CAMPUS PARK WEST PROJECT

APPENDIX L

VOLUME 1: CEQA PRELIMINARY HYDROLOGY/ON-SITE DRAINAGE STUDY

SPA05-001, GPA05-003, REZ05-005,
TM 5424, LOG NO. 05-02-009

for the

DRAFT SUBSEQUENT ENVIRONMENTAL IMPACT REPORT

August 2013

CEQA PRELIMINARY HYDROLOGY/ ONSITE DRAINAGE STUDY

CAMPUS PARK WEST

County of San Diego, CA

April 16, 2013

TM Tract 5424; GPA05-003; SPA05-001;

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PROJECT DESIGN CONSULTANTS

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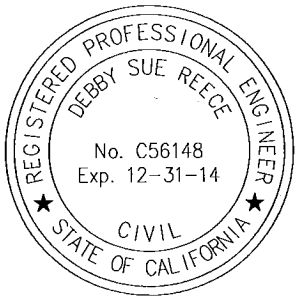

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TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

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

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

3 100-year Existing Conditions Rational Method Computer Output

4 100-year Proposed Conditions Rational Method Computer Output

5 Rational Method Hydrographs

6 FEMA FIRM Panel

7 Calculations for Caltrans Sump (Outfall #3)

8 Interstate 15 Storm Drain As-builts

9 Floodplain Calculations for Minor Tributaries (not including HRC or SLR River)

10 Preliminary Hydraulic Calculations of Outfalls to HRC

11 Excerpts from Pala Mesa Specific Plan

12 Electronic Copies of URS Roadway & Hydraulic Studies (For Reference)

13 Drainage Exhibits

A-1 – Offsite Existing Conditions Hydrology Map

A-2 – Onsite Existing Conditions Hydrology Map

B – Onsite Proposed Conditions Hydrology Map

C – Land use Map (General Plan and Specific Plan)

D – Soil Type Map

1. INTRODUCTION

This drainage report supports the preliminary design of the proposed storm drain improvements associated with Campus Park West project, for a Tentative Map (TM) submittal. The project is located in the County of San Diego within the Fallbrook Community Planning Area. The site is 116.6 acres in size and is located east of Interstate 15, with the majority of the site located north of State Route 76 (SR 76), adjacent to Interstate 15, and the remaining property is located south of SR 76 on either side of Pankey Road. Figure 1 shows the vicinity map for the project.

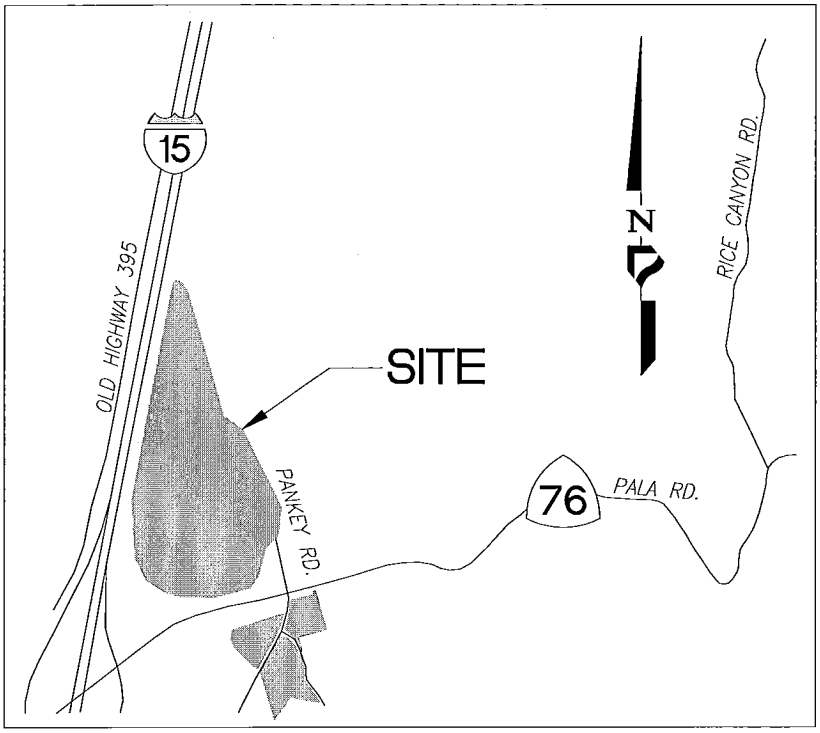


Figure 1: Project Vicinity Map

The Tentative Map shows the proposed project design plus one alternative design for the westerly pad located to the southwest of the SR 76/Pankey Road intersection. Grading Alternative #1 is the grading alternative that, if selected, would expand the development footprint to the north by decertifying a portion of the existing SR 76 Caltrans right-of-way. This alternative is dependent on whether the Caltrans Decertification process is achieved. If the process to decertify the right-of-way is not successful, the "Grading Alternative #1" would be

eliminated. The "Grading Alternative #1" is analyzed herein as an alternative for the proposed condition.

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, 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 Management Plan (SMWP) for Campus Park West project. The final post-construction BMP design will be provided during final engineering.

The Campus Park West project is adjacent to the Meadowood (TM 5354) and Campus Park (VTM 5338) projects. For information on the Meadowood project, refer to the *Drainage Study for Meadowood Vesting Tentative Map*, dated March 19, 2010 from Rick Engineering. For information on the Campus Park project, refer to the *CEQA Level Preliminary Hydrology & Hydraulics Study for Campus Park*, dated February 23, 2010 from Landmark Engineering. This Campus Park West report is a stand-alone report and does not include analysis of cumulative effects of the nearby proposed projects.

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.

2.1 Existing Drainage Patterns

The site currently consists of mostly undeveloped land. Slopes vary from moderate to steep and cover is mostly brush with some areas of dense trees. There are five existing culverts underneath Interstate 15 that convey offsite runoff from areas west of Interstate 15 onto the property. The site area north of SR 76 generally slopes south and east towards Horse Ranch Creek. To the east of the site perimeter, Horse Ranch Creek drains to the south. There are three existing bridges that cross Horse Ranch Creek, including two Pankey Road bridges, and one SR 76 Caltrans bridge. Approximately 600 feet south of the South Pankey Road bridge, the creek confluences with the San Luis Rey River.

Onsite drainage is divided generally into four drainage areas, Systems 100E through 400E. The "E" in the system name refers to the existing condition drainage area in order to differentiate between the proposed (P) drainage areas. From north to south, they include the following areas:

System 100E: System 100E represents the area that drains easterly and enters Horse Ranch Creek upstream of the existing North Pankey Road Bridge. The majority of the drainage area within this system is from offsite areas west of Interstate 15.

System 200E: System 200E represents the onsite area that drains southeasterly and enters Horse Ranch Creek downstream of the existing north Pankey Road Bridge, but north of SR 76.

System 300E: System 300E consists of the onsite and offsite drainage area that drains to the southwest corner of the site and enters a natural sump north of SR 76. This sump area was studied previously in the URS study entitled *Drainage Report – SR 76 Widening and Realignment from Interstate 15 to 2.2km East*, dated December 21, 2007. This study will be referred to in this report as the URS Roadway study. The sump area does not appear to have a low-level outlet. Presumably the runoff infiltrates into the native B-type soils

and percolates towards the San Luis Rey River. Per the URS Roadway study, this natural sump area contains sufficient volume below the existing 72-inch culvert outlet pipe elevation to fully retain the 100-year flood volume of its tributary area under existing conditions. However, due to drainage area and topographic information differences for this project compared to the URS report, it is unlikely the full 100-year retention volume is retained under existing conditions. Regardless, if the water elevation rises high enough in the sump area, excess runoff will flow to the south via the 72-inch culvert underneath SR 76. Sediment in the 72-inch pipe was recently observed following significant January 2010 rain events, so it is apparent that the water in the sump does pond high enough to flow into the culvert on some occasions, but the area acts as a natural retention/infiltration basin for small storm events. PDC's field survey shots indicate that the grade of the pipe is actually adverse even though the Caltrans plans show a 0.5% slope from north to south. Refer to Appendix 7.

System 400E: System 400E consists of the area located south of SR 76 that sheetflows to either the San Luis Rey River, or the section of Horse Ranch Creek that is located south of the SR 76 bridge. A portion of the runoff enters the trapezoidal concrete channel that was recently constructed with the SR76 improvements that discharges into Horse Ranch Creek just south of the SR76 bridge.

See Exhibits A-1 and A-2 in Appendix 13 for the existing condition hydrology maps. In order to adequately compare existing flows to proposed flows at each of the project outfalls and to provide a valid comparison, the downstream limits of the existing drainage boundaries match the limits of the proposed drainage boundaries. This was needed because of the large number of drainage outfalls, and lack of concentration points in the pre-developed condition.

2.2 Proposed Drainage Patterns and Improvements

The proposed project consists of building a mixed-use planned community comprised of multi-family residential, limited industrial, mixed-use, and commercial components. The proposed northern development includes all four land uses, and two parcels in the southern development will be solely commercial, while the other parcel will be undisturbed and will remain as open space. (Refer to Exhibit C in Appendix 13). The project street improvements include the

extension of Pankey Road north of SR 76. Part of the extension will include replacement of the Pankey Road bridge over Horse Ranch Creek north of SR 76. The street improvements south of SR 76 consist of realigning Pankey Road and building a new intersection with Shearer Crossing.

The onsite drainage improvements consist of a series of mass graded pads, public and private streets, gutters, curb inlets, and catch basins that all tie into an underground storm drain system. Note that at this stage in the design process, the commercial and multi-family planning areas do not have detailed site plans with internal streets and pads shown, but the future internal drainage improvements will convey runoff to the basins as indicated on the drainage exhibits.

In order to allow for treatment of the onsite runoff, the storm drains for this project were designed so that upstream offsite water from the Interstate 15 culverts is not commingled with onsite water (except for the most northerly Caltrans storm drain, which represents a very small area). Flow from both onsite and offsite drainage areas are conveyed to outfalls at existing natural canyon locations to closely match existing conditions.

See Exhibit B in Appendix 13 for the proposed conditions hydrology map. In order to provide a simple comparison between existing and proposed conditions for the four drainage areas of interest, a naming convention was adopted similar to the existing condition drainage areas and the downstream ends of the four drainage areas of interest are named Outfalls 1 through 4. From the north to the south, they include the following drainage areas:

Outfall #1: This area was defined as the area under proposed conditions that drains easterly and enters Horse Ranch Creek upstream of the existing North Pankey Road bridge. The drainage area consists of two systems: System 1000P and System 100P. System 100P represents mostly offsite area west of Interstate 15 and includes all drainage that does not commingle with onsite water. System 1000P includes onsite proposed developed area plus a portion of Caltrans drainage area that drains into Water Quality/Hydromodification Basin 1. Note that the two systems added together represent the point of comparison in order to evaluate the proposed condition against the existing condition (between System 100E).

Outfall #2: System 2000P represents the onsite proposed developed area that drains

southeasterly and enters Horse Ranch Creek downstream of the existing north Pankey Road bridge, but north of SR 76. It includes the discharge from Basins 2 and 3, and a small portion of Pankey Road just north of the SR 76 intersection that does not drain to a basin.

Outfall #3: This area was defined as the area that drains to the southwest corner of the site and enters a natural sump north of SR 76. The drainage area consists of two systems: System 3000P and System 300P. Following the same naming convention, System 3000P includes solely onsite proposed developed area, and System 300P represents the balance of the area, which is mostly offsite area west of the project. Note that the two systems added together represent the point of comparison in order to evaluate the proposed condition against the existing condition (between System 300E).

Outfall #4: System 4000P consists of the area located south of SR 76 that will drain to either the Caltrans channel south of SR 76 or the section of Horse Ranch Creek that is located south of the SR 76 bridge. The existing Caltrans concrete channel east of Pankey Road South between the Campus Park West property and the SR 76 edge of pavement will be filled and converted to an underground pipe system that will connect into the existing system that crosses Pankey Road South. If Alternative #1 is pursued, the open channel on the west side of Pankey Road South will also be filled and converted to an underground pipe system. For both alternatives, the commercial pads will be filled above the San Luis Rey River floodplain elevation.

The site plan includes a total of four proposed basins. All of the proposed basins will be combined water quality/hydromodification management basins. Determination of whether any of the basins would also require attenuation of the 100-year peak flow rate is considered in Section 3.6 in this report. Figure 2 summarizes the location of the major drainage systems analyzed in this report and the main project discharges.

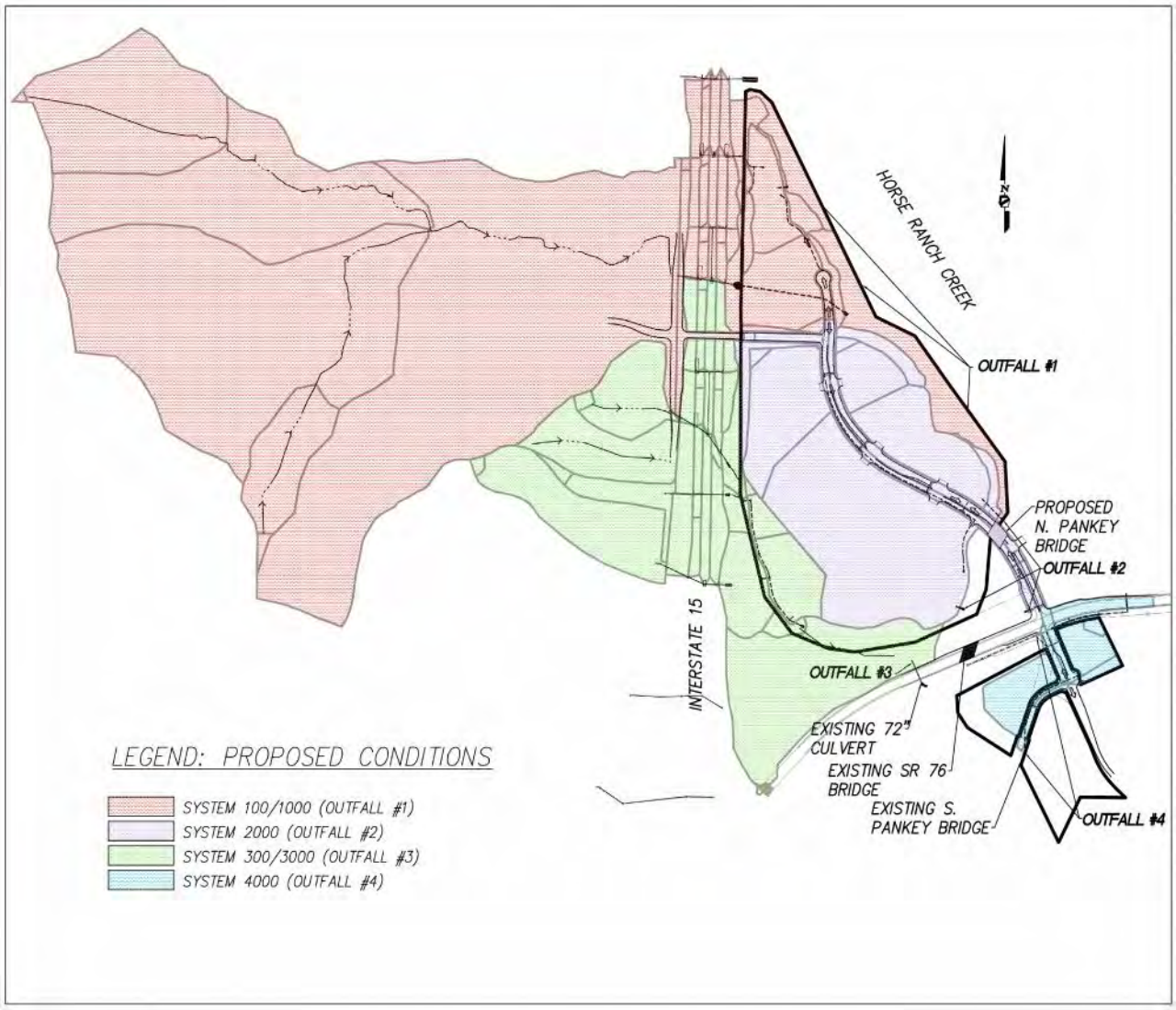


Figure 2: Schematic of Drainage Systems & Drainage Discharge Locations

2.3 Offsite Improvements

The offsite improvements include, but are not limited to, Old Highway 395 widening near the Pala Mesa Drive intersection, widening of SR 76, and realignment of the Shearer Crossing/Pankey Road intersection. The existing drainage patterns of these areas will be preserved to the maximum extent practicable. The widening near Old Highway 395 may require adjustments to inlets and other collection points due to the revised curb locations, but will not substantially change the existing drainage condition of the roadway. In order to accommodate

the new edge of pavement locations, the SR 76 improvements will require some minor revisions to the asphalt concrete overside drains to collect the runoff from the superelevated roadway. Generally, the drainage improvements to accommodate the offsite roadway widening locations are minor and these minor offsite improvements will be finalized during final engineering.

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 B, C, and D per USDA web soil survey. See Exhibit D (Appendix 13).
Land Use / Runoff Coefficients:	Based on criteria presented in the 2003 County of San Diego Hydrology Manual,
Rainfall intensity:	Based on intensity duration frequency relationships presented in the 2003 County of San Diego Hydrology Manual.

For the Rational Method calculations, the runoff coefficients for the offsite areas west of Interstate 15 were estimated using an estimate of the existing land development per the current County General Plan. Much of the land west of Interstate 15 is zoned for low density residential (1 and 2 dwelling units per acre). The remainder of the offsite area is zoned per the Pala Mesa Specific Plan (*Pala Mesa Private Development Plan*, prepared by Alvin W. Ray, dated February

15, 1974). The planning areas within the original 1974 Pala Mesa Specific Plan have since been separated into various projects. Some of the planning areas have been developed, and some are undergoing Specific Plan Amendments and are not yet developed. The original land use and densities from the Pala Mesa Specific Plan were used to develop runoff coefficients for the Rational Method model for the planning areas that have already been constructed based on field observations. The runoff coefficients for the planning areas not yet constructed were based on existing conditions, since future development would require detention of peak flows to pre-development conditions. Refer to Exhibit C in Appendix 13 for corresponding specific plan land use areas.

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. All of the onsite area contains type B soils. The land use densities for the onsite proposed conditions are based on the preliminary site plan for Campus Park West.

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 Exhibit A-1, A-2, and B (Appendix 13) 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.

3.4 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) determine if detention of peak flows is necessary.

Storm runoff from the project will be collected and conveyed to several locations. In order to compare the existing and proposed drainage conditions, four comparison outfall locations have been established. Table 2 summarizes the Rational Method hydrology results for the project outfalls for the existing and proposed conditions.

Table 2: Hydrology Results

	EXISTING CONDITIONS					PROPOSED CONDITIONS				
Outfall of Interest	*System*	*Q_{100} (cfs)*	*Contrib. Area (acres)*	*Tc (min)*	*Composite C value*	*System*	*Q_{100} (cfs)*	*Contrib. Area (acres)*	*Tc (min)*	*Composite C value*
Outfall #1	System 100E	370.2	275.00	21.44	0.37	Onsite System 1000P	102.5	23.00	7.56	0.63
						Offsite System 100P	345.8	242.50	19.98	0.37
						Sum 1000P+ 100P	358.9	265.50	-	0.39
Outfall #2	System 200E	48.6	40.30	20.08	0.32	Onsite System 2000P	280.1	63.30	9.67	0.75
Outfall #3	System 300E	151.3	95.54	15.73	0.36	Onsite System 3000P	28.1	5.93	9.93	0.8
						Offsite System 300P	135.8	76.00	13.64	0.37
						Sum 3000P+ 300P	159.2	81.93	-	0.40
Outfall #4	System 400E	24.5	11.90	16.53	0.48	System 4000P	67.5	10.50	6.51	0.83
						-OR- System 4000P (ALT. OPTION #1)	76.6	11.90	6.51	0.82

Table 2 compares the existing and proposed peak flow rates for each outfall without detention taken into account. Each outfall consists of one or more drainage systems.

3.5 Analysis of Hydrology Results for Project Outfalls

The results in Table 2 provide a comparison for the four project outfalls. Each outfall is discussed below in relation to the project's impacts and proposed mitigations with respect to

increased velocities, concentration of flows, and increased quantities of flows. For each drainage system, the peak inflow hydrograph was generated with Rick Engineering Rational Method Hydrograph Generator. This program develops a synthetic hydrograph per the 2003 County Hydrology Manual by using the results of the AES output.

