF(CFS) = 59.82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.340
TOTAL AREA(ACRES) = 36.3 PEAK FLOW RATE(CFS) = 63.05

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.48 FLOW VELOCITY(Feet/Sec.) = 10.65
LONGEST FLOWPATH FROM NODE 460.00 TO NODE 462.00 = 2900.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 458.00 TO NODE 462.00 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.) = 11.43
RAINFALL INTENSITY(INCH/HR) = 5.10
TOTAL STREAM AREA(ACRES) = 36.31
PEAK FLOW RATE(CFS) AT CONFLUENCE = 63.05

```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	67.93	10.70	5.322	35.55
2	63.05	11.43	5.099	36.31

```

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

```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	126.94	10.70	5.322
2	128.14	11.43	5.099

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

```

PEAK FLOW RATE(CFS) = 128.14 Tc(MIN.) = 11.43
TOTAL AREA(ACRES) = 71.9
LONGEST FLOWPATH FROM NODE 460.00 TO NODE 462.00 = 2900.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 462.00 TO NODE 400.00 IS CODE = 51

```

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

```

=====
ELEVATION DATA: UPSTREAM(Feet) = 618.00 DOWNSTREAM(Feet) = 606.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 170.00 CHANNEL SLOPE = 0.0706
CHANNEL BASE(Feet) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.011
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
S.C.S. CURVE NUMBER (AMC II) = 88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 129.08
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 9.03
AVERAGE FLOW DEPTH(Feet) = 0.96 TRAVEL TIME(MIN.) = 0.31
Tc(MIN.) = 11.75
SUBAREA AREA(ACRES) = 1.22 SUBAREA RUNOFF(CFS) = 1.90
AREA-AVERAGE RUNOFF COEFFICIENT = 0.344
TOTAL AREA(ACRES) = 73.1 PEAK FLOW RATE(CFS) = 128.14

```

```

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.96 FLOW VELOCITY(Feet/Sec.) = 9.04
LONGEST FLOWPATH FROM NODE 460.00 TO NODE 400.00 = 3070.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 456.00 TO NODE 400.00 IS CODE = 81

```

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