Outfall #1: Under proposed conditions, pipe exit velocities at the two proposed pipe discharge locations will be mitigated by providing adequate energy dissipation at the outlet headwalls. The outfall locations closely match where the natural concentrated drainages leave the site in the existing condition, so concentration of flows is not a significant project impact. Table 2 indicates that if the peaks from System 1000P and 100P peak flow were simultaneous, the total peak flow rate would increase for Outfall #1 under proposed conditions. However, the time of concentration values for the onsite and offsite drainage areas are significantly different, which means that the total 100-year peak flow rate (from combining the hydrographs as opposed to just adding the peaks together) is much less than the sum of the respective peak flow rates from the onsite and offsite drainage areas. See the sum of the two hydrographs in Appendix 5. Since the hydrograph of the onsite area peaks much faster than the hydrograph of the offsite area, and the onsite area represents a small percentage of the total area, the total peak flow rate of the combined hydrograph is relatively independent of the onsite peak hydrograph. Therefore, if the project provided detention, the onsite hydrograph peak would be delayed such that the combined peak at the project outfall location gets worse than the no detention alternative.

Outfall #2: Under proposed conditions, System 2000P proposes to discharge into the Horse Ranch Creek in three locations which are all within 400 feet of the existing condition natural channel entry to the creek. Pipe exit velocities will be mitigated with adequate energy dissipation near the pipe outfalls. Although onsite conditions increase peak 100-year discharge, the increase is minimal compared to the offsite Horse Ranch Creek hydrograph. Refer to discussion in Section 3.6 below.

Outfall #3: Concentration of flows is not a major concern for Outfall #3, since concentration points will be mostly identical to existing conditions. Under proposed conditions, pipe exit velocities at the proposed pipe discharge locations will be mitigated by providing adequate energy dissipation at the outlet headwalls. As discussed previously, this area drains to a sump

area which has been analyzed previously with the URS Roadway study. The sump area encompasses both Campus Park West property and Caltrans right-of-way. The point of comparison for Outfall #3 shall be the 72-inch culvert crossing, since it was established with the URS Roadway study that the 72-inch culvert is the only outlet to the sump area. Although the sump may have a lot of retention volume, it does not have a low-level outlet, so the analysis included herein ignored the retention volume in the sump and analyzed the culvert assuming the sump volume is already full at the time the peak flow occurs. Note that per PDC's Horse Ranch Creek Floodplain study, the sump and the 72-inch culvert are inundated from flows from Horse Ranch Creek at the time of the peak flow in the creek. However, since the Horse Ranch Creek watershed is much larger than the drainage area for Systems 3000P and 300P, the peak flow for the onsite system will discharge to the creek before the peak flow occurs in Horse Ranch Creek. Therefore, the tailwater condition of the 72-inch pipe was estimated based on the time to peak of the Rational Method hydrographs and used to estimate the conveyance capacity of the culvert. Refer to Appendix 10 for the tailwater calculations. The hydrographs of the onsite System 3000P and the offsite System 300P were added together and then compared with the conveyance capacity of the 72-inch pipe. The tailwater from Horse Ranch Creek at the time of concentration of the peak flow to the 72-inch pipe was estimated and incorporated into the calculation for the 72-inch capacity calculation.

The proposed grading of the onsite area was designed to reduce the existing condition drainage area into the sump to minimize impacts to the area. The proposed condition flow to the 72-inch pipe is less than the capacity of the 72-inch pipe, and therefore the proposed peak flow rate will not cause a detrimental impact. Note that the sump retention volume is ignored in this approach in order to be conservative. Therefore, there will be no significant impact due to increase in quantities of peak flows for the proposed condition at Outfall #3.

Outfall #4: There are two proposed alternatives for Outfall #4. Grading Alternative #1 includes a larger development footprint. Under proposed conditions, System 4000 will discharge directly into Horse Ranch Creek south of the SR 76 bridge. Pipe exit velocities will be mitigated with adequate energy dissipation near the pipe outfall. Although onsite conditions increase peak 100-year discharge, the peak flow of onsite flows occurs prior to the peak flow in Horse Ranch Creek, therefore detention for 100-year flows are not warranted. Refer to discussion in Section

3.6 below. Note that under existing conditions, the site runoff sheetflows either to the north or south, but in the proposed condition runoff is concentrated to one location for treatment purposes. The proposed concentration towards the south is not a major concern because the flow discharges directly into the creek, and represents such a small flow rate compared with the flow in the creek. As a comparison, the peak flow from Outfall #4 represents less than one percent of the total peak flow in the creek.

3.6 Cumulative Analysis of Hydrology Results Compared to Horse Ranch Creek

Table 2 summarizes the results for each project outfall individually. In order to determine if project impacts exist compared to the overall watershed, a different type of analysis is warranted. Since the project is situated at the downstream end of the Horse Ranch Creek watershed, the peak of the project's runoff will occur within the rising limb of the overall watershed's hydrograph. Therefore, detention of peak onsite flows is not warranted due to the effects of delaying of the peak flows in relation to the overall watershed. Since the time of concentration of the onsite flows is so much smaller than the time of concentration of the Horse Ranch Creek watershed, no detention is required.

Table 3 below summarizes the results described above in Sections 3.5 and 3.6 with respect to the project's impacts on discharge velocities, concentration of flows, and increased quantities of flows.

Table 3: Project Impacts Summary

	Summary of Potential Project-Related Drainage Impacts		
Outfall of Interest	***a. Increased velocity of discharge***	***b. concentration of flows***	***c. increased quantities of flows***
Outfall #1	Energy dissipators proposed	Concentration points roughly mimic existing conditions	Peak flows actually decrease
Outfall #2	Energy dissipators proposed	Concentration points roughly mimic existing conditions	Peak flows increase
Outfall #3	Energy dissipators proposed	Concentration points roughly mimic existing conditions	Peak flows increase, but are still less than capacity of existing 72" culvert in SR76. Drainage area to sump decreases.
Outfall #4	Energy dissipators proposed	Concentration points roughly mimic existing conditions	Peak flows increase
Combined Outfalls	See above	See above	Compared with Horse Ranch Creek, increase in flows are insignificant

3.7 Water Quality Basin Sizing

Table 4 summarizes the basin volumes required and the proposed basin volumes per the tentative map. The water quality volume for each basin was sized according to County of San Diego criteria using the 85th percentile rainfall depth of 0.83 inches. All basins are proposed for water quality and hydromodification purposes, since attenuation of 100-year flows is not warranted. Refer to the Preliminary Storm Water Management Plan for further information regarding the post-construction BMPs selected for this project.

Table 4: Water Quality Basin Summary

Basin #	Type of Basin	System	Drainage Area (AC)	C(WQ)	WQ Vol (AF)	Proposed Basin Volume (Minimum to also address Hydromod Volume) (AF)
1	WQ/Hydromod	1000	21.46	0.63	0.93	2
2	WQ/Hydromod	2000	14.78	0.62	0.63	1.3
3	WQ/Hydromod	2000	47.64	0.86	2.83	7.4
4	WQ/Hydromod	3000	5.93	0.86	0.35	1.4

3.8 Hydromodification Analysis

It is anticipated that the water quality basins will address hydromodification requirements, since both water quality basins and hydromodification basins produce similar alterations to the flow regime for the smaller, more frequent storm events. 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. Although the project will comply with the hydromodification requirements, there are existing erosion problems downstream of the project in the San Luis Rey River, which are documented in previous studies. For example, FEMA classified the San Luis Rey River in the vicinity of the project as an *approximate* special flood hazard area (Zone A) due to "possible erosion/sedimentation hazards". (Refer to the FEMA FIRM panel in Appendix 6). The majority of all onsite water will be treated with water quality/hydromodification basins, which will detain the smaller, more frequent events and therefore will mitigate the post-development onsite flows.

4. HYDRAULIC CRITERIA, METHODOLOGY, AND RESULTS

Hydraulic calculations for pipes, inlets, and ditches will be performed during final engineering. However, hydraulic calculations for the floodplain areas are necessary for the TM stage. The floodplain work for this project includes three floodplain analyses: onsite floodplain delineation for drainage areas greater than 25 acres, Horse Ranch creek floodplain analysis, and San Luis Rey River floodplain analysis. Each task is discussed below.

4.1 Onsite Floodplain Delineation

The County requires limits of flooding be delineated for any area within the site perimeter that has a tributary area of greater than 25 acres. This was performed for both existing and proposed conditions by performing normal depth calculations at key cross sections along the onsite channels. The limits of flooding for the 100-year storm are shown on Exhibit A-2 and Exhibit B (Appendix 13). For the sump area near Outfall #3, the elevation corresponding to the headwater elevation for the existing 72-inch culvert is included on the inundation limits. See Appendices 9 and 10 for floodplain calculations and further documentation.

4.2 Horse Ranch Creek Floodplain Delineation

The hydraulics of the SR 76 Horse Creek Ranch bridge was modeled previously for the Caltrans SR 76 widening project. The results are in the URS study entitled *FEMA Letter of Map Revision (LOMR) – Follow up to CLOMR #05-09-1045R State Route 76 Widening And Realignment from Interstate 15 to 3.9 KM East, San Diego County*, dated August 26, 2011. This LOMR report was an update to the previous CLOMR report, entitled *Hydraulic and Scour Report – State Route 76 Widening and Realignment from Interstate 15 to 2.2km East*, dated March 25, 2005 (herein referred to as the "URS Hydraulic Report"). The URS Hydraulic Report was based on a peak Horse Ranch Creek flow rate of 6405 cfs using the County 1993 NRCS methodology. The 2003 Hydrology Manual methodology was not used for the analysis of the bridge because the original bridge design was based upon the 1993 County methodology, and so the use of the original bridge design hydrology criteria and methodology was considered appropriate for that project. However, the Horse Ranch Creek design flow rate was developed for this project using the County 2003 NRCS methodology in order to model the proposed Pankey Road bridge, and to delineate the floodplain through the project limits. The Campus Park West Horse Ranch Creek Floodplain Study, submitted under a separate cover, documents the hydrologic and hydraulic modeling of the Horse Ranch Creek watershed through the limits of the project. The delineation of the existing and proposed condition floodplains for Horse Ranch Creek are included in the flood study and are shown on the exhibits in this study for reference only. The project team plans on submitting to FEMA a CLOMR application during final engineering and a LOMR after site construction for the portion of Horse Ranch Creek within the FEMA special flood hazard

area (south of SR 76 only).

4.3 San Luis Rey River Floodplain Delineation

The parcel to the southeast of the SR 76/Pankey Road intersection is partially within the current San Luis Rey River 100-year floodplain limits (designated as a FEMA Zone A). The area will be filled to remove the building pad area from the floodplain as a part of the project improvements. A copy of a portion of the FEMA FIRM Panel is included in Appendix 6. The recent SR 76 widening and realignment project modified the limits of the San Luis Rey floodplain, and these revisions were approved by FEMA per LOMR Case #12-09-0511P. The hydraulic calculations to support the LOMR are located in the URS Hydraulic Report.

Note that the URS Hydraulic Report modeled the San Luis Rey River and a small portion of Horse Ranch Creek with detailed hydraulic methods, however, the floodplain is designated as approximate due to concerns about existing sedimentation hazards in the San Luis Rey River. Floodplain calculations to show the post-project floodplain modifications for the Campus Park West project are included in the San Luis Rey River Floodplain Study, submitted under a separate cover by Chang Consultants. The project team plans on submitting to FEMA a CLOMR application during final engineering and a LOMR after site construction to revise the floodplain limits in the San Luis Rey River.

5. 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 Horse Ranch Creek or San Luis Rey River, but does proposes to raise a portion of the site east of Pankey Road and south of SR 76 above the floodplain elevation. Development of the project will not result in substantial erosion of 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 substantially increase the rate or amount of surface runoff in a manner which would result in any substantial increase of flooding on- or off-site.

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

The capacity of the existing 72-inch culvert underneath SR 76 will not be exceeded with the proposed project flow rates. The hydraulic modeling for the project's proposed widening of the recently widened Caltrans SR 76 Horse Ranch Creek bridge indicates that peak existing condition flows exceed the bridge capacity. Since the proposed project proposes to not significantly increase peak flows to the creek, the capacity will not be substantially affected. The hydraulic modeling for the proposed North Pankey Bridge indicates that the bridge will be large enough to convey the peak 100-year flow in Horse Ranch 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 Horse Ranch Creek (in the Horse Ranch Creek Floodplain Study) shows that the proposed multi-family 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 area southeast of the SR 76/Pankey Road intersection is currently partially within the 100-year flood limits. The Campus Park West San Luis Rey Floodplain Study indicates that the proposed grading will raise the pad out of the floodplain and will not significantly impede flood flows.

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?**

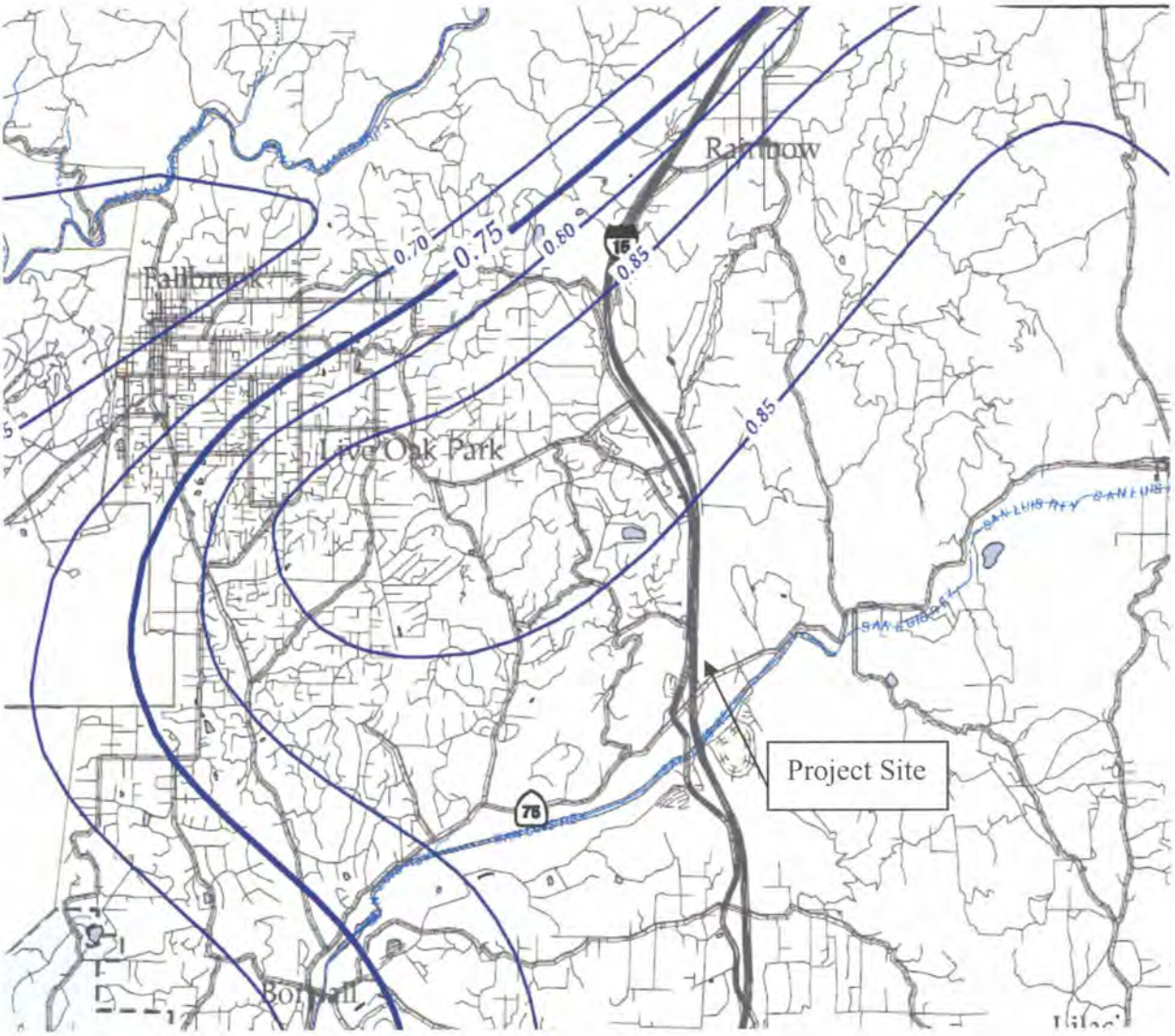
There are no dams or levees within or near the project site. The onsite basins may be designed with small berms, but will be designed adequately to reduce the potential for subsurface piping.

6. CONCLUSION

This drainage report has been prepared in support of the preliminary design of the storm drain improvements for the tentative map for the Campus Park West 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 issues regarding comparing the post-project flows to the pre-project flows. The hydrology results indicate that the peak flow from the developed site do not exceed the capacity of existing storm water drainage systems. 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



85th Percentile Rainfall Depth = 0.83 inches per 85th Percentile Rainfall Isopluvial Map in San Diego County 2003 Hydrology Manual

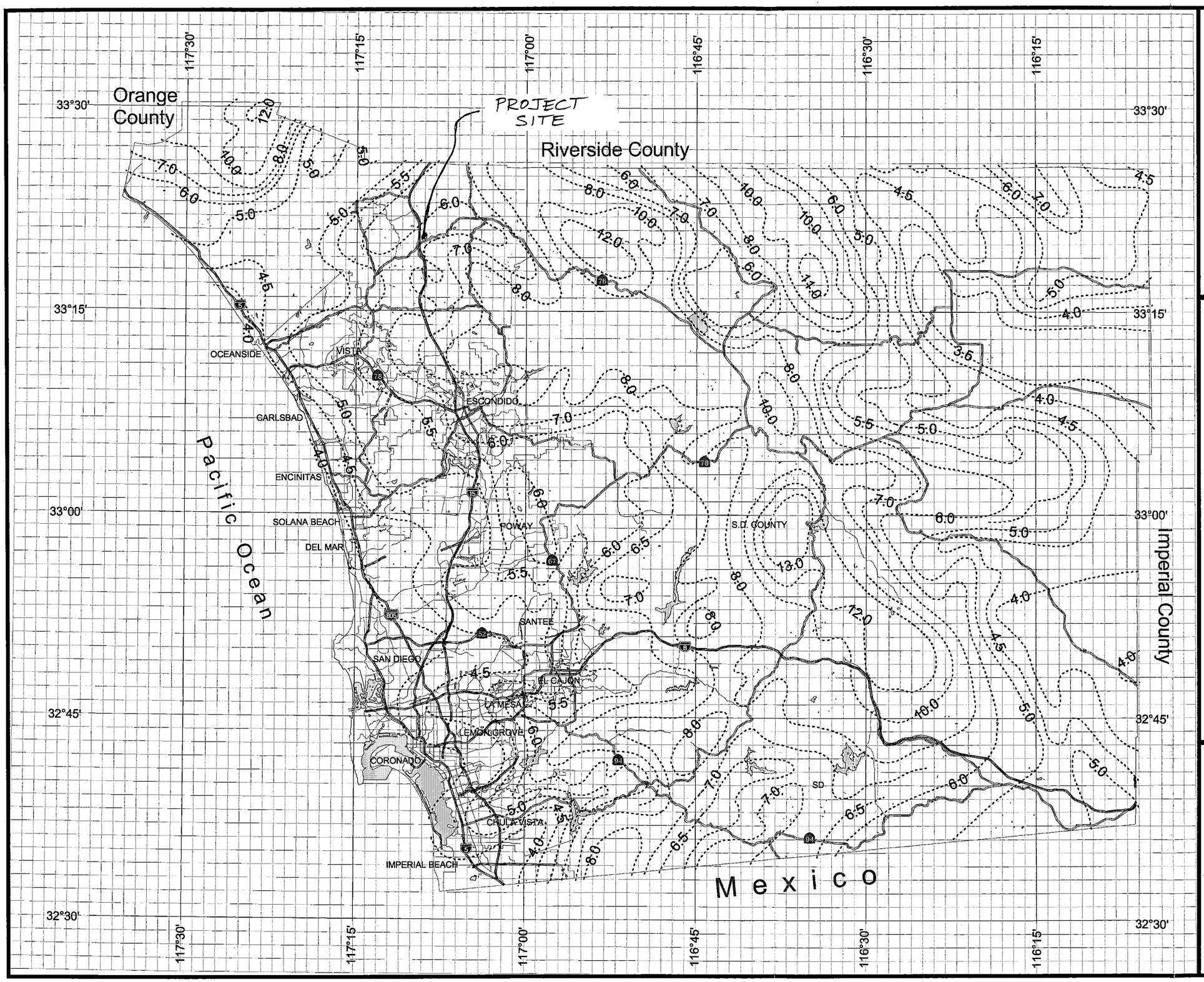
(FOR WATER QUALITY TREATMENT VOLUME CRITERIA)

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)



DPW GIS
Department of Public Works Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

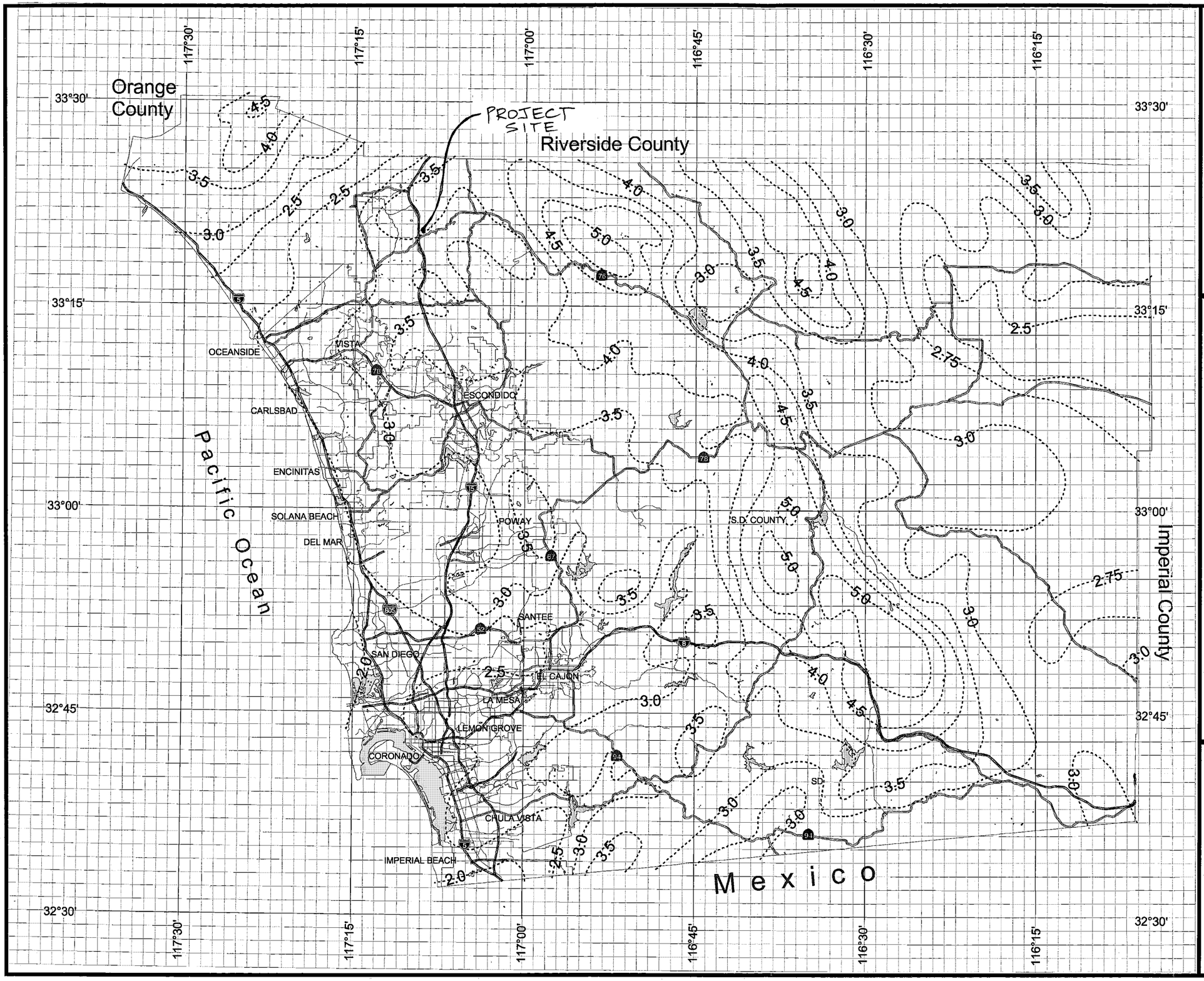
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



DPW GIS
Department of Public Works Geographical Information Services

SanGIS
We Have San Diego Covered!

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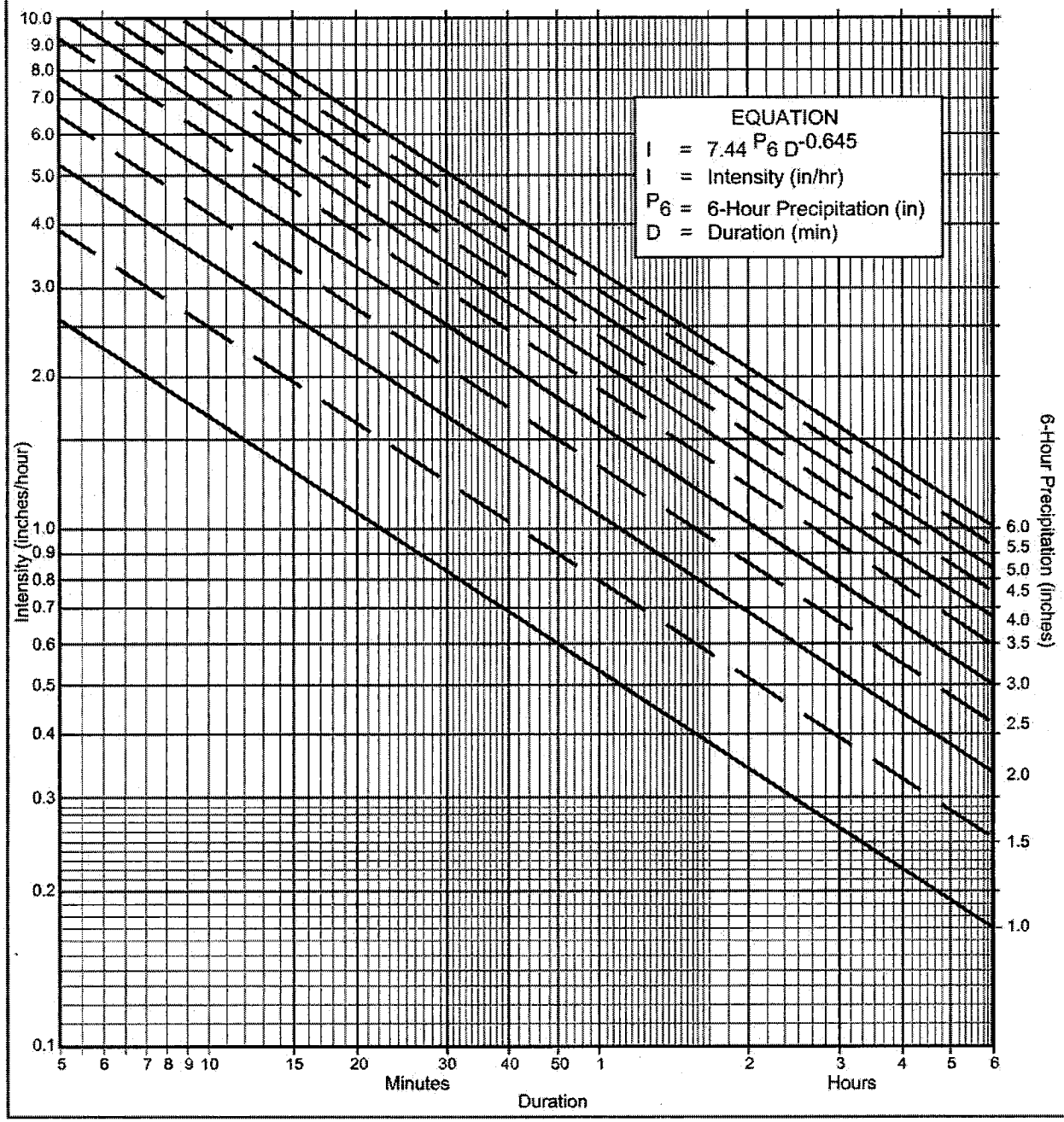


Directions for Application:

(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 applicaple 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 = 3.5 in., P_{24} = 6.0, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 3.5 in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

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

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
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	2.39	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

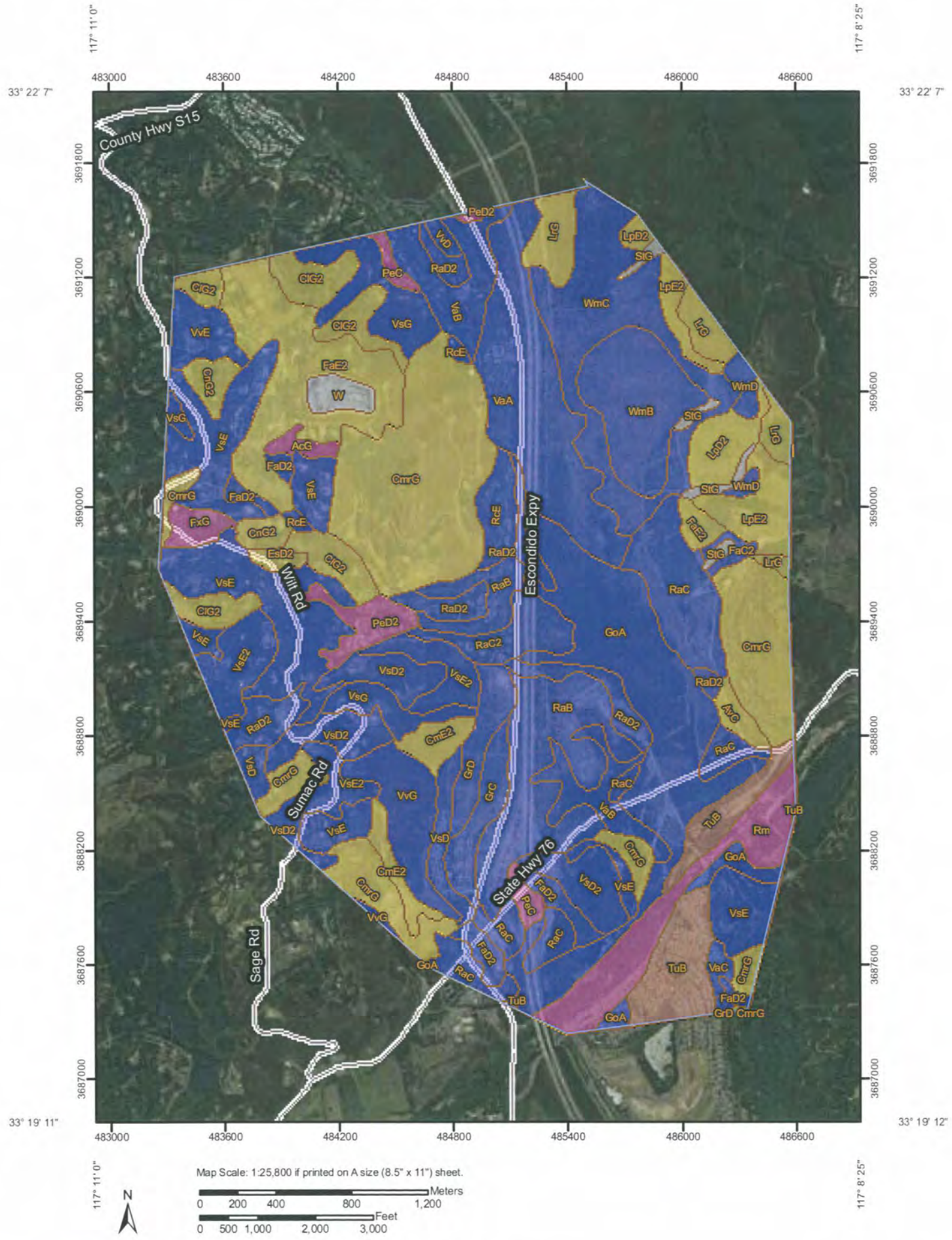
Intensity-Duration Design Chart - Template

FIGURE
3-1

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	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, Cp, 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


117° 11' 0"
117° 8' 25"
483000
483600
484200
484800
485400
486000
486600
33° 22' 7"
33° 19' 11"
33° 19' 12"
3691800
3691200
3690600
3690000
3689400
3688800
3688200
3687600
3687000
County Hwy S15
Escondido Expy
Witt Rd
Sumac Rd
State Hwy 76
Sage Rd
PeD2
VvD
LrG
LpD2
StG
PeC
RaD2
ClG2
WmC
LpE2
CrG2
VaB
VvE
VsG
RcE
FaE2
W
VaA
WmD
WmB
AcG
FaD2
CmrG
VsE
FxG
EsD2
RaB
RaC
GoA
VsE2
VsD2
CmE2
GrD
GrC
VvG
VsD
PoC
TuB
Rm
VaC
FaD2
GrD
CmrG
Map Scale: 1:25,800 if printed on A size (8.5" x 11") sheet.
N
Meters
0 200 400 800 1,200
Feet
0 500 1,000 2,000 3,000

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AcG	Acid igneous rock land	D	8.5	0.3%
AvC	Arlington coarse sandy loam, 2 to 9 percent slopes	C	11.4	0.4%
ClG2	Cieneba coarse sandy loam, 30 to 65 percent slopes, ero ded	C	86.6	3.0%
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded	C	31.2	1.1%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	C	341.8	11.9%
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent s lopes, eroded	C	23.9	0.8%
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded	C	6.7	0.2%
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	B	7.1	0.2%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	B	35.7	1.2%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	136.7	4.8%
FxG	Friant rocky fine sandy loam, 30 to 70 percent slopes	D	14.0	0.5%
GoA	Grangeville fine sandy loam, 0 to 2 percent slopes	B	228.8	8.0%
GrC	Greenfield sandy loam, 5 to 9 percent slopes	B	30.5	1.1%
GrD	Greenfield sandy loam, 9 to 15 percent slopes	B	32.4	1.1%
LpD2	Las Posas fine sandy loam, 9 to 15 percent slopes, erod ed	C	34.5	1.2%
LpE2	Las Posas fine sandy loam, 15 to 30 percent slopes, ero ded	C	52.5	1.8%
LrG	Las Posas stony fine sandy loam, 30 to 65 percent slope s	C	54.1	1.9%
PeC	Placentia sandy loam, 2 to 9 percent slopes	D	15.1	0.5%
PeD2	Placentia sandy loam, 9 to 15 percent slopes, eroded	D	26.1	0.9%
RaB	Ramona sandy loam, 2 to 5 percent slopes	B	146.4	5.1%
RaC	Ramona sandy loam, 5 to 9 percent slopes	B	123.1	4.3%

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	B	35.4	1.2%
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	B	77.7	2.7%
RcE	Ramona gravelly sandy loam, 15 to 30 percent slopes	B	28.6	1.0%
Rm	Riverwash	D	79.2	2.8%
StG	Steep gullied land		13.8	0.5%
TuB	Tujunga sand, 0 to 5 percent slopes	A	81.7	2.8%
VaA	Visalia sandy loam, 0 to 2 percent slopes	B	150.1	5.2%
VaB	Visalia sandy loam, 2 to 5 percent slopes	B	84.4	2.9%
VaC	Visalia sandy loam, 5 to 9 percent slopes	B	6.7	0.2%
VsD	Vista coarse sandy loam, 9 to 15 percent slopes	B	29.6	1.0%
VsD2	Vista coarse sandy loam, 9 to 15 percent slopes, eroded	B	97.8	3.4%
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	242.7	8.5%
VsE2	Vista coarse sandy loam, 15 to 30 percent slopes, erode d	B	80.2	2.8%
VsG	Vista coarse sandy loam, 30 to 65 percent slopes	B	71.5	2.5%
VvD	Vista rocky coarse sandy loam, 5 to 15 percent slopes	B	5.0	0.2%
VvE	Vista rocky coarse sandy loam, 15 to 30 percent slopes	B	26.5	0.9%
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes	B	54.9	1.9%
W	Water		14.8	0.5%
WmB	Wyman loam, 2 to 5 percent slopes	B	86.8	3.0%
WmC	Wyman loam, 5 to 9 percent slopes	B	143.9	5.0%
WmD	Wyman loam, 9 to 15 percent slopes	B	13.6	0.5%
Totals for Area of Interest			**2,871.9**	**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: Lower

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

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

Political Features

- Cities

Water Features

- Oceans
- Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:25,800 if printed on A size (8.5" × 11") sheet.

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

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 6, Dec 17, 2007

Date(s) aerial images were photographed: 6/7/2005

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.

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 107-108

Total acreage= 22.99

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	18.13	2.62	2.24	0.27	0.32	0.36	0.41	0.00	5.80	0.94	0.92	
													0.33

Node 108-120

Total acreage= 32.10

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.
Low Density Resid, 1du/ac or less	0	14.51	0	7.25	0.27	0.32	0.36	0.41	0.00	4.64	0.00	2.97	
Low Density Resid, 2du/ac or less	0	3.31	0	5.07	0.34	0.38	0.42	0.46	0.00	1.26	0.00	2.33	
Low Density Resid, 6du/ac or less	0	0	0.14	1.82	0.48	0.51	0.54	0.57	0.00	0.00	0.08	1.04	
													0.38

Node 115-120

Total acreage= 62.54

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	33.67	0	0.7	0.27	0.32	0.36	0.41	0.00	10.77	0.00	0.29	
Low Density Resid, 2du/ac or less	0	23.3	0	4.34	0.34	0.38	0.42	0.46	0.00	8.85	0.00	2.00	
Low Density Resid, 6du/ac or less	0	0.5	0	0.03	0.48	0.51	0.54	0.57	0.00	0.26	0.00	0.02	
													0.35

Node 120-121

Total acreage= 97.10

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.
Low Density Resid, 1du/ac or less	0	56.47	1.11	0	0.27	0.32	0.36	0.41	0.00	18.07	0.40	0.00	
Low Density Resid, 2du/ac or less	0	19.69	0	0	0.34	0.38	0.42	0.46	0.00	7.48	0.00	0.00	
Low Density Resid, 6du/ac or less	0	18.33	0	1.5	0.48	0.51	0.54	0.57	0.00	9.35	0.00	0.86	**0.37**

Node 304-305

Total acreage= 8.47

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	7.35	1.12	0	0.27	0.32	0.36	0.41	0.00	2.35	0.40	0.00	
													0.33

Node 341-355

Total acreage= 11.73

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	8.13	3.6	0	0.27	0.32	0.36	0.41	0.00	2.60	1.30	0.00	
													0.33

PROPOSED OFFSITE CONDITIONS

Node 120-121

Total acreage= 97.10

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.
Low Density Resid, 1du/ac or less	0	56.47	1.11	0	0.27	0.32	0.36	0.41	0.00	18.07	0.40	0.00	
Low Density Resid, 2du/ac or less	0	19.69	0	0	0.34	0.38	0.42	0.46	0.00	7.48	0.00	0.00	
Low Density Resid, 6du/ac or less	0	18.33	0	1.5	0.48	0.51	0.54	0.57	0.00	9.35	0.00	0.86	**0.37**

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 1982-2010 Advanced Engineering Software (aes)
            Ver. 17.0 Release Date: 07/01/2010  License ID 1509

                          Analysis prepared by:



 ************************** DESCRIPTION OF STUDY **************************
* PDC JOB 3631 CAMPUS PARK WEST                                           *
* EXISTING CONDITIONS                                                     *
* SYSTEM 100, FILE: S100E100                                              *
 *************************************************************************

  FILE NAME: S100E100.DAT
  TIME/DATE OF STUDY: 11:38 07/06/2012
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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    100.00 TO NODE    101.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   114.00
  UPSTREAM ELEVATION(FEET) =    299.00
  DOWNSTREAM ELEVATION(FEET) =    298.40
```

```
 ELEVATION DIFFERENCE(FEET) =      0.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.645
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.53
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.80
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  298.40  DOWNSTREAM ELEVATION(FEET) =  296.00
 STREET LENGTH(FEET) =   461.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.60
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   12.07
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
 STREET FLOW TRAVEL TIME(MIN.) =   4.42   Tc(MIN.) =    8.06
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.776
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    3.54
 TOTAL AREA(ACRES) =       0.7        PEAK FLOW RATE(CFS) =       4.13

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.73
 FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     575.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    101.50 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.776
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5270
```

```
 SUBAREA AREA(ACRES) =     1.16   SUBAREA RUNOFF(CFS) =     2.52
 TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       6.64
 TC(MIN.) =    8.06