```

=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.011
RESIDENTIAL (1.00/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3444

```


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SUBAREA AREA(ACRES) = 3.77 SUBAREA RUNOFF(CFS) = 6.80
 TOTAL AREA(ACRES) = 76.8 TOTAL RUNOFF(CFS) = 132.64
 TC(MIN.) = 11.75

FLOW PROCESS FROM NODE 400.00 TO NODE 400.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.011
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3444
 SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00
 TOTAL AREA(ACRES) = 76.8 TOTAL RUNOFF(CFS) = 132.64
 TC(MIN.) = 11.75

=====

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 76.8 TC(MIN.) = 11.75
 PEAK FLOW RATE(CFS) = 132.64

=====

END OF RATIONAL METHOD ANALYSIS

5

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE

Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT

2003, 1985, 1981 HYDROLOGY MANUAL

(c) Copyright 1982-2012 Advanced Engineering Software (aes)

Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****

* HARMONY GROVE VILLAGE SOUTH *

* JN 4095 *

* BASIN 503 - PROPOSED CONDITION - 100-YEAR STORM EVENT *

FILE NAME: S500P100.DAT
TIME/DATE OF STUDY: 13:00 12/20/2016

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT (YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300
SPECIFIED MINIMUM PIPE SIZE (INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES WIDTH LIP (FT) (FT)	MANNING HIKE FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.50	2.00 0.0313	0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.40 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 0.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 506.00 TO NODE 504.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
INITIAL SUBAREA FLOW-LENGTH (FEET) = 100.00
UPSTREAM ELEVATION (FEET) = 589.00
DOWNSTREAM ELEVATION (FEET) = 586.00
ELEVATION DIFFERENCE (FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 2.568
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

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THE MAXIMUM OVERLAND FLOW LENGTH = 80.00
(Reference: Table 3-13 of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF (CFS) = 0.38
TOTAL AREA (ACRES) = 0.05 TOTAL RUNOFF (CFS) = 0.38

FLOW PROCESS FROM NODE 504.00 TO NODE 502.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION (FEET) = 586.00 DOWNSTREAM ELEVATION (FEET) = 574.00
STREET LENGTH (FEET) = 740.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.016

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.35
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.32
HALFSTREET FLOOD WIDTH (FEET) = 8.78
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.66
PRODUCT OF DEPTH*VELOCITY (FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME (MIN.) = 4.63 Tc (MIN.) = 7.20
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.875
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
SUBAREA AREA (ACRES) = 0.65 SUBAREA RUNOFF (CFS) = 3.69
TOTAL AREA (ACRES) = 0.7 PEAK FLOW RATE (CFS) = 4.19

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.37 HALFSTREET FLOOD WIDTH (FEET) = 11.60
FLOW VELOCITY (FEET/SEC.) = 3.00 DEPTH*VELOCITY (FT*FT/SEC.) = 1.11
LONGEST FLOWPATH FROM NODE 506.00 TO NODE 502.00 = 840.00 FEET.

FLOW PROCESS FROM NODE 504.00 TO NODE 502.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 7.20
RAINFALL INTENSITY (INCH/HR) = 6.88
TOTAL STREAM AREA (ACRES) = 0.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 4.19

FLOW PROCESS FROM NODE 514.00 TO NODE 512.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

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STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 100.00
 UPSTREAM ELEVATION(Feet) = 589.00
 DOWNSTREAM ELEVATION(Feet) = 586.00
 ELEVATION DIFFERENCE(Feet) = 3.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.568
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 80.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.45
 TOTAL AREA(ACRES) = 0.06 TOTAL RUNOFF(CFS) = 0.45

 FLOW PROCESS FROM NODE 512.00 TO NODE 510.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(Feet) = 586.00 DOWNSTREAM ELEVATION(Feet) = 574.00
 STREET LENGTH(Feet) = 740.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.016
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.02
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.34
 HALFSTREET FLOOD WIDTH(Feet) = 9.97
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.80
 PRODUCT OF DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.95
 STREET FLOW TRAVEL TIME(MIN.) = 4.41 Tc(MIN.) = 6.98
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.012
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
 SUBAREA AREA(ACRES) = 0.83 SUBAREA RUNOFF(CFS) = 5.06
 TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 5.43

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.39 HALFSTREET FLOOD WIDTH(Feet) = 13.01
 FLOW VELOCITY(Feet/Sec.) = 3.18 DEPTH*VELOCITY(Ft*Ft/Sec.) = 1.26
 LONGEST FLOWPATH FROM NODE 514.00 TO NODE 510.00 = 840.00 FEET.

 FLOW PROCESS FROM NODE 510.00 TO NODE 502.00 IS CODE = 31

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

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ELEVATION DATA: UPSTREAM(Feet) = 570.00 DOWNSTREAM(Feet) = 569.40
 FLOW LENGTH(Feet) = 61.50 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.5 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 9.71
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.43
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 7.16
 LONGEST FLOWPATH FROM NODE 514.00 TO NODE 502.00 = 901.50 FEET.

 FLOW PROCESS FROM NODE 512.00 TO NODE 510.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.16
 RAINFALL INTENSITY(INCH/HR) = 6.90
 TOTAL STREAM AREA(ACRES) = 0.89
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.43

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	4.19	7.20	6.875	0.70
2	5.43	7.16	6.898	0.89

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	9.59	7.16	6.898
2	9.60	7.20	6.875

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.60 Tc(MIN.) = 7.20
 TOTAL AREA(ACRES) = 1.6
 LONGEST FLOWPATH FROM NODE 514.00 TO NODE 510.00 = 901.50 FEET.

 FLOW PROCESS FROM NODE 502.00 TO NODE 500.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(Feet) = 569.40 DOWNSTREAM(Feet) = 566.00
 FLOW LENGTH(Feet) = 20.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.9 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 18.96
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.60
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 7.21
 LONGEST FLOWPATH FROM NODE 514.00 TO NODE 500.00 = 921.50 FEET.

 FLOW PROCESS FROM NODE 500.00 TO NODE 500.00 IS CODE = 81

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

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100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.864
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (ANC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
SUBAREA AREA(ACRES) = 0.00 SUBAREA RUNOFF(CFS) = 0.00
TOTAL AREA(ACRES) = 1.6 TOTAL RUNOFF(CFS) = 9.60
TC(MIN.) = 7.21
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
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END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.6 TC(MIN.) = 7.21
PEAK FLOW RATE(CFS) = 9.60
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END OF RATIONAL METHOD ANALYSIS