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   292.00  DOWNSTREAM(FEET) =   289.00
 FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.42
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.64
 PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =    8.76
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     845.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.422
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6363
 SUBAREA AREA(ACRES) =    0.87   SUBAREA RUNOFF(CFS) =    4.86
 TOTAL AREA(ACRES) =       2.7   TOTAL RUNOFF(CFS) =      11.15
 TC(MIN.) =    8.76

****************************************************************************
 FLOW PROCESS FROM NODE    103.50 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.422
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5605
 SUBAREA AREA(ACRES) =    0.86   SUBAREA RUNOFF(CFS) =    1.77
 TOTAL AREA(ACRES) =       3.6   TOTAL RUNOFF(CFS) =      12.92
 TC(MIN.) =    8.76

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    289.00  DOWNSTREAM(FEET) =    277.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   716.00   CHANNEL SLOPE =  0.0158
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.910
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
```

```
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.46
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.64
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   4.52
 Tc(MIN.) =   13.28
 SUBAREA AREA(ACRES) =     8.11       SUBAREA RUNOFF(CFS) =   12.74
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.394
 TOTAL AREA(ACRES) =       11.7         PEAK FLOW RATE(CFS) =      22.62

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   2.82
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    1561.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    190.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    880.00
 DOWNSTREAM ELEVATION(FEET) =    850.00
 ELEVATION DIFFERENCE(FEET) =     30.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.517
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.773
 SUBAREA RUNOFF(CFS) =      0.25
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    850.00  DOWNSTREAM(FEET) =    490.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1448.00   CHANNEL SLOPE =  0.2486
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.790
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3300
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.81
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
 AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   3.77
 Tc(MIN.) =   10.29
 SUBAREA AREA(ACRES) =    22.99       SUBAREA RUNOFF(CFS) =   43.93
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.330
 TOTAL AREA(ACRES) =       23.1         PEAK FLOW RATE(CFS) =      44.11

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   8.48
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    108.00 =    1548.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    339.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1773.00   CHANNEL SLOPE =  0.0852
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.680
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      72.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.35
 AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   4.02
 Tc(MIN.) =   14.31
 SUBAREA AREA(ACRES) =    32.10       SUBAREA RUNOFF(CFS) =   57.09
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.359
 TOTAL AREA(ACRES) =       55.2         PEAK FLOW RATE(CFS) =      92.74

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.44   FLOW VELOCITY(FEET/SEC.) =   8.05
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    120.00 =    3321.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.31
 RAINFALL INTENSITY(INCH/HR) =   4.68
 TOTAL STREAM AREA(ACRES) =    55.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     92.74

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 UPSTREAM ELEVATION(FEET) =    840.00
 DOWNSTREAM ELEVATION(FEET) =    795.00
 ELEVATION DIFFERENCE(FEET) =     45.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.517
 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) =  7.773
 SUBAREA RUNOFF(CFS) =      0.80
```

```
 TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    795.00  DOWNSTREAM(FEET) =    630.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1130.00   CHANNEL SLOPE =  0.1460
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.371
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.74
 AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   5.04
 Tc(MIN.) =   11.56
 SUBAREA AREA(ACRES) =     8.58       SUBAREA RUNOFF(CFS) =   14.75
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
 TOTAL AREA(ACRES) =        8.9         PEAK FLOW RATE(CFS) =      15.30

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   4.75
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    115.00 =    1385.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    339.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1609.00   CHANNEL SLOPE =  0.1809
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.630
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      66.04
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.96
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   2.99
 Tc(MIN.) =   14.55
 SUBAREA AREA(ACRES) =    62.54       SUBAREA RUNOFF(CFS) =  101.34
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.346
 TOTAL AREA(ACRES) =       71.4         PEAK FLOW RATE(CFS) =     114.53

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =  10.94
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    120.00 =    2994.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.55
 RAINFALL INTENSITY(INCH/HR) =   4.63
 TOTAL STREAM AREA(ACRES) =    71.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    114.53

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1        92.74    14.31        4.680         55.19
    2       114.53    14.55        4.630         71.44

 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       205.38    14.31        4.680
    2       206.28    14.55        4.630

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     206.28   Tc(MIN.) =   14.55
 TOTAL AREA(ACRES) =      126.6
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    120.00 =    3321.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    339.00  DOWNSTREAM(FEET) =    286.92
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1911.00   CHANNEL SLOPE =  0.0273
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.983
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3700
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     277.92
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.33
 AVERAGE FLOW DEPTH(FEET) =   1.17   TRAVEL TIME(MIN.) =   3.82
 Tc(MIN.) =   18.37
 SUBAREA AREA(ACRES) =    97.10       SUBAREA RUNOFF(CFS) =  143.10
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.360
 TOTAL AREA(ACRES) =      223.7         PEAK FLOW RATE(CFS) =     320.56

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.27   FLOW VELOCITY(FEET/SEC.) =   8.75
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    121.00 =    5232.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
 TIME OF CONCENTRATION(MIN.) =   18.37
 RAINFALL INTENSITY(INCH/HR) =   3.98
 TOTAL STREAM AREA(ACRES) =   223.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    320.56

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    310.80
 DOWNSTREAM ELEVATION(FEET) =    310.30
 ELEVATION DIFFERENCE(FEET) =      0.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.412
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    54.29
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.96
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    109.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  310.30  DOWNSTREAM ELEVATION(FEET) =  309.00
 STREET LENGTH(FEET) =   625.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.10
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.56
   HALFSTREET FLOOD WIDTH(FEET) =   22.15
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.55
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
 STREET FLOW TRAVEL TIME(MIN.) =   6.71   Tc(MIN.) =   10.13
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.850
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    2.32      SUBAREA RUNOFF(CFS) =   11.81
 TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =      12.42
```

```
 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.65  HALFSTREET FLOOD WIDTH(FEET) =  27.54
 FLOW VELOCITY(FEET/SEC.) =  1.78  DEPTH*VELOCITY(FT*FT/SEC.) =  1.17
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  625.0 FT WITH ELEVATION-DROP =  1.3 FT, IS  18.6 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE  109.00
 LONGEST FLOWPATH FROM NODE  119.00 TO NODE  109.00 =  695.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  109.00 TO NODE  121.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  305.70  DOWNSTREAM(FEET) =  299.30
 FLOW LENGTH(FEET) =  69.00  MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  7.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.65
 ESTIMATED PIPE DIAMETER(INCH) =  18.00  NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  12.42
 PIPE TRAVEL TIME(MIN.) =  0.07  Tc(MIN.) =  10.19
 LONGEST FLOWPATH FROM NODE  119.00 TO NODE  121.00 =  764.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  109.00 TO NODE  121.00 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.19
 RAINFALL INTENSITY(INCH/HR) =  5.82
 TOTAL STREAM AREA(ACRES) =  2.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =  12.42

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       320.56   18.37       3.983        223.73
    2        12.42   10.19       5.824          2.44

 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       231.64   10.19       5.824
    2       329.06   18.37       3.983

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =  329.06  Tc(MIN.) =  18.37
 TOTAL AREA(ACRES) =  226.2
 LONGEST FLOWPATH FROM NODE  106.00 TO NODE  121.00 =  5232.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  121.00 TO NODE  124.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   286.92  DOWNSTREAM(FEET) =   284.50
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.18
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     329.06
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   18.57
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    124.00 =    5432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    124.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.57
  RAINFALL INTENSITY(INCH/HR) =   3.96
  TOTAL STREAM AREA(ACRES) =   226.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    329.06

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   127.00
  UPSTREAM ELEVATION(FEET) =    295.00
  DOWNSTREAM ELEVATION(FEET) =    294.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.347
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    55.75
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      1.44

****************************************************************************
  FLOW PROCESS FROM NODE    122.50 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  294.00  DOWNSTREAM ELEVATION(FEET) =  293.00
  STREET LENGTH(FEET) =   255.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.91
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   13.48
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.60
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
 STREET FLOW TRAVEL TIME(MIN.) =   2.65   Tc(MIN.) =    6.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.199
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.41      SUBAREA RUNOFF(CFS) =    2.92
 TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       4.21

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.74
 FLOW VELOCITY(FEET/SEC.) =  1.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.78
 LONGEST FLOWPATH FROM NODE    122.00 TO NODE    124.00 =     382.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.199
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5622
 SUBAREA AREA(ACRES) =    0.75   SUBAREA RUNOFF(CFS) =    1.97
 TOTAL AREA(ACRES) =       1.3   TOTAL RUNOFF(CFS) =       6.18
 TC(MIN.) =    6.00

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 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.) =    6.00
 RAINFALL INTENSITY(INCH/HR) =   8.20
 TOTAL STREAM AREA(ACRES) =     1.34
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.18

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1      329.06    18.57        3.956        226.17
    2        6.18     6.00        8.199          1.34

 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       164.95      6.00       8.199
    2       332.04     18.57       3.956

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     332.04   Tc(MIN.) =   18.57
 TOTAL AREA(ACRES) =      227.5
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    124.00 =    5432.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    124.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   284.50  DOWNSTREAM(FEET) =   283.05
 FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.65
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     332.04
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   18.65
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    135.00 =    5528.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    124.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.65
 RAINFALL INTENSITY(INCH/HR) =   3.94
 TOTAL STREAM AREA(ACRES) =   227.51
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    332.04

****************************************************************************
 FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    297.90
 DOWNSTREAM ELEVATION(FEET) =    295.90
 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) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.96
```

```
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  295.90  DOWNSTREAM ELEVATION(FEET) =  294.20
 STREET LENGTH(FEET) =   432.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.89
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   13.48
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.59
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
 STREET FLOW TRAVEL TIME(MIN.) =   4.53   Tc(MIN.) =    7.28
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.237
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    3.78
 TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       4.53

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.29
 FLOW VELOCITY(FEET/SEC.) =  1.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.80
 LONGEST FLOWPATH FROM NODE    126.00 TO NODE    128.00 =     532.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    127.50 TO NODE    128.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.237
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5876
 SUBAREA AREA(ACRES) =    0.76   SUBAREA RUNOFF(CFS) =    1.76
 TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       6.29
 TC(MIN.) =    7.28

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   292.66  DOWNSTREAM(FEET) =   291.51
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.71
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.29
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    7.50
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    130.00 =     621.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.099
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4907
  SUBAREA AREA(ACRES) =    0.84   SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =       2.3   TOTAL RUNOFF(CFS) =      8.08
  TC(MIN.) =    7.50

****************************************************************************
  FLOW PROCESS FROM NODE    129.30 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.099
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5915
  SUBAREA AREA(ACRES) =    0.84   SUBAREA RUNOFF(CFS) =    5.19
  TOTAL AREA(ACRES) =       3.2   TOTAL RUNOFF(CFS) =     13.27
  TC(MIN.) =    7.50

****************************************************************************
  FLOW PROCESS FROM NODE    129.50 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.099
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5406
  SUBAREA AREA(ACRES) =    0.73   SUBAREA RUNOFF(CFS) =    1.66
  TOTAL AREA(ACRES) =       3.9   TOTAL RUNOFF(CFS) =     14.93
  TC(MIN.) =    7.50

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   291.51  DOWNSTREAM(FEET) =   281.10
```

```
 FLOW LENGTH(FEET) =   402.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.56
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.93
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    8.14
 LONGEST FLOWPATH FROM NODE    126.00 TO NODE    135.00 =    1023.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.736
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5163
 SUBAREA AREA(ACRES) =    0.48   SUBAREA RUNOFF(CFS) =    1.03
 TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =      15.20
 TC(MIN.) =    8.14

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 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.) =    8.14
 RAINFALL INTENSITY(INCH/HR) =   6.74
 TOTAL STREAM AREA(ACRES) =     4.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.20

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      332.04    18.65        3.944        227.51
     2       15.20     8.14        6.736          4.37

 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      209.62     8.14       6.736
     2      340.94    18.65       3.944

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     340.94   Tc(MIN.) =   18.65
 TOTAL AREA(ACRES) =      231.9
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    135.00 =    5528.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   281.10  DOWNSTREAM(FEET) =   280.50
  FLOW LENGTH(FEET) =    92.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.74
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     340.94
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   18.77
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    140.00 =    5620.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.77
  RAINFALL INTENSITY(INCH/HR) =   3.93
  TOTAL STREAM AREA(ACRES) =   231.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    340.94

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   128.30
  UPSTREAM ELEVATION(FEET) =    295.20
  DOWNSTREAM ELEVATION(FEET) =    293.70
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.087
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    61.69
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.36
  TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      1.36

****************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  293.70  DOWNSTREAM ELEVATION(FEET) =  292.80
  STREET LENGTH(FEET) =   280.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
```

```
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.87
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   14.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.47
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
 STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =    6.26
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.978
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.43      SUBAREA RUNOFF(CFS) =    2.98
 TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       4.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.37
 FLOW VELOCITY(FEET/SEC.) =  1.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
 LONGEST FLOWPATH FROM NODE    136.00 TO NODE    140.00 =     408.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    138.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.978
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6567
 SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.97
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       5.13
 TC(MIN.) =    6.26

****************************************************************************
 FLOW PROCESS FROM NODE    138.00 TO NODE    140.00 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.) =    6.26
 RAINFALL INTENSITY(INCH/HR) =   7.98
 TOTAL STREAM AREA(ACRES) =     0.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.13

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       340.94    18.77       3.929        231.88
    2         5.13     6.26       7.978          0.98

 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        173.06      6.26       7.978
    2        343.46     18.77       3.929

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     343.46   Tc(MIN.) =   18.77
 TOTAL AREA(ACRES) =      232.9
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    140.00 =    5620.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   280.50  DOWNSTREAM(FEET) =   280.00
 FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.67
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     343.46
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   18.84
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    145.00 =    5684.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    280.00  DOWNSTREAM(FEET) =    268.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1044.00   CHANNEL SLOPE =  0.0109
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.606
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     355.96
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.69
 AVERAGE FLOW DEPTH(FEET) =   1.76   TRAVEL TIME(MIN.) =   2.60
 Tc(MIN.) =   21.44
 SUBAREA AREA(ACRES) =    21.65       SUBAREA RUNOFF(CFS) =   24.98
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.366
 TOTAL AREA(ACRES) =      254.5         PEAK FLOW RATE(CFS) =     343.46

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.72   FLOW VELOCITY(FEET/SEC.) =   6.62
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    150.00 =    6728.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    190.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY     AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
```

```
    1      343.46    21.44       3.606      254.51
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    190.00 =    6728.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY     AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
    1        22.62    13.28       4.910       11.70
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    190.00 =    1561.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)   (INCH/HOUR)
    1      235.43       13.28        4.910
    2      360.08       21.44        3.606

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     360.08   Tc(MIN.) =   21.44
 TOTAL AREA(ACRES) =      266.2

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    190.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    165.00 TO NODE    167.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    92.00
 UPSTREAM ELEVATION(FEET) =    300.00
 DOWNSTREAM ELEVATION(FEET) =    294.00
 ELEVATION DIFFERENCE(FEET) =      6.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.208
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.283
 SUBAREA RUNOFF(CFS) =      0.84
 TOTAL AREA(ACRES) =      0.36   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
 FLOW PROCESS FROM NODE    167.00 TO NODE    169.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    294.00  DOWNSTREAM(FEET) =    264.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   459.00   CHANNEL SLOPE =  0.0654
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.301
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.35
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.21
 AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   1.82
 Tc(MIN.) =    9.02
```

```
 SUBAREA AREA(ACRES) =     8.39       SUBAREA RUNOFF(CFS) =   16.92
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
 TOTAL AREA(ACRES) =        8.8         PEAK FLOW RATE(CFS) =      17.64

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   5.35
 LONGEST FLOWPATH FROM NODE    165.00 TO NODE    169.00 =     551.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    169.00 TO NODE    190.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1       17.64     9.02       6.301        8.75
 LONGEST FLOWPATH FROM NODE    165.00 TO NODE    190.00 =     551.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1      360.08    21.44       3.606      266.21
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    190.00 =    6728.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1     169.19       9.02       6.301
    2     370.17      21.44       3.606

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     370.17   Tc(MIN.) =   21.44
 TOTAL AREA(ACRES) =      275.0

****************************************************************************
 FLOW PROCESS FROM NODE    190.00 TO NODE    190.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.606
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3658
 SUBAREA AREA(ACRES) =    0.00   SUBAREA RUNOFF(CFS) =    0.00
 TOTAL AREA(ACRES) =      275.0   TOTAL RUNOFF(CFS) =    370.17
 TC(MIN.) =   21.44
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      275.0  TC(MIN.) =     21.44
 PEAK FLOW RATE(CFS)   =     370.17
============================================================================
============================================================================
 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 ID 1509

                          Analysis prepared by:



 ************************** DESCRIPTION OF STUDY **************************
* 3631 CAMPUS PARK WEST                                                   *
* EXISTING CONDITIONS                                                     *
* SYSTEM 200, FILE: S200E100                                              *
 *************************************************************************

  FILE NAME: S200E100.DAT
  TIME/DATE OF STUDY: 14:43 10/02/2012
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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    200.00 TO NODE    202.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    86.00
  UPSTREAM ELEVATION(FEET) =    320.00
  DOWNSTREAM ELEVATION(FEET) =    317.50
```

```
 ELEVATION DIFFERENCE(FEET) =      2.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.123
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.257
 SUBAREA RUNOFF(CFS) =      0.36
 TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
 FLOW PROCESS FROM NODE    202.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    317.50  DOWNSTREAM(FEET) =    273.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   993.00   CHANNEL SLOPE =  0.0448
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.655
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.92
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.12
 AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   5.31
 Tc(MIN.) =   14.43
 SUBAREA AREA(ACRES) =    13.79       SUBAREA RUNOFF(CFS) =   20.54
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
 TOTAL AREA(ACRES) =       14.0         PEAK FLOW RATE(CFS) =      20.81

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   4.03
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1079.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    273.00  DOWNSTREAM(FEET) =    258.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1140.00   CHANNEL SLOPE =  0.0126
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.761
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      36.79
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.36
 AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   5.65
 Tc(MIN.) =   20.08
 SUBAREA AREA(ACRES) =    26.38       SUBAREA RUNOFF(CFS) =   31.75
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
 TOTAL AREA(ACRES) =       40.3         PEAK FLOW RATE(CFS) =      48.57

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   3.73
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =    2219.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       40.3  TC(MIN.) =     20.08
```

PEAK FLOW RATE(CFS) = 48.57

==========

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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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            Ver. 2.0 Release Date: 06/01/2005  License ID 1509

                          Analysis prepared by:

                        Project Design Consultants
                              701 B Street
                               Suite 800
                            San Diego, Ca. 92101

 ************************* DESCRIPTION OF STUDY *************************
* PDC JOB 3631 CAMPUS PARK WEST                                         *
* EXISTING CONDITIONS                                                   *
* SYSTEM 300, FILE: S300E100                                            *
 *************************************************************************

  FILE NAME: S300E100.DAT
  TIME/DATE OF STUDY: 15:25 04/22/2010
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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    300.00 TO NODE    302.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    78.00
 UPSTREAM ELEVATION(FEET) =    424.00
 DOWNSTREAM ELEVATION(FEET) =    412.00
 ELEVATION DIFFERENCE(FEET) =     12.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.756
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.421
 SUBAREA RUNOFF(CFS) =      0.81
 TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.81

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    412.00  DOWNSTREAM(FEET) =    320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.1623
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.779
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.11
 AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   2.30
 Tc(MIN.) =   8.06
 SUBAREA AREA(ACRES) =     6.59       SUBAREA RUNOFF(CFS) =   14.30
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
 TOTAL AREA(ACRES) =      6.89         PEAK FLOW RATE(CFS) =      14.95

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   5.22
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =   645.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.779
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3300
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3255
 SUBAREA AREA(ACRES) =    8.47   SUBAREA RUNOFF(CFS) =   18.95
 TOTAL AREA(ACRES) =     15.36   TOTAL RUNOFF(CFS) =   33.90
 TC(MIN.) =   8.06

****************************************************************************
 FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   313.30  DOWNSTREAM(FEET) =   285.00
```

```
 FLOW LENGTH(FEET) =   204.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.38
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     33.90
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   8.20
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    306.00 =   849.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    305.00 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.) =   8.20
 RAINFALL INTENSITY(INCH/HR) =   6.70
 TOTAL STREAM AREA(ACRES) =    15.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.90

****************************************************************************
 FLOW PROCESS FROM NODE    305.20 TO NODE    305.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   127.00
 UPSTREAM ELEVATION(FEET) =    291.60
 DOWNSTREAM ELEVATION(FEET) =    290.00
 ELEVATION DIFFERENCE(FEET) =      1.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.033
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    62.60
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.44
 TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      1.44

****************************************************************************
 FLOW PROCESS FROM NODE    305.40 TO NODE    306.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  290.00  DOWNSTREAM ELEVATION(FEET) =  289.00
 STREET LENGTH(FEET) =   265.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

```
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.79
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   13.40
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.55
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
 STREET FLOW TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =   5.88
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.307
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =     0.37      SUBAREA RUNOFF(CFS) =     2.67
 TOTAL AREA(ACRES) =      0.55        PEAK FLOW RATE(CFS) =       3.97

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.51
 FLOW VELOCITY(FEET/SEC.) =  1.70   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
 LONGEST FLOWPATH FROM NODE    305.20 TO NODE    306.00 =   392.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    305.80 TO NODE    306.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.307
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5392
 SUBAREA AREA(ACRES) =     0.83   SUBAREA RUNOFF(CFS) =     2.21
 TOTAL AREA(ACRES) =      1.38   TOTAL RUNOFF(CFS) =     6.18
 TC(MIN.) =   5.88

****************************************************************************
 FLOW PROCESS FROM NODE    305.80 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   5.88
 RAINFALL INTENSITY(INCH/HR) =   8.31
 TOTAL STREAM AREA(ACRES) =     1.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.18

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        33.90      8.20         6.705         15.36
     2         6.18      5.88         8.307          1.38
```

```
 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        30.50     5.88       8.307
    2        38.89     8.20       6.705

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     38.89   Tc(MIN.) =    8.20
 TOTAL AREA(ACRES) =     16.74
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    306.00 =   849.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   285.00  DOWNSTREAM(FEET) =   283.00
 FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.56
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     38.89
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   8.32
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =   942.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    315.00 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.) =   8.32
 RAINFALL INTENSITY(INCH/HR) =   6.64
 TOTAL STREAM AREA(ACRES) =    16.74
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     38.89

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
 UPSTREAM ELEVATION(FEET) =    293.50
 DOWNSTREAM ELEVATION(FEET) =    293.10
 ELEVATION DIFFERENCE(FEET) =      0.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.688
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
          (Reference: Table 3-1B of Hydrology Manual)
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.96
TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    309.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  293.10  DOWNSTREAM ELEVATION(FEET) =  291.40
 STREET LENGTH(FEET) =   290.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.37
   HALFSTREET FLOOD WIDTH(FEET) =   11.37
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
 STREET FLOW TRAVEL TIME(MIN.) =   2.70   Tc(MIN.) =   6.39
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.872
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    2.88
 TOTAL AREA(ACRES) =      0.54        PEAK FLOW RATE(CFS) =       3.70

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.71
 FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.80
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    309.20 =   380.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    309.10 TO NODE    309.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.872
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5485
 SUBAREA AREA(ACRES) =    0.76   SUBAREA RUNOFF(CFS) =    1.91
 TOTAL AREA(ACRES) =      1.30   TOTAL RUNOFF(CFS) =    5.61
```

```
 TC(MIN.) =   6.39

****************************************************************************
 FLOW PROCESS FROM NODE    309.20 TO NODE    310.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  291.40  DOWNSTREAM ELEVATION(FEET) =  290.50
 STREET LENGTH(FEET) =   289.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.43
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.51
   HALFSTREET FLOOD WIDTH(FEET) =   19.65
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.77
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
 STREET FLOW TRAVEL TIME(MIN.) =   2.73   Tc(MIN.) =   9.12
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.259
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.609
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.63
 TOTAL AREA(ACRES) =      1.60        PEAK FLOW RATE(CFS) =       6.10

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.26
 FLOW VELOCITY(FEET/SEC.) =  1.74   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    310.00 =   669.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    309.50 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.259
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5443
 SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    0.92
 TOTAL AREA(ACRES) =      2.06   TOTAL RUNOFF(CFS) =    7.02
 TC(MIN.) =   9.12

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   286.00  DOWNSTREAM(FEET) =   285.37
  FLOW LENGTH(FEET) =   104.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.02
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   9.46
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    311.00 =   773.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.10 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5048
  SUBAREA AREA(ACRES) =     0.44   SUBAREA RUNOFF(CFS) =    0.86
  TOTAL AREA(ACRES) =      2.50   TOTAL RUNOFF(CFS) =    7.71
  TC(MIN.) =   9.46

****************************************************************************
  FLOW PROCESS FROM NODE    310.20 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5726
  SUBAREA AREA(ACRES) =     0.57   SUBAREA RUNOFF(CFS) =    3.03
  TOTAL AREA(ACRES) =      3.07   TOTAL RUNOFF(CFS) =   10.74
  TC(MIN.) =   9.46

****************************************************************************
  FLOW PROCESS FROM NODE    310.30 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5999
  SUBAREA AREA(ACRES) =     0.31   SUBAREA RUNOFF(CFS) =    1.65
  TOTAL AREA(ACRES) =      3.38   TOTAL RUNOFF(CFS) =   12.39
  TC(MIN.) =   9.46

****************************************************************************
  FLOW PROCESS FROM NODE    310.40 TO NODE    311.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5613
  SUBAREA AREA(ACRES) =     0.54   SUBAREA RUNOFF(CFS) =     1.06
  TOTAL AREA(ACRES) =       3.92   TOTAL RUNOFF(CFS) =    13.45
  TC(MIN.) =   9.46

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5415
  SUBAREA AREA(ACRES) =     0.35   SUBAREA RUNOFF(CFS) =     0.68
  TOTAL AREA(ACRES) =       4.27   TOTAL RUNOFF(CFS) =    14.13
  TC(MIN.) =   9.46

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   285.00  DOWNSTREAM(FEET) =   283.00
  FLOW LENGTH(FEET) =   417.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.52
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.13
  PIPE TRAVEL TIME(MIN.) =   1.26    Tc(MIN.) =  10.72
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    315.00 =  1190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.639
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5123
  SUBAREA AREA(ACRES) =     0.65   SUBAREA RUNOFF(CFS) =     1.17
  TOTAL AREA(ACRES) =       4.92   TOTAL RUNOFF(CFS) =    14.21
  TC(MIN.) =  10.72

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.72
  RAINFALL INTENSITY(INCH/HR) =   5.64
  TOTAL STREAM AREA(ACRES) =     4.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.21

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1        38.89      8.32         6.640          16.74
      2        14.21     10.72         5.639           4.92

  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        49.92      8.32         6.640
      2        47.23     10.72         5.639

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     49.92   Tc(MIN.) =    8.32
  TOTAL AREA(ACRES) =     21.66
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    315.00 =  1190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   283.00  DOWNSTREAM(FEET) =   281.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.04
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.92
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   8.55
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    315.50 =  1346.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.55
  RAINFALL INTENSITY(INCH/HR) =   6.52
  TOTAL STREAM AREA(ACRES) =    21.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.92
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    315.10 TO NODE    315.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   117.00
  UPSTREAM ELEVATION(FEET) =    291.30
  DOWNSTREAM ELEVATION(FEET) =    290.00
  ELEVATION DIFFERENCE(FEET) =      1.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.125
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    61.11
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      1.44

****************************************************************************
  FLOW PROCESS FROM NODE    315.20 TO NODE    315.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  290.00  DOWNSTREAM ELEVATION(FEET) =  288.00
  STREET LENGTH(FEET) =   439.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   4.22   Tc(MIN.) =   7.34
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.198
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.55      SUBAREA RUNOFF(CFS) =    3.44
  TOTAL AREA(ACRES) =      0.73        PEAK FLOW RATE(CFS) =       4.57
```

```
 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.82
 FLOW VELOCITY(FEET/SEC.) =  1.88   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
 LONGEST FLOWPATH FROM NODE    315.10 TO NODE    315.50 =   556.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.30 TO NODE    315.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.198
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5931
 SUBAREA AREA(ACRES) =     0.74   SUBAREA RUNOFF(CFS) =    1.70
 TOTAL AREA(ACRES) =       1.47   TOTAL RUNOFF(CFS) =    6.28
 TC(MIN.) =   7.34

****************************************************************************
 FLOW PROCESS FROM NODE    315.30 TO NODE    315.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.34
 RAINFALL INTENSITY(INCH/HR) =   7.20
 TOTAL STREAM AREA(ACRES) =     1.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.28

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        49.92      8.55        6.522          21.66
     2         6.28      7.34        7.198           1.47

 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        51.50      7.34        7.198
     2        55.60      8.55        6.522

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     55.60   Tc(MIN.) =    8.55
 TOTAL AREA(ACRES) =     23.13
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    315.50 =  1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.50 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) =   281.00  DOWNSTREAM(FEET) =   280.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.56
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     55.60
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   8.70
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    316.00 =  1441.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    335.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    280.00  DOWNSTREAM(FEET) =    274.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   278.00   CHANNEL SLOPE =  0.0216
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     55.60
  FLOW VELOCITY(FEET/SEC.) =   4.65   FLOW DEPTH(FEET) =   0.55
  TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   9.70
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    335.00 =  1719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    335.00 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.) =   9.70
  RAINFALL INTENSITY(INCH/HR) =   6.01
  TOTAL STREAM AREA(ACRES) =    23.13
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     55.60

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    322.00 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) =   267.00
  UPSTREAM ELEVATION(FEET) =    495.00
  DOWNSTREAM ELEVATION(FEET) =    410.00
  ELEVATION DIFFERENCE(FEET) =     85.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.183
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.041
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.37   TOTAL RUNOFF(CFS) =      1.07
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    324.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    320.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   746.00   CHANNEL SLOPE =  0.1206
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.729
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.91
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   4.28
  Tc(MIN.) =  10.46
  SUBAREA AREA(ACRES) =     2.96       SUBAREA RUNOFF(CFS) =    5.43
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.324
  TOTAL AREA(ACRES) =      3.33         PEAK FLOW RATE(CFS) =       6.19

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   3.44
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    324.00 =  1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   312.75  DOWNSTREAM(FEET) =   281.50
  FLOW LENGTH(FEET) =   133.00   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.) =  19.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.19
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  10.57
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    326.00 =  1146.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.689
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4147
  SUBAREA AREA(ACRES) =     0.66   SUBAREA RUNOFF(CFS) =    3.27
  TOTAL AREA(ACRES) =      3.99   TOTAL RUNOFF(CFS) =    9.41
  TC(MIN.) =  10.57
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.689
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3913
 SUBAREA AREA(ACRES) =     1.31   SUBAREA RUNOFF(CFS) =    2.38
 TOTAL AREA(ACRES) =       5.30   TOTAL RUNOFF(CFS) =   11.80
 TC(MIN.) =  10.57

****************************************************************************
 FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   281.50  DOWNSTREAM(FEET) =   280.00
 FLOW LENGTH(FEET) =   227.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.80
 PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =  11.21
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    327.00 =  1373.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    327.00 TO NODE    335.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    280.00  DOWNSTREAM(FEET) =    274.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   118.00   CHANNEL SLOPE =  0.0508
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     11.80
 FLOW VELOCITY(FEET/SEC.) =   3.37   FLOW DEPTH(FEET) =   0.17
 TRAVEL TIME(MIN.) =   0.58   Tc(MIN.) =  11.80
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    335.00 =  1491.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    327.00 TO NODE    335.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  11.80
 RAINFALL INTENSITY(INCH/HR) =   5.30
 TOTAL STREAM AREA(ACRES) =     5.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.80

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

```
 FLOW PROCESS FROM NODE    330.00 TO NODE    332.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   102.00
 UPSTREAM ELEVATION(FEET) =    320.00
 DOWNSTREAM ELEVATION(FEET) =    317.00
 ELEVATION DIFFERENCE(FEET) =      3.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.756
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    99.12
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.992
 SUBAREA RUNOFF(CFS) =      0.35
 TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
 FLOW PROCESS FROM NODE    332.00 TO NODE    335.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    274.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   791.00   CHANNEL SLOPE =  0.0544
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.196
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.44
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.83
 AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   7.20
 Tc(MIN.) =  16.95
 SUBAREA AREA(ACRES) =     3.03       SUBAREA RUNOFF(CFS) =    4.07
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
 TOTAL AREA(ACRES) =      3.21          PEAK FLOW RATE(CFS) =       4.31

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.40
 LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =   893.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    332.00 TO NODE    335.00 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.) =  16.95
 RAINFALL INTENSITY(INCH/HR) =   4.20
 TOTAL STREAM AREA(ACRES) =     3.21
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.31

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1         55.60      9.70         6.014         23.13
    2         11.80     11.80         5.301          5.30
    3          4.31     16.95         4.196          3.21

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1         67.77      9.70         6.014
    2         63.81     11.80         5.301
    3         52.44     16.95         4.196

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     67.77   Tc(MIN.) =     9.70
 TOTAL AREA(ACRES) =     31.64
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    335.00 =  1719.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    370.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    274.00  DOWNSTREAM(FEET) =    262.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =   638.00   CHANNEL SLOPE =  0.0187
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.290
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     77.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.99
 AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   2.13
 Tc(MIN.) =  11.83
 SUBAREA AREA(ACRES) =    10.92       SUBAREA RUNOFF(CFS) =   18.49
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.370
 TOTAL AREA(ACRES) =     42.56         PEAK FLOW RATE(CFS) =      83.23

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   5.14
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    370.00 =  2357.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    370.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE    340.00 TO NODE    341.00 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) =   100.00
 UPSTREAM ELEVATION(FEET) =    605.00
 DOWNSTREAM ELEVATION(FEET) =    565.00
 ELEVATION DIFFERENCE(FEET) =     40.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.183
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.041
 SUBAREA RUNOFF(CFS) =      0.61
 TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.61

****************************************************************************
 FLOW PROCESS FROM NODE    341.00 TO NODE    355.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    318.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1465.00   CHANNEL SLOPE =  0.1680
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.468
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3300
 S.C.S. CURVE NUMBER (AMC II) =  76
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.71
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.83
 AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   5.06
 Tc(MIN.) =  11.24
 SUBAREA AREA(ACRES) =    11.73       SUBAREA RUNOFF(CFS) =   21.17
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.331
 TOTAL AREA(ACRES) =     11.94         PEAK FLOW RATE(CFS) =      21.58

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   6.16
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    355.00 =  1565.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    355.00 TO NODE    359.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   317.00  DOWNSTREAM(FEET) =   279.00
 FLOW LENGTH(FEET) =   237.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.50
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     21.58
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  11.41
```

```
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    359.00 =  1802.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    355.00 TO NODE    363.00 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.) =  11.41
 RAINFALL INTENSITY(INCH/HR) =   5.42
 TOTAL STREAM AREA(ACRES) =    11.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.58

****************************************************************************
 FLOW PROCESS FROM NODE    356.00 TO NODE    357.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
 UPSTREAM ELEVATION(FEET) =    288.00
 DOWNSTREAM ELEVATION(FEET) =    286.20
 ELEVATION DIFFERENCE(FEET) =      1.80
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.115
 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) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.85
 TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      1.85

****************************************************************************
 FLOW PROCESS FROM NODE    357.00 TO NODE    359.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  286.20  DOWNSTREAM ELEVATION(FEET) =  284.00
 STREET LENGTH(FEET) =   426.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.89
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   3.74   Tc(MIN.) =   6.86
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.523
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     4.06
  TOTAL AREA(ACRES) =       0.85        PEAK FLOW RATE(CFS) =       5.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.76
  FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE    356.00 TO NODE    359.00 =   586.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    358.00 TO NODE    359.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.523
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4829
  SUBAREA AREA(ACRES) =     2.02   SUBAREA RUNOFF(CFS) =     4.86
  TOTAL AREA(ACRES) =       2.87   TOTAL RUNOFF(CFS) =   10.43
  TC(MIN.) =   6.86

****************************************************************************
  FLOW PROCESS FROM NODE    358.00 TO NODE    359.00 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.) =   6.86
  RAINFALL INTENSITY(INCH/HR) =   7.52
  TOTAL STREAM AREA(ACRES) =     2.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.43

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1        21.58     11.41         5.416         11.94
      2        10.43      6.86         7.523          2.87

  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       23.39      6.86        7.523
     2       29.09     11.41        5.416

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     29.09   Tc(MIN.) =   11.41
  TOTAL AREA(ACRES) =     14.81
  LONGEST FLOWPATH FROM NODE    340.00 TO NODE    359.00 =  1802.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    359.00 TO NODE    359.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   279.00  DOWNSTREAM(FEET) =   278.00
  FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.04
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.09
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =  11.68
  LONGEST FLOWPATH FROM NODE    340.00 TO NODE    359.50 =  1930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    359.50 TO NODE    359.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.336
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3562
  SUBAREA AREA(ACRES) =    1.56   SUBAREA RUNOFF(CFS) =    2.66
  TOTAL AREA(ACRES) =     16.37   TOTAL RUNOFF(CFS) =   31.12
  TC(MIN.) =  11.68

****************************************************************************
  FLOW PROCESS FROM NODE    359.50 TO NODE    363.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   278.00  DOWNSTREAM(FEET) =   274.03
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.05
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     31.12
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  11.79
  LONGEST FLOWPATH FROM NODE    340.00 TO NODE    363.00 =  2032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    359.50 TO NODE    363.00 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.) =  11.79
 RAINFALL INTENSITY(INCH/HR) =   5.30
 TOTAL STREAM AREA(ACRES) =    16.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.12

****************************************************************************
 FLOW PROCESS FROM NODE    360.00 TO NODE    361.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 UPSTREAM ELEVATION(FEET) =    289.20
 DOWNSTREAM ELEVATION(FEET) =    287.90
 ELEVATION DIFFERENCE(FEET) =      1.30
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.207
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.68
 TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      1.68

****************************************************************************
 FLOW PROCESS FROM NODE    361.00 TO NODE    363.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  287.90  DOWNSTREAM ELEVATION(FEET) =  285.30
 STREET LENGTH(FEET) =   808.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.82
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   14.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.48
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
 STREET FLOW TRAVEL TIME(MIN.) =   9.11   Tc(MIN.) =  12.32
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.155
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
```

```
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =     1.76      SUBAREA RUNOFF(CFS) =     7.89
 TOTAL AREA(ACRES) =      1.97        PEAK FLOW RATE(CFS) =       8.83

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.76
 FLOW VELOCITY(FEET/SEC.) =  1.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
 LONGEST FLOWPATH FROM NODE    360.00 TO NODE    363.00 =   938.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    361.00 TO NODE    363.00 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.) =  12.32
 RAINFALL INTENSITY(INCH/HR) =   5.15
 TOTAL STREAM AREA(ACRES) =     1.97
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.83

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        31.12     11.79         5.303          16.37
     2         8.83     12.32         5.155           1.97

 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        39.57     11.79         5.303
     2        39.08     12.32         5.155

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     39.57   Tc(MIN.) =   11.79
 TOTAL AREA(ACRES) =     18.34
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    363.00 =  2032.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    363.00 TO NODE    365.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   274.03  DOWNSTREAM(FEET) =   273.60
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.61
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     39.57
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  11.86
```

```
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    365.00 =  2072.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    365.00 TO NODE    370.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    273.60  DOWNSTREAM(FEET) =    262.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =   431.00   CHANNEL SLOPE =  0.0267
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.871
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     43.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.52
 AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   1.59
 Tc(MIN.) =  13.45
 SUBAREA AREA(ACRES) =     4.52       SUBAREA RUNOFF(CFS) =    7.05
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.393
 TOTAL AREA(ACRES) =     22.86         PEAK FLOW RATE(CFS) =      43.80

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   4.53
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    370.00 =  2503.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    365.00 TO NODE    370.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
    1       43.80     13.45        4.871       22.86
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    370.00 =  2503.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
    1       83.23     11.83        5.290       42.56
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    370.00 =  2357.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
    1     121.77      11.83         5.290
    2     120.43      13.45         4.871

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    121.77   Tc(MIN.) =   11.83
 TOTAL AREA(ACRES) =     65.42

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

```
 FLOW PROCESS FROM NODE    370.00 TO NODE    390.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    262.10  DOWNSTREAM(FEET) =    254.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1075.00   CHANNEL SLOPE =  0.0075
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.403
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    143.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.60
 AVERAGE FLOW DEPTH(FEET) =   1.30   TRAVEL TIME(MIN.) =   3.90
 Tc(MIN.) =  15.73
 SUBAREA AREA(ACRES) =    30.12       SUBAREA RUNOFF(CFS) =   42.44
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.360
 TOTAL AREA(ACRES) =     95.54         PEAK FLOW RATE(CFS) =     151.29

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.35   FLOW VELOCITY(FEET/SEC.) =   4.68
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    390.00 =  3578.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    390.00 TO NODE    390.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.403
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3597
 SUBAREA AREA(ACRES) =    0.00   SUBAREA RUNOFF(CFS) =    0.00
 TOTAL AREA(ACRES) =     95.54   TOTAL RUNOFF(CFS) =  151.29
 TC(MIN.) =  15.73
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =     95.54  TC(MIN.) =     15.73
 PEAK FLOW RATE(CFS)    =    151.29
============================================================================
============================================================================
 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 ID 1509

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* PDC JOB 3631 CAMPUS PARK WEST                                         *
* SYSTEM 400 EXISTING CONDITIONS                                        *
* FILE: S400E100                                                        *
 ************************************************************************

  FILE NAME: S400E100.DAT
  TIME/DATE OF STUDY: 15:33 10/02/2012
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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    400.00 TO NODE    405.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   112.00
  UPSTREAM ELEVATION(FEET) =    267.40
  DOWNSTREAM ELEVATION(FEET) =    266.00
```

```
 ELEVATION DIFFERENCE(FEET) =      1.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.193
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    73.75
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.484
 SUBAREA RUNOFF(CFS) =      0.61
 TOTAL AREA(ACRES) =      0.35   TOTAL RUNOFF(CFS) =      0.61

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    266.00  DOWNSTREAM(FEET) =    263.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.0073
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.494
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.22
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.24
 AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   4.05
 Tc(MIN.) =   15.24
 SUBAREA AREA(ACRES) =     2.21       SUBAREA RUNOFF(CFS) =     3.18
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
 TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       3.68

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   1.53
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     412.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    408.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.494
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3200
 SUBAREA AREA(ACRES) =    1.34   SUBAREA RUNOFF(CFS) =    1.93
 TOTAL AREA(ACRES) =       3.9   TOTAL RUNOFF(CFS) =       5.61
 TC(MIN.) =   15.24

****************************************************************************
 FLOW PROCESS FROM NODE    408.00 TO NODE    410.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    440.00 TO NODE    445.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
================================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    89.00
  UPSTREAM ELEVATION(FEET) =    264.30
  DOWNSTREAM ELEVATION(FEET) =    263.20
  ELEVATION DIFFERENCE(FEET) =      1.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.219
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    73.54
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.475
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE    445.00 TO NODE    455.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    263.20  DOWNSTREAM(FEET) =    261.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.0069
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.264
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.00
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   5.31
  Tc(MIN.) =   16.53
  SUBAREA AREA(ACRES) =     1.24       SUBAREA RUNOFF(CFS) =    1.69
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.16
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    455.00 =     409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    455.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.264
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3200
  SUBAREA AREA(ACRES) =    2.91   SUBAREA RUNOFF(CFS) =    3.97
  TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =       5.96
  TC(MIN.) =   16.53

****************************************************************************
  FLOW PROCESS FROM NODE    453.00 TO NODE    455.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.264
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5642
  SUBAREA AREA(ACRES) =    3.49   SUBAREA RUNOFF(CFS) =   12.95
  TOTAL AREA(ACRES) =       7.9   TOTAL RUNOFF(CFS) =      18.91
  TC(MIN.) =   16.53

****************************************************************************
  FLOW PROCESS FROM NODE    454.00 TO NODE    455.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.264
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5590
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.23
  TOTAL AREA(ACRES) =       8.0   TOTAL RUNOFF(CFS) =      19.14
  TC(MIN.) =   16.53

****************************************************************************
  FLOW PROCESS FROM NODE    454.00 TO NODE    455.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
      1       19.14     16.53       4.264        8.03
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    455.00 =     409.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
      1        5.61     15.24       4.494        3.90
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    455.00 =     412.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)      (MIN.)    (INCH/HOUR)
      1      23.25       15.24        4.494
      2      24.46       16.53        4.264

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      24.46   Tc(MIN.) =   16.53
  TOTAL AREA(ACRES) =       11.9

****************************************************************************
  FLOW PROCESS FROM NODE    455.00 TO NODE    455.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.264
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
```

```
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4809
  SUBAREA AREA(ACRES) =    0.00   SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =       11.9   TOTAL RUNOFF(CFS) =      24.46
  TC(MIN.) =   16.53
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       11.9  TC(MIN.) =     16.53
  PEAK FLOW RATE(CFS)    =      24.46
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX 4

100-year Proposed Conditions Rational Method Computer Output

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 17.0 Release Date: 07/01/2010  License ID 1509

                          Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* PDC JOB 3631 CAMPUS PARK WEST                                          *
* PROPOSED CONDITIONS                                                    *
* SYSTEM 100, FILE: S100P100                                             *
 ************************************************************************

  FILE NAME: S100P100.DAT
  TIME/DATE OF STUDY: 12:58 07/06/2012
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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    106.00 TO NODE    107.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    880.00
  DOWNSTREAM ELEVATION(FEET) =    850.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.517
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.773
 SUBAREA RUNOFF(CFS) =      0.25
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    850.00  DOWNSTREAM(FEET) =    490.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1448.00   CHANNEL SLOPE =  0.2486
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.790
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3300
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.81
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
 AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   3.77
 Tc(MIN.) =   10.29
 SUBAREA AREA(ACRES) =    22.99       SUBAREA RUNOFF(CFS) =   43.93
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.330
 TOTAL AREA(ACRES) =       23.1         PEAK FLOW RATE(CFS) =      44.11

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   8.48
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    108.00 =    1548.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    339.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1773.00   CHANNEL SLOPE =  0.0852
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.680
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      72.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.35
 AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   4.02
 Tc(MIN.) =   14.31
 SUBAREA AREA(ACRES) =    32.10       SUBAREA RUNOFF(CFS) =   57.09
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.359
 TOTAL AREA(ACRES) =       55.2         PEAK FLOW RATE(CFS) =      92.74

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.44   FLOW VELOCITY(FEET/SEC.) =   8.05
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    120.00 =    3321.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
 TIME OF CONCENTRATION(MIN.) =   14.31
 RAINFALL INTENSITY(INCH/HR) =   4.68
 TOTAL STREAM AREA(ACRES) =    55.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     92.74

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 UPSTREAM ELEVATION(FEET) =    840.00
 DOWNSTREAM ELEVATION(FEET) =    795.00
 ELEVATION DIFFERENCE(FEET) =     45.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.517
 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) =  7.773
 SUBAREA RUNOFF(CFS) =      0.80
 TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    795.00  DOWNSTREAM(FEET) =    630.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1130.00   CHANNEL SLOPE =  0.1460
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.371
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.74
 AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   5.04
 Tc(MIN.) =   11.56
 SUBAREA AREA(ACRES) =     8.58       SUBAREA RUNOFF(CFS) =   14.75
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
 TOTAL AREA(ACRES) =        8.9         PEAK FLOW RATE(CFS) =      15.30

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   4.75
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    115.00 =    1385.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    339.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1609.00   CHANNEL SLOPE =  0.1809
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.630
```

```
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      66.04
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.96
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   2.99
 Tc(MIN.) =   14.55
 SUBAREA AREA(ACRES) =    62.54       SUBAREA RUNOFF(CFS) =  101.34
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.346
 TOTAL AREA(ACRES) =       71.4         PEAK FLOW RATE(CFS) =     114.53

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =  10.94
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    120.00 =    2994.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.55
 RAINFALL INTENSITY(INCH/HR) =   4.63
 TOTAL STREAM AREA(ACRES) =    71.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    114.53

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1        92.74    14.31        4.680         55.19
    2       114.53    14.55        4.630         71.44

 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       205.38    14.31       4.680
    2       206.28    14.55       4.630

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     206.28   Tc(MIN.) =   14.55
 TOTAL AREA(ACRES) =      126.6
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    120.00 =    3321.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    339.00  DOWNSTREAM(FEET) =    286.92
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1911.00   CHANNEL SLOPE =  0.0273
 CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.983
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3700
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     277.92
```

```
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.33
 AVERAGE FLOW DEPTH(FEET) =   1.17   TRAVEL TIME(MIN.) =   3.82
 Tc(MIN.) =   18.37
 SUBAREA AREA(ACRES) =    97.10       SUBAREA RUNOFF(CFS) =  143.10
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.360
 TOTAL AREA(ACRES) =      223.7         PEAK FLOW RATE(CFS) =     320.56

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.27   FLOW VELOCITY(FEET/SEC.) =   8.75
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    121.00 =    5232.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.37
 RAINFALL INTENSITY(INCH/HR) =   3.98
 TOTAL STREAM AREA(ACRES) =   223.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    320.56

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    310.80
 DOWNSTREAM ELEVATION(FEET) =    310.30
 ELEVATION DIFFERENCE(FEET) =      0.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.412
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    54.29
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.96
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    109.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  310.30  DOWNSTREAM ELEVATION(FEET) =  309.00
 STREET LENGTH(FEET) =   625.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

```
  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.58
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.57
  HALFSTREET FLOOD WIDTH(FEET) =   22.77
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.57
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
 STREET FLOW TRAVEL TIME(MIN.) =   6.63   Tc(MIN.) =   10.04
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.881
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    2.49      SUBAREA RUNOFF(CFS) =   12.74
 TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =      13.35

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.67   HALFSTREET FLOOD WIDTH(FEET) =  28.40
 FLOW VELOCITY(FEET/SEC.) =  1.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  625.0 FT WITH ELEVATION-DROP =   1.3 FT, IS   20.0 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    109.00
 LONGEST FLOWPATH FROM NODE    119.00 TO NODE    109.00 =     695.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    121.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   305.70  DOWNSTREAM(FEET) =   299.30
 FLOW LENGTH(FEET) =    69.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.96
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.35
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   10.11
 LONGEST FLOWPATH FROM NODE    119.00 TO NODE    121.00 =     764.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    121.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.11
 RAINFALL INTENSITY(INCH/HR) =   5.86
 TOTAL STREAM AREA(ACRES) =     2.61
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.35

 ** CONFLUENCE DATA **
 STREAM      RUNOFF        Tc       INTENSITY       AREA
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)     (ACRE)
     1       320.56     18.37         3.983         223.73
     2        13.35     10.11         5.855           2.61

 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       231.42     10.11        5.855
      2       329.65     18.37        3.983

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      329.65   Tc(MIN.) =   18.37
  TOTAL AREA(ACRES) =      226.3
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    121.00 =    5232.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   286.92  DOWNSTREAM(FEET) =   284.50
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.18
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     329.65
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   18.57
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    124.00 =    5432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    124.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.57
  RAINFALL INTENSITY(INCH/HR) =   3.96
  TOTAL STREAM AREA(ACRES) =   226.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    329.65

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   127.00
  UPSTREAM ELEVATION(FEET) =    295.00
  DOWNSTREAM ELEVATION(FEET) =    294.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.347
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    55.75
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      1.44

****************************************************************************
  FLOW PROCESS FROM NODE    122.50 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  294.00  DOWNSTREAM ELEVATION(FEET) =  293.00
  STREET LENGTH(FEET) =   255.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   2.65   Tc(MIN.) =    6.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.199
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.41      SUBAREA RUNOFF(CFS) =    2.92
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       4.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.74
  FLOW VELOCITY(FEET/SEC.) =  1.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE    122.00 TO NODE    124.00 =     382.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.199
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5622
  SUBAREA AREA(ACRES) =    0.75   SUBAREA RUNOFF(CFS) =    1.97
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       6.18
  TC(MIN.) =    6.00

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 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.) =    6.00
  RAINFALL INTENSITY(INCH/HR) =   8.20
  TOTAL STREAM AREA(ACRES) =     1.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.18

  ** CONFLUENCE DATA **
```

```
 STREAM      RUNOFF        Tc       INTENSITY       AREA
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)     (ACRE)
    1        329.65     18.57         3.956         226.34
    2          6.18      6.00         8.199           1.34

 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        165.24      6.00         8.199
    2        332.63     18.57         3.956

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      332.63   Tc(MIN.) =   18.57
 TOTAL AREA(ACRES) =       227.7
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    124.00 =    5432.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    124.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   284.50  DOWNSTREAM(FEET) =   283.05
 FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.66
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     332.63
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   18.65
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    135.00 =    5528.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    124.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.65
 RAINFALL INTENSITY(INCH/HR) =   3.94
 TOTAL STREAM AREA(ACRES) =   227.68
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    332.63

****************************************************************************
 FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    297.90
 DOWNSTREAM ELEVATION(FEET) =    295.90
 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) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.96
TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  295.90  DOWNSTREAM ELEVATION(FEET) =  294.20
STREET LENGTH(FEET) =   432.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.89
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.40
  HALFSTREET FLOOD WIDTH(FEET) =   13.48
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.59
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
STREET FLOW TRAVEL TIME(MIN.) =   4.53   Tc(MIN.) =    7.28
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.237
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  96
AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    3.78
TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       4.53

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.29
FLOW VELOCITY(FEET/SEC.) =  1.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.80
LONGEST FLOWPATH FROM NODE    126.00 TO NODE    128.00 =     532.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    127.50 TO NODE    128.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.237
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  65
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5876
SUBAREA AREA(ACRES) =    0.76   SUBAREA RUNOFF(CFS) =    1.76
TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       6.29
TC(MIN.) =    7.28

****************************************************************************
FLOW PROCESS FROM NODE    128.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   292.66  DOWNSTREAM(FEET) =   291.51
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.71
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.29
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    7.50
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    130.00 =     621.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.099
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4907
  SUBAREA AREA(ACRES) =    0.84   SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =       2.3   TOTAL RUNOFF(CFS) =       8.08
  TC(MIN.) =    7.50

****************************************************************************
  FLOW PROCESS FROM NODE    129.30 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.099
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5915
  SUBAREA AREA(ACRES) =    0.84   SUBAREA RUNOFF(CFS) =    5.19
  TOTAL AREA(ACRES) =       3.2   TOTAL RUNOFF(CFS) =      13.27
  TC(MIN.) =    7.50

****************************************************************************
  FLOW PROCESS FROM NODE    129.50 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.099
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5406
  SUBAREA AREA(ACRES) =    0.73   SUBAREA RUNOFF(CFS) =    1.66
  TOTAL AREA(ACRES) =       3.9   TOTAL RUNOFF(CFS) =      14.93
  TC(MIN.) =    7.50

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   291.51  DOWNSTREAM(FEET) =   281.10
  FLOW LENGTH(FEET) =   402.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.56
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.93
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    8.14
 LONGEST FLOWPATH FROM NODE    126.00 TO NODE    135.00 =    1023.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.736
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5163
 SUBAREA AREA(ACRES) =    0.48   SUBAREA RUNOFF(CFS) =    1.03
 TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =      15.20
 TC(MIN.) =    8.14

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 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.) =    8.14
 RAINFALL INTENSITY(INCH/HR) =   6.74
 TOTAL STREAM AREA(ACRES) =     4.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.20

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      332.63    18.65        3.944        227.68
     2       15.20     8.14        6.736          4.37

 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      209.97     8.14        6.736
     2      341.53    18.65        3.944

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     341.53   Tc(MIN.) =   18.65
 TOTAL AREA(ACRES) =      232.1
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    135.00 =    5528.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   281.10  DOWNSTREAM(FEET) =   280.50
 FLOW LENGTH(FEET) =    92.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.74
 ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     341.53
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   18.77
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    140.00 =    5620.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.77
 RAINFALL INTENSITY(INCH/HR) =   3.93
 TOTAL STREAM AREA(ACRES) =   232.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    341.53

****************************************************************************
 FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   128.30
 UPSTREAM ELEVATION(FEET) =    295.20
 DOWNSTREAM ELEVATION(FEET) =    293.70
 ELEVATION DIFFERENCE(FEET) =      1.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.087
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    61.69
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.36
 TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      1.36

****************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  293.70  DOWNSTREAM ELEVATION(FEET) =  292.80
 STREET LENGTH(FEET) =   280.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.87
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   14.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.47
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =    6.26
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.978
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.43      SUBAREA RUNOFF(CFS) =    2.98
 TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       4.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.37
 FLOW VELOCITY(FEET/SEC.) =  1.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
 LONGEST FLOWPATH FROM NODE    136.00 TO NODE    140.00 =     408.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    138.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.978
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6567
 SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.97
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       5.13
 TC(MIN.) =    6.26

****************************************************************************
 FLOW PROCESS FROM NODE    138.00 TO NODE    140.00 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.) =    6.26
 RAINFALL INTENSITY(INCH/HR) =   7.98
 TOTAL STREAM AREA(ACRES) =     0.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.13

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1      341.53    18.77       3.929        232.05
    2        5.13     6.26       7.978          0.98

 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      173.35     6.26       7.978
    2      344.06    18.77       3.929

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     344.06   Tc(MIN.) =   18.77
 TOTAL AREA(ACRES) =      233.0
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    140.00 =    5620.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   280.50  DOWNSTREAM(FEET) =   280.00
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.68
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     344.06
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   18.84
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    145.00 =    5684.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.84
  RAINFALL INTENSITY(INCH/HR) =   3.92
  TOTAL STREAM AREA(ACRES) =   233.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    344.06

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    145.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    296.00
  DOWNSTREAM ELEVATION(FEET) =    286.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.517
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.773
  SUBAREA RUNOFF(CFS) =      3.43
  TOTAL AREA(ACRES) =      1.38   TOTAL RUNOFF(CFS) =      3.43

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.52
  RAINFALL INTENSITY(INCH/HR) =   7.77
  TOTAL STREAM AREA(ACRES) =     1.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      344.06    18.84        3.920        233.03
      2        3.43     6.52        7.773          1.38

  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      176.93      6.52       7.773
     2      345.79     18.84       3.920

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     345.79   Tc(MIN.) =   18.84
 TOTAL AREA(ACRES) =      234.4
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    145.00 =    5684.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    147.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   273.60  DOWNSTREAM(FEET) =   270.00
 FLOW LENGTH(FEET) =   815.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  81.0 INCH PIPE IS  61.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.91
 ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     345.79
 PIPE TRAVEL TIME(MIN.) =   1.14    Tc(MIN.) =   19.98
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    147.00 =    6499.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    147.00 TO NODE    147.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.774
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3703
 SUBAREA AREA(ACRES) =     0.86   SUBAREA RUNOFF(CFS) =     1.04
 TOTAL AREA(ACRES) =      235.3   TOTAL RUNOFF(CFS) =     345.79
 TC(MIN.) =   19.98
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    147.00 TO NODE    147.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.774
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3688
 SUBAREA AREA(ACRES) =     7.26   SUBAREA RUNOFF(CFS) =     8.77
 TOTAL AREA(ACRES) =      242.5   TOTAL RUNOFF(CFS) =     345.79
 TC(MIN.) =   19.98
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      242.5  TC(MIN.) =     19.98
 PEAK FLOW RATE(CFS)   =     345.79
============================================================================
============================================================================
```

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 ID 1509

                          Analysis prepared by:



 ************************** DESCRIPTION OF STUDY **************************
* PDC JOB 3631 CAMPUS PARK WEST                                           *
* PROPOSED ONSITE CONDITIONS                                              *
* SYSTEM 1000, FILE: 1000P100                                             *
 *************************************************************************

  FILE NAME: 1000P100.DAT
  TIME/DATE OF STUDY: 12:11 10/03/2012
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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   1535.00 TO NODE   1537.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=========================================================================
  LIMITED INDUSTRIAL RUNOFF COEFFICIENT = .8400
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  UPSTREAM ELEVATION(FEET) =    300.50
  DOWNSTREAM ELEVATION(FEET) =    299.70
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.591
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    60.39
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      1.86
TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.86

****************************************************************************
FLOW PROCESS FROM NODE   1543.00 TO NODE   1537.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  65
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5469
SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    0.91
TOTAL AREA(ACRES) =       0.6   TOTAL RUNOFF(CFS) =      2.77
TC(MIN.) =    3.59

****************************************************************************
FLOW PROCESS FROM NODE   1537.00 TO NODE   1540.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    299.70  DOWNSTREAM(FEET) =    294.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0086
CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.847
LIMITED INDUSTRIAL RUNOFF COEFFICIENT = .8400
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  94
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.59
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.89
AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   2.83
Tc(MIN.) =    6.42
SUBAREA AREA(ACRES) =     6.79       SUBAREA RUNOFF(CFS) =   44.76
AREA-AVERAGE RUNOFF COEFFICIENT =  0.818
TOTAL AREA(ACRES) =       7.3         PEAK FLOW RATE(CFS) =      47.12

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   4.92
LONGEST FLOWPATH FROM NODE   1535.00 TO NODE   1540.00 =     737.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1545.00 TO NODE   1540.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.847
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  65
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7526
SUBAREA AREA(ACRES) =    1.11   SUBAREA RUNOFF(CFS) =    2.79
TOTAL AREA(ACRES) =       8.4   TOTAL RUNOFF(CFS) =     49.90
TC(MIN.) =    6.42
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   1540.00 TO NODE   1590.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    297.00  DOWNSTREAM(FEET) =    290.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0153
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.093
 LIMITED INDUSTRIAL RUNOFF COEFFICIENT = .8400
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  94
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      63.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.58
 AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   1.09
 Tc(MIN.) =    7.51
 SUBAREA AREA(ACRES) =     4.40       SUBAREA RUNOFF(CFS) =   26.22
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.783
 TOTAL AREA(ACRES) =       12.9         PEAK FLOW RATE(CFS) =      71.32

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   6.91
 LONGEST FLOWPATH FROM NODE   1535.00 TO NODE   1590.00 =    1167.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1540.00 TO NODE   1590.00 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.) =    7.51
 RAINFALL INTENSITY(INCH/HR) =   7.09
 TOTAL STREAM AREA(ACRES) =    12.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     71.32

****************************************************************************
 FLOW PROCESS FROM NODE   1551.00 TO NODE   1552.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    301.90
 DOWNSTREAM ELEVATION(FEET) =    301.45
 ELEVATION DIFFERENCE(FEET) =      0.45
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.487
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    52.86
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.96
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
 FLOW PROCESS FROM NODE   1552.00 TO NODE   1553.00 IS CODE =  61
----------------------------------------------------------------------------
```

```
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  301.45  DOWNSTREAM ELEVATION(FEET) =  299.00
 STREET LENGTH(FEET) =   271.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 26.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.93
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    8.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.92
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.55
 STREET FLOW TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =    5.85
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.338
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    3.92
 TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       4.79

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.02
 FLOW VELOCITY(FEET/SEC.) =  2.13   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
 LONGEST FLOWPATH FROM NODE   1551.00 TO NODE   1553.00 =     341.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1553.00 TO NODE   1588.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   292.00  DOWNSTREAM(FEET) =   286.00
 FLOW LENGTH(FEET) =   635.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.58
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.79
 PIPE TRAVEL TIME(MIN.) =   1.90    Tc(MIN.) =    7.74
 LONGEST FLOWPATH FROM NODE   1551.00 TO NODE   1588.00 =     976.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1599.00 TO NODE   1588.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.956
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5512
 SUBAREA AREA(ACRES) =    0.91   SUBAREA RUNOFF(CFS) =    2.03
```

```
 TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       6.02
 TC(MIN.) =    7.74

****************************************************************************
 FLOW PROCESS FROM NODE   1599.00 TO NODE   1588.00 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.) =    7.74
 RAINFALL INTENSITY(INCH/HR) =   6.96
 TOTAL STREAM AREA(ACRES) =     1.57
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.02

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       71.32     7.51        7.093         12.85
    2        6.02     7.74        6.956          1.57

 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       77.16     7.51       7.093
    2       75.97     7.74       6.956

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      77.16   Tc(MIN.) =    7.51
 TOTAL AREA(ACRES) =       14.4
 LONGEST FLOWPATH FROM NODE   1535.00 TO NODE   1588.00 =    1167.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1588.00 TO NODE   1595.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   1000.00 TO NODE   1001.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   114.00
 UPSTREAM ELEVATION(FEET) =    299.00
 DOWNSTREAM ELEVATION(FEET) =    298.40
 ELEVATION DIFFERENCE(FEET) =      0.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.645
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.53
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.80
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  298.40  DOWNSTREAM ELEVATION(FEET) =  296.00
 STREET LENGTH(FEET) =   461.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.60
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   12.07
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
 STREET FLOW TRAVEL TIME(MIN.) =   4.42   Tc(MIN.) =    8.06
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.776
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    3.54
 TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       4.13

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.73
 FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1002.00 =     575.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1001.50 TO NODE   1002.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.776
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5270
 SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    2.52
 TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       6.64
 TC(MIN.) =    8.06

****************************************************************************
 FLOW PROCESS FROM NODE   1002.00 TO NODE   1004.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   292.00  DOWNSTREAM(FEET) =   289.00
 FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.42
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.64
 PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =    8.76
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1004.00 =     845.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.422
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6363
 SUBAREA AREA(ACRES) =    0.87   SUBAREA RUNOFF(CFS) =    4.86
 TOTAL AREA(ACRES) =       2.7   TOTAL RUNOFF(CFS) =     11.15
 TC(MIN.) =    8.76

****************************************************************************
 FLOW PROCESS FROM NODE   1003.50 TO NODE   1004.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.422
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5605
 SUBAREA AREA(ACRES) =    0.86   SUBAREA RUNOFF(CFS) =    1.77
 TOTAL AREA(ACRES) =       3.6   TOTAL RUNOFF(CFS) =     12.92
 TC(MIN.) =    8.76

****************************************************************************
 FLOW PROCESS FROM NODE   1004.00 TO NODE   1004.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.422
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4790
 SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =    3.78
 TOTAL AREA(ACRES) =       5.4   TOTAL RUNOFF(CFS) =     16.70
 TC(MIN.) =    8.76

****************************************************************************
 FLOW PROCESS FROM NODE   1004.00 TO NODE   1057.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   286.00  DOWNSTREAM(FEET) =   285.20
 FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.60
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.70
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    8.94
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1057.00 =     928.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   1004.00 TO NODE   1057.00 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.) =    8.94
 RAINFALL INTENSITY(INCH/HR) =   6.34
 TOTAL STREAM AREA(ACRES) =     5.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.70

****************************************************************************
 FLOW PROCESS FROM NODE   1055.00 TO NODE   1056.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   136.00
 UPSTREAM ELEVATION(FEET) =    322.00
 DOWNSTREAM ELEVATION(FEET) =    300.00
 ELEVATION DIFFERENCE(FEET) =     22.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.517
 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) =  7.773
 SUBAREA RUNOFF(CFS) =      0.57
 TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
 FLOW PROCESS FROM NODE   1056.00 TO NODE   1057.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   288.00  DOWNSTREAM(FEET) =   285.20
 FLOW LENGTH(FEET) =   182.00   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.) =   3.65
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.57
 PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =    7.35
 LONGEST FLOWPATH FROM NODE   1055.00 TO NODE   1057.00 =     318.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1056.00 TO NODE   1057.00 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.) =    7.35
 RAINFALL INTENSITY(INCH/HR) =   7.19
 TOTAL STREAM AREA(ACRES) =     0.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.57

 ** CONFLUENCE DATA **
```

```
 STREAM      RUNOFF        Tc       INTENSITY       AREA
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)     (ACRE)
     1        16.70      8.94         6.337          5.43
     2         0.57      7.35         7.194          0.23

 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        14.29      7.35         7.194
     2        17.21      8.94         6.337

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       17.21   Tc(MIN.) =     8.94
 TOTAL AREA(ACRES) =         5.7
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1057.00 =      928.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1057.00 TO NODE   1595.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   285.20  DOWNSTREAM(FEET) =   282.50
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.92
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.21
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =     9.11
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1595.00 =     1038.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1057.00 TO NODE   1595.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF        Tc       INTENSITY      AREA
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)    (ACRE)
     1        17.21      9.11         6.261         5.66
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1595.00 =     1038.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF        Tc       INTENSITY      AREA
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)    (ACRE)
     1        77.16      7.51         7.093        14.42
 LONGEST FLOWPATH FROM NODE   1535.00 TO NODE   1595.00 =     1167.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)
     1       91.35        7.51         7.093
     2       85.33        9.11         6.261

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       91.35   Tc(MIN.) =     7.51
 TOTAL AREA(ACRES) =        20.1

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

```
 FLOW PROCESS FROM NODE   1595.00 TO NODE   1598.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   281.00  DOWNSTREAM(FEET) =   280.00
 FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.43
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      91.35
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.56
 LONGEST FLOWPATH FROM NODE   1535.00 TO NODE   1598.00 =    1213.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1596.00 TO NODE   1598.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.063
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6727
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    0.57
 TOTAL AREA(ACRES) =       20.3   TOTAL RUNOFF(CFS) =      96.59
 TC(MIN.) =    7.56

****************************************************************************
 FLOW PROCESS FROM NODE   1598.00 TO NODE   1598.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.063
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6323
 SUBAREA AREA(ACRES) =    2.63   SUBAREA RUNOFF(CFS) =    5.94
 TOTAL AREA(ACRES) =       23.0   TOTAL RUNOFF(CFS) =     102.53
 TC(MIN.) =    7.56
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       23.0  TC(MIN.) =      7.56
 PEAK FLOW RATE(CFS)   =     102.53
============================================================================
============================================================================
 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 1982-2010 Advanced Engineering Software (aes)
            Ver. 17.0 Release Date: 07/01/2010  License ID 1509

                        Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* PDC JOB 3631 CAMPUS PARK WEST                                         *
* SYSTEM 2000 PROPOSED CONDITIONS                                       *
* FILE: 2000P100                                                        *
 ************************************************************************

  FILE NAME: 2000P100.DAT
  TIME/DATE OF STUDY: 17:05 07/06/2012
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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   2000.00 TO NODE   2005.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    72.00
  UPSTREAM ELEVATION(FEET) =    294.50
  DOWNSTREAM ELEVATION(FEET) =    294.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.531
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    55.83
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.762
SUBAREA RUNOFF(CFS) =      1.25
TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.25

****************************************************************************
 FLOW PROCESS FROM NODE   2005.00 TO NODE   2100.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    294.00  DOWNSTREAM(FEET) =    287.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   424.00   CHANNEL SLOPE =  0.0146
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.797
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  85
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.73
 AVERAGE FLOW DEPTH(FEET) =   0.31   TRAVEL TIME(MIN.) =   1.49
 Tc(MIN.) =    8.02
 SUBAREA AREA(ACRES) =     3.63       SUBAREA RUNOFF(CFS) =   16.53
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
 TOTAL AREA(ACRES) =        3.9         PEAK FLOW RATE(CFS) =      17.62

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   5.70
 LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2100.00 =     496.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2010.00 TO NODE   2100.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.797
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5708
 SUBAREA AREA(ACRES) =  1.53   SUBAREA RUNOFF(CFS) =    3.33
 TOTAL AREA(ACRES) =      5.4   TOTAL RUNOFF(CFS) =     20.95
 TC(MIN.) =    8.02

****************************************************************************
 FLOW PROCESS FROM NODE   2100.00 TO NODE   2200.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    287.80  DOWNSTREAM(FEET) =    274.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1060.00   CHANNEL SLOPE =  0.0130
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.671
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  85
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.79
```

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 AVERAGE FLOW DEPTH(FEET) =   0.66   TRAVEL TIME(MIN.) =   2.60
 Tc(MIN.) =   10.63
 SUBAREA AREA(ACRES) =     8.50       SUBAREA RUNOFF(CFS) =   32.30
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.631
 TOTAL AREA(ACRES) =       13.9         PEAK FLOW RATE(CFS) =      49.78

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   7.36
 LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2200.00 =    1556.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2120.00 TO NODE   2200.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.671
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6129
 SUBAREA AREA(ACRES) =    0.88   SUBAREA RUNOFF(CFS) =    1.60
 TOTAL AREA(ACRES) =       14.8   TOTAL RUNOFF(CFS) =      51.37
 TC(MIN.) =   10.63

****************************************************************************
 FLOW PROCESS FROM NODE   2200.00 TO NODE   2200.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   2500.00 TO NODE   2505.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    78.00
 UPSTREAM ELEVATION(FEET) =    319.57
 DOWNSTREAM ELEVATION(FEET) =    319.00
 ELEVATION DIFFERENCE(FEET) =      0.57
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.397
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    54.62
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.04
 TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      1.04

****************************************************************************
 FLOW PROCESS FROM NODE   2505.00 TO NODE   2510.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  319.00  DOWNSTREAM ELEVATION(FEET) =  295.70
 STREET LENGTH(FEET) =   685.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
```

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.16
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =    7.59
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.64
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
 STREET FLOW TRAVEL TIME(MIN.) =   3.13   Tc(MIN.) =    6.53
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.762
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    1.21      SUBAREA RUNOFF(CFS) =    8.17
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       9.05

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.12
 FLOW VELOCITY(FEET/SEC.) =  4.08   DEPTH*VELOCITY(FT*FT/SEC.) =   1.40
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2510.00 =     763.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2508.00 TO NODE   2510.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.762
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
 SUBAREA AREA(ACRES) =    0.45   SUBAREA RUNOFF(CFS) =    3.04
 TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =      12.09
 TC(MIN.) =    6.53

****************************************************************************
 FLOW PROCESS FROM NODE   2510.00 TO NODE   2530.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   290.00  DOWNSTREAM(FEET) =   281.00
 FLOW LENGTH(FEET) =   582.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.20
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.09
 PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =    7.71
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2530.00 =    1345.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2520.00 TO NODE   2530.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.972
```

```
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
 SUBAREA AREA(ACRES) =     0.70   SUBAREA RUNOFF(CFS) =     4.25
 TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =      15.10
 TC(MIN.) =     7.71

****************************************************************************
 FLOW PROCESS FROM NODE   2525.00 TO NODE   2530.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.972
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
 SUBAREA AREA(ACRES) =     0.70   SUBAREA RUNOFF(CFS) =     4.25
 TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =      19.35
 TC(MIN.) =     7.71

****************************************************************************
 FLOW PROCESS FROM NODE   2530.00 TO NODE   2540.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   281.00  DOWNSTREAM(FEET) =   275.00
 FLOW LENGTH(FEET) =   486.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.64
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.35
 PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =    8.65
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2540.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2548.00 TO NODE   2540.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.475
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
 SUBAREA AREA(ACRES) =     0.68   SUBAREA RUNOFF(CFS) =     3.83
 TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =      21.80
 TC(MIN.) =     8.65

****************************************************************************
 FLOW PROCESS FROM NODE   2549.00 TO NODE   2540.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.475
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
 SUBAREA AREA(ACRES) =     0.81   SUBAREA RUNOFF(CFS) =     4.56
 TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      26.36
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 TC(MIN.) =    8.65

****************************************************************************
 FLOW PROCESS FROM NODE   2540.00 TO NODE   2710.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   275.00  DOWNSTREAM(FEET) =   272.00
 FLOW LENGTH(FEET) =   286.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.73
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.36
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    9.20
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2710.00 =    2117.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2540.00 TO NODE   2710.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.20
 RAINFALL INTENSITY(INCH/HR) =   6.22
 TOTAL STREAM AREA(ACRES) =     4.68
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.36

****************************************************************************
 FLOW PROCESS FROM NODE   2700.00 TO NODE   2707.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    282.60
 DOWNSTREAM ELEVATION(FEET) =    282.10
 ELEVATION DIFFERENCE(FEET) =      0.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.461
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    53.33
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.96
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
 FLOW PROCESS FROM NODE   2707.00 TO NODE   2708.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  282.10  DOWNSTREAM ELEVATION(FEET) =  278.00
 STREET LENGTH(FEET) =   485.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

```
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.71
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   14.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
 STREET FLOW TRAVEL TIME(MIN.) =   3.38   Tc(MIN.) =    6.84
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.533
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    1.13      SUBAREA RUNOFF(CFS) =    7.41
 TOTAL AREA(ACRES) =       1.2        PEAK FLOW RATE(CFS) =       8.19

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.70
 FLOW VELOCITY(FEET/SEC.) =  2.74   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
 LONGEST FLOWPATH FROM NODE   2700.00 TO NODE   2708.00 =     560.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2708.00 TO NODE   2710.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   273.00  DOWNSTREAM(FEET) =   272.00
 FLOW LENGTH(FEET) =    84.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.91
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.19
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.04
 LONGEST FLOWPATH FROM NODE   2700.00 TO NODE   2710.00 =     644.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2715.00 TO NODE   2710.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.393
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
 SUBAREA AREA(ACRES) =    0.98   SUBAREA RUNOFF(CFS) =    6.30
 TOTAL AREA(ACRES) =       2.2   TOTAL RUNOFF(CFS) =      14.34
 TC(MIN.) =    7.04

****************************************************************************
 FLOW PROCESS FROM NODE   2715.00 TO NODE   2710.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
```

```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     7.04
 RAINFALL INTENSITY(INCH/HR) =    7.39
 TOTAL STREAM AREA(ACRES) =      2.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.34

 ** CONFLUENCE DATA **
 STREAM      RUNOFF        Tc       INTENSITY       AREA
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)     (ACRE)
     1        26.36      9.20         6.224          4.68
     2        14.34      7.04         7.393          2.23

 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        34.53      7.04        7.393
     2        38.44      9.20        6.224

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       38.44   Tc(MIN.) =     9.20
 TOTAL AREA(ACRES) =         6.9
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2710.00 =    2117.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2710.00 TO NODE   2740.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   272.00  DOWNSTREAM(FEET) =   269.00
 FLOW LENGTH(FEET) =   513.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.56
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      38.44
 PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   10.33
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2740.00 =    2630.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2710.00 TO NODE   2740.00 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.) =   10.33
 RAINFALL INTENSITY(INCH/HR) =   5.78
 TOTAL STREAM AREA(ACRES) =     6.91
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     38.44

****************************************************************************
 FLOW PROCESS FROM NODE   2541.00 TO NODE   2542.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   111.00
 UPSTREAM ELEVATION(FEET) =    294.90
```

```
 DOWNSTREAM ELEVATION(FEET) =    294.00
 ELEVATION DIFFERENCE(FEET) =      0.90
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.342
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    56.22
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.92
 TOTAL AREA(ACRES) =      0.26   TOTAL RUNOFF(CFS) =      1.92

****************************************************************************
 FLOW PROCESS FROM NODE   2545.00 TO NODE   2542.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3860
 SUBAREA AREA(ACRES) =    1.63   SUBAREA RUNOFF(CFS) =    4.81
 TOTAL AREA(ACRES) =       1.9   TOTAL RUNOFF(CFS) =      6.73
 TC(MIN.) =    4.34

****************************************************************************
 FLOW PROCESS FROM NODE   2542.00 TO NODE   2800.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    294.00  DOWNSTREAM(FEET) =    288.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   621.00   CHANNEL SLOPE =  0.0097
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.995
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.46
 AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   1.90
 Tc(MIN.) =    6.24
 SUBAREA AREA(ACRES) =     9.03       SUBAREA RUNOFF(CFS) =   57.76
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.728
 TOTAL AREA(ACRES) =       10.9         PEAK FLOW RATE(CFS) =      63.59

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =   6.58
 LONGEST FLOWPATH FROM NODE   2541.00 TO NODE   2800.00 =     732.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2800.00 TO NODE   2740.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    288.00  DOWNSTREAM(FEET) =    274.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0093
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.025
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     135.92
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.28
 AVERAGE FLOW DEPTH(FEET) =   0.78   TRAVEL TIME(MIN.) =   3.43
 Tc(MIN.) =    9.67
 SUBAREA AREA(ACRES) =    29.78       SUBAREA RUNOFF(CFS) =  143.55
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.781
 TOTAL AREA(ACRES) =       40.7         PEAK FLOW RATE(CFS) =     191.47

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.95   FLOW VELOCITY(FEET/SEC.) =   8.15
 LONGEST FLOWPATH FROM NODE   2541.00 TO NODE   2740.00 =    2232.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2800.00 TO NODE   2740.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.67
 RAINFALL INTENSITY(INCH/HR) =   6.03
 TOTAL STREAM AREA(ACRES) =    40.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    191.47

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1        38.44    10.33         5.776          6.91
     2       191.47     9.67         6.025         40.70

 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       228.31     9.67         6.025
     2       221.98    10.33         5.776

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     228.31   Tc(MIN.) =    9.67
 TOTAL AREA(ACRES) =       47.6
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2740.00 =    2630.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2200.00 TO NODE   2740.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1       228.31     9.67         6.025        47.61
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2740.00 =    2630.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
```

```
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1        51.37     10.63        5.671        14.78
 LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2740.00 =    1556.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
     1     275.08       9.67        6.025
     2     266.25      10.63        5.671

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     275.08   Tc(MIN.) =    9.67
 TOTAL AREA(ACRES) =       62.4

****************************************************************************
 FLOW PROCESS FROM NODE   2740.00 TO NODE   2740.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   2700.00 TO NODE   2705.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    282.57
 DOWNSTREAM ELEVATION(FEET) =    281.90
 ELEVATION DIFFERENCE(FEET) =      0.67
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.457
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    53.40
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.28
 TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      1.28

****************************************************************************
 FLOW PROCESS FROM NODE   2705.00 TO NODE   2730.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  281.90  DOWNSTREAM ELEVATION(FEET) =  274.00
 STREET LENGTH(FEET) =   238.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =    4.54
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.35      SUBAREA RUNOFF(CFS) =    2.81
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       4.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.72
  FLOW VELOCITY(FEET/SEC.) =  3.94   DEPTH*VELOCITY(FT*FT/SEC.) =   1.33
  LONGEST FLOWPATH FROM NODE   2700.00 TO NODE   2730.00 =     338.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2730.00 TO NODE   2735.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   269.00  DOWNSTREAM(FEET) =   268.00
  FLOW LENGTH(FEET) =   104.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.09
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    4.86
  LONGEST FLOWPATH FROM NODE   2700.00 TO NODE   2735.00 =     442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2735.00 TO NODE   2735.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.45   SUBAREA RUNOFF(CFS) =    3.61
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       7.70
  TC(MIN.) =    4.86

****************************************************************************
  FLOW PROCESS FROM NODE   2735.00 TO NODE   2735.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1         7.70      4.86        9.222         0.96
  LONGEST FLOWPATH FROM NODE   2700.00 TO NODE   2735.00 =     442.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
```

```
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
    1       275.08      9.67        6.025        62.39
 LONGEST FLOWPATH FROM NODE   2500.00 TO NODE   2735.00 =    2630.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1       146.00       4.86        9.222
    2       280.11       9.67        6.025

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     280.11   Tc(MIN.) =    9.67
 TOTAL AREA(ACRES) =       63.3
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       63.3  TC(MIN.) =      9.67
 PEAK FLOW RATE(CFS)    =     280.11
================================================================================
================================================================================
 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 1982-2010 Advanced Engineering Software (aes)
            Ver. 17.0 Release Date: 07/01/2010  License ID 1509

                          Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* PDC JOB 3631 CAMPUS PARK WEST                                         *
* PROPOSED CONDITIONS                                                   *
* SYSTEM 300, FILE: S300P100                                            *
 *************************************************************************

  FILE NAME: S300P100.DAT
  TIME/DATE OF STUDY: 14:17 07/06/2012
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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    300.00 TO NODE    302.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=========================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    78.00
  UPSTREAM ELEVATION(FEET) =    424.00
  DOWNSTREAM ELEVATION(FEET) =    412.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.756
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.421
SUBAREA RUNOFF(CFS) =       0.81
TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.81

****************************************************************************
FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    412.00  DOWNSTREAM(FEET) =    320.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.1623
CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.779
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  65
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.03
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.11
AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   2.30
Tc(MIN.) =    8.06
SUBAREA AREA(ACRES) =     6.59       SUBAREA RUNOFF(CFS) =   14.30
AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
TOTAL AREA(ACRES) =        6.9         PEAK FLOW RATE(CFS) =      14.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   5.22
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     645.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.779
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3300
S.C.S. CURVE NUMBER (AMC II) =  65
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3255
SUBAREA AREA(ACRES) =    8.47   SUBAREA RUNOFF(CFS) =   18.95
TOTAL AREA(ACRES) =       15.4   TOTAL RUNOFF(CFS) =      33.90
TC(MIN.) =    8.06

****************************************************************************
FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   313.30  DOWNSTREAM(FEET) =   285.00
FLOW LENGTH(FEET) =   204.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  24.38
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      33.90
PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.20
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    306.00 =     849.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    305.00 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.) =    8.20
  RAINFALL INTENSITY(INCH/HR) =   6.70
  TOTAL STREAM AREA(ACRES) =    15.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.90

**************************************************************************
  FLOW PROCESS FROM NODE    305.20 TO NODE    305.40 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   127.00
  UPSTREAM ELEVATION(FEET) =    291.60
  DOWNSTREAM ELEVATION(FEET) =    290.00
  ELEVATION DIFFERENCE(FEET) =      1.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.033
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    62.60
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      1.44

**************************************************************************
  FLOW PROCESS FROM NODE    305.40 TO NODE    306.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  290.00  DOWNSTREAM ELEVATION(FEET) =  289.00
  STREET LENGTH(FEET) =   265.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.40
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
  STREET FLOW TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =    5.88
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.307
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    2.67
  TOTAL AREA(ACRES) =       0.6        PEAK FLOW RATE(CFS) =       3.97
```

```
 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.51
 FLOW VELOCITY(FEET/SEC.) =  1.70   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
 LONGEST FLOWPATH FROM NODE    305.20 TO NODE    306.00 =     392.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    305.80 TO NODE    306.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.307
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5441
 SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.13
 TOTAL AREA(ACRES) =       1.4   TOTAL RUNOFF(CFS) =       6.10
 TC(MIN.) =    5.88

****************************************************************************
 FLOW PROCESS FROM NODE    305.80 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.88
 RAINFALL INTENSITY(INCH/HR) =   8.31
 TOTAL STREAM AREA(ACRES) =     1.35
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.10

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc      INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
     1       33.90     8.20        6.705         15.36
     2        6.10     5.88        8.307          1.35

 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       30.42     5.88        8.307
     2       38.82     8.20        6.705

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      38.82   Tc(MIN.) =    8.20
 TOTAL AREA(ACRES) =       16.7
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    306.00 =     849.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   285.00  DOWNSTREAM(FEET) =   283.00
 FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.55
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      38.82
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    8.32
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =     942.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    315.00 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.) =    8.32
 RAINFALL INTENSITY(INCH/HR) =   6.64
 TOTAL STREAM AREA(ACRES) =    16.71
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     38.82

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
 UPSTREAM ELEVATION(FEET) =    293.50
 DOWNSTREAM ELEVATION(FEET) =    293.10
 ELEVATION DIFFERENCE(FEET) =      0.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.688
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.96
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    309.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  293.10  DOWNSTREAM ELEVATION(FEET) =  291.40
 STREET LENGTH(FEET) =   290.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.37
   HALFSTREET FLOOD WIDTH(FEET) =   11.37
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
```

```
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
 STREET FLOW TRAVEL TIME(MIN.) =   2.70   Tc(MIN.) =    6.39
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.872
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    2.88
 TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       3.70

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.71
 FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.80
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    309.20 =     380.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    309.10 TO NODE    309.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.872
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5485
 SUBAREA AREA(ACRES) =    0.76   SUBAREA RUNOFF(CFS) =    1.91
 TOTAL AREA(ACRES) =       1.3   TOTAL RUNOFF(CFS) =       5.61
 TC(MIN.) =    6.39

****************************************************************************
 FLOW PROCESS FROM NODE    309.20 TO NODE    310.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  291.40  DOWNSTREAM ELEVATION(FEET) =  290.50
 STREET LENGTH(FEET) =   289.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.43
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.51
   HALFSTREET FLOOD WIDTH(FEET) =   19.65
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.77
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
 STREET FLOW TRAVEL TIME(MIN.) =   2.73   Tc(MIN.) =    9.12
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.259
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.609
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.63
 TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       6.10
```

```
 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.26
 FLOW VELOCITY(FEET/SEC.) =  1.74   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    310.00 =     669.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    309.50 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.259
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5499
 SUBAREA AREA(ACRES) =     0.41   SUBAREA RUNOFF(CFS) =     0.82
 TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       6.92
 TC(MIN.) =    9.12

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   286.00  DOWNSTREAM(FEET) =   285.37
 FLOW LENGTH(FEET) =   104.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.08
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.92
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    9.46
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    311.00 =     773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.10 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5086
 SUBAREA AREA(ACRES) =     0.44   SUBAREA RUNOFF(CFS) =     0.86
 TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =       7.62
 TC(MIN.) =    9.46

****************************************************************************
 FLOW PROCESS FROM NODE    310.20 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5768
 SUBAREA AREA(ACRES) =     0.57   SUBAREA RUNOFF(CFS) =     3.03
 TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =      10.65
 TC(MIN.) =    9.46

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

```
 FLOW PROCESS FROM NODE    310.30 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6041
 SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    1.65
 TOTAL AREA(ACRES) =       3.3   TOTAL RUNOFF(CFS) =     12.30
 TC(MIN.) =    9.46

****************************************************************************
 FLOW PROCESS FROM NODE    310.40 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5644
 SUBAREA AREA(ACRES) =    0.54   SUBAREA RUNOFF(CFS) =    1.06
 TOTAL AREA(ACRES) =       3.9   TOTAL RUNOFF(CFS) =     13.35
 TC(MIN.) =    9.46

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.112
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5442
 SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    0.68
 TOTAL AREA(ACRES) =       4.2   TOTAL RUNOFF(CFS) =     14.04
 TC(MIN.) =    9.46

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   285.00  DOWNSTREAM(FEET) =   283.00
 FLOW LENGTH(FEET) =   417.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.51
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.04
 PIPE TRAVEL TIME(MIN.) =   1.26    Tc(MIN.) =   10.72
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    315.00 =    1190.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.638
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
```

```
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5143
 SUBAREA AREA(ACRES) =     0.65   SUBAREA RUNOFF(CFS) =     1.17
 TOTAL AREA(ACRES) =        4.9   TOTAL RUNOFF(CFS) =      14.12
 TC(MIN.) =   10.72

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.72
 RAINFALL INTENSITY(INCH/HR) =   5.64
 TOTAL STREAM AREA(ACRES) =     4.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.12

 ** CONFLUENCE DATA **
 STREAM      RUNOFF        Tc       INTENSITY       AREA
 NUMBER       (CFS)      (MIN.)   (INCH/HOUR)     (ACRE)
     1        38.82      8.32        6.640          16.71
     2        14.12     10.72        5.638           4.87

 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        49.78      8.32        6.640
     2        47.08     10.72        5.638

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      49.78   Tc(MIN.) =    8.32
 TOTAL AREA(ACRES) =       21.6
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    315.00 =    1190.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   283.00  DOWNSTREAM(FEET) =   281.00
 FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.04
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      49.78
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    8.55
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    315.50 =    1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.55
```

```
 RAINFALL INTENSITY(INCH/HR) =   6.52
 TOTAL STREAM AREA(ACRES) =    21.58
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.78

****************************************************************************
 FLOW PROCESS FROM NODE    315.10 TO NODE    315.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   117.00
 UPSTREAM ELEVATION(FEET) =    291.30
 DOWNSTREAM ELEVATION(FEET) =    290.00
 ELEVATION DIFFERENCE(FEET) =      1.30
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.125
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    61.11
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.44
 TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      1.44

****************************************************************************
 FLOW PROCESS FROM NODE    315.20 TO NODE    315.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  290.00  DOWNSTREAM ELEVATION(FEET) =  288.00
 STREET LENGTH(FEET) =   439.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.18
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   13.55
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
 STREET FLOW TRAVEL TIME(MIN.) =   4.22   Tc(MIN.) =    7.34
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.198
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.55      SUBAREA RUNOFF(CFS) =    3.44
 TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       4.57

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.82
 FLOW VELOCITY(FEET/SEC.) =  1.88   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
```

```
 LONGEST FLOWPATH FROM NODE    315.10 TO NODE    315.50 =     556.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.30 TO NODE    315.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.198
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5931
 SUBAREA AREA(ACRES) =    0.74   SUBAREA RUNOFF(CFS) =    1.70
 TOTAL AREA(ACRES) =       1.5   TOTAL RUNOFF(CFS) =      6.28
 TC(MIN.) =    7.34

****************************************************************************
 FLOW PROCESS FROM NODE    315.30 TO NODE    315.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.34
 RAINFALL INTENSITY(INCH/HR) =   7.20
 TOTAL STREAM AREA(ACRES) =     1.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.28

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       49.78     8.55        6.522         21.58
    2        6.28     7.34        7.198          1.47

 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       51.38     7.34       7.198
    2       55.47     8.55       6.522

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      55.47   Tc(MIN.) =    8.55
 TOTAL AREA(ACRES) =       23.1
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    315.50 =    1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.50 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) =   281.00  DOWNSTREAM(FEET) =   280.00
 FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      55.47
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    8.70
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    316.00 =    1441.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    316.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    280.00  DOWNSTREAM(FEET) =    274.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   278.00   CHANNEL SLOPE =  0.0216
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.018
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      57.22
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.70
 AVERAGE FLOW DEPTH(FEET) =   0.56   TRAVEL TIME(MIN.) =   0.99
 Tc(MIN.) =    9.69
 SUBAREA AREA(ACRES) =     1.82       SUBAREA RUNOFF(CFS) =    3.50
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.390
 TOTAL AREA(ACRES) =       24.9         PEAK FLOW RATE(CFS) =      58.33

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.57   FLOW VELOCITY(FEET/SEC.) =   4.72
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    330.00 =    1719.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    316.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.69
 RAINFALL INTENSITY(INCH/HR) =   6.02
 TOTAL STREAM AREA(ACRES) =    24.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     58.33

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    322.00 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) =   267.00
 UPSTREAM ELEVATION(FEET) =    495.00
 DOWNSTREAM ELEVATION(FEET) =    410.00
 ELEVATION DIFFERENCE(FEET) =     85.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.183
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.041
 SUBAREA RUNOFF(CFS) =      1.07
 TOTAL AREA(ACRES) =      0.37   TOTAL RUNOFF(CFS) =      1.07

****************************************************************************
 FLOW PROCESS FROM NODE    322.00 TO NODE    324.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   746.00   CHANNEL SLOPE =  0.1206
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.729
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.87
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.91
 AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   4.28
 Tc(MIN.) =   10.46
 SUBAREA AREA(ACRES) =     2.96       SUBAREA RUNOFF(CFS) =    5.43
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.324
 TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       6.19

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   3.44
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    324.00 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    324.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   312.75  DOWNSTREAM(FEET) =   281.50
 FLOW LENGTH(FEET) =   133.00   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.) =  19.14
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.19
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.57
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    326.00 =    1146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.689
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4147
 SUBAREA AREA(ACRES) =    0.66   SUBAREA RUNOFF(CFS) =    3.27
 TOTAL AREA(ACRES) =       4.0   TOTAL RUNOFF(CFS) =      9.41
 TC(MIN.) =   10.57

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.689
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3913
```

```
 SUBAREA AREA(ACRES) =     1.31   SUBAREA RUNOFF(CFS) =     2.38
 TOTAL AREA(ACRES) =        5.3   TOTAL RUNOFF(CFS) =      11.80
 TC(MIN.) =   10.57

****************************************************************************
 FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   281.50  DOWNSTREAM(FEET) =   280.00
 FLOW LENGTH(FEET) =   227.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.80
 PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   11.21
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    327.00 =    1373.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    327.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    280.00  DOWNSTREAM(FEET) =    274.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE =  0.0500
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.370
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.69
 AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   0.35
 Tc(MIN.) =   11.56
 SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    1.79
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.380
 TOTAL AREA(ACRES) =        6.3         PEAK FLOW RATE(CFS) =      12.92

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   5.80
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    330.00 =    1493.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    327.00 TO NODE    330.00 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.) =   11.56
 RAINFALL INTENSITY(INCH/HR) =   5.37
 TOTAL STREAM AREA(ACRES) =     6.34
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.92

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       58.33     9.69        6.018         24.87
     2       12.92    11.56        5.370          6.34
```

```
 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        69.16      9.69        6.018
     2        64.97     11.56        5.370

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      69.16   Tc(MIN.) =    9.69
 TOTAL AREA(ACRES) =       31.2
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    330.00 =    1719.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    331.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   274.00  DOWNSTREAM(FEET) =   273.30
 FLOW LENGTH(FEET) =    56.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.65
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      69.16
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    9.77
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    331.00 =    1775.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    331.00 TO NODE    368.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   273.30  DOWNSTREAM(FEET) =   264.50
 FLOW LENGTH(FEET) =   558.42   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.95
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      69.16
 PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   10.49
 LONGEST FLOWPATH FROM NODE    307.00 TO NODE    368.00 =    2333.92 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    331.00 TO NODE    368.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    341.00 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) =   100.00
 UPSTREAM ELEVATION(FEET) =    605.00
 DOWNSTREAM ELEVATION(FEET) =    565.00
 ELEVATION DIFFERENCE(FEET) =     40.00
```

```
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.183
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.041
 SUBAREA RUNOFF(CFS) =      0.61
 TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.61

****************************************************************************
 FLOW PROCESS FROM NODE    341.00 TO NODE    355.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    318.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1465.00   CHANNEL SLOPE =  0.1680
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.468
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3300
 S.C.S. CURVE NUMBER (AMC II) =  76
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.71
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.83
 AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   5.06
 Tc(MIN.) =   11.24
 SUBAREA AREA(ACRES) =    11.73       SUBAREA RUNOFF(CFS) =   21.17
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.331
 TOTAL AREA(ACRES) =       11.9         PEAK FLOW RATE(CFS) =      21.58

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   6.16
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    355.00 =    1565.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    355.00 TO NODE    359.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   317.00  DOWNSTREAM(FEET) =   279.00
 FLOW LENGTH(FEET) =   237.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.50
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.58
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.41
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    359.00 =    1802.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    355.00 TO NODE    359.00 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.) =   11.41
 RAINFALL INTENSITY(INCH/HR) =   5.42
 TOTAL STREAM AREA(ACRES) =    11.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.58

****************************************************************************
 FLOW PROCESS FROM NODE    356.00 TO NODE    357.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
  UPSTREAM ELEVATION(FEET) =    288.00
  DOWNSTREAM ELEVATION(FEET) =    286.20
  ELEVATION DIFFERENCE(FEET) =      1.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.115
  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) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.85
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      1.85

****************************************************************************
  FLOW PROCESS FROM NODE    357.00 TO NODE    359.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  286.20  DOWNSTREAM ELEVATION(FEET) =  284.00
  STREET LENGTH(FEET) =   426.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.89
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   3.74   Tc(MIN.) =    6.86
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.523
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    4.06
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       5.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.76
  FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE    356.00 TO NODE    359.00 =     586.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    358.00 TO NODE    359.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.523
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4829
 SUBAREA AREA(ACRES) =    2.02   SUBAREA RUNOFF(CFS) =    4.86
 TOTAL AREA(ACRES) =       2.9   TOTAL RUNOFF(CFS) =     10.43
 TC(MIN.) =    6.86

****************************************************************************
 FLOW PROCESS FROM NODE    358.00 TO NODE    359.00 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.) =    6.86
 RAINFALL INTENSITY(INCH/HR) =   7.52
 TOTAL STREAM AREA(ACRES) =     2.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.43

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       21.58    11.41        5.416         11.94
    2       10.43     6.86        7.523          2.87

 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       23.39     6.86       7.523
    2       29.09    11.41       5.416

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      29.09   Tc(MIN.) =   11.41
 TOTAL AREA(ACRES) =       14.8
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    359.00 =    1802.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    359.00 TO NODE    359.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   279.00  DOWNSTREAM(FEET) =   278.00
 FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.04
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      29.09
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.68
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    359.50 =    1930.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    359.50 TO NODE    359.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.336
```

```
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3562
 SUBAREA AREA(ACRES) =     1.56   SUBAREA RUNOFF(CFS) =     2.66
 TOTAL AREA(ACRES) =       16.4   TOTAL RUNOFF(CFS) =      31.12
 TC(MIN.) =   11.68

****************************************************************************
 FLOW PROCESS FROM NODE     359.50 TO NODE     363.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   278.00  DOWNSTREAM(FEET) =   274.03
 FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.05
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      31.12
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.79
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    363.00 =    2032.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     359.50 TO NODE     363.00 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.) =   11.79
 RAINFALL INTENSITY(INCH/HR) =   5.30
 TOTAL STREAM AREA(ACRES) =    16.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.12

****************************************************************************
 FLOW PROCESS FROM NODE     360.00 TO NODE     361.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 UPSTREAM ELEVATION(FEET) =    289.20
 DOWNSTREAM ELEVATION(FEET) =    287.90
 ELEVATION DIFFERENCE(FEET) =      1.30
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.207
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.68
 TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      1.68

****************************************************************************
 FLOW PROCESS FROM NODE     361.00 TO NODE     363.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
 UPSTREAM ELEVATION(FEET) =  287.90  DOWNSTREAM ELEVATION(FEET) =  285.30
 STREET LENGTH(FEET) =   808.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.82
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   14.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.48
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
 STREET FLOW TRAVEL TIME(MIN.) =   9.11   Tc(MIN.) =   12.32
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.155
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    1.76      SUBAREA RUNOFF(CFS) =    7.89
 TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =       8.83

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.76
 FLOW VELOCITY(FEET/SEC.) =  1.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
 LONGEST FLOWPATH FROM NODE    360.00 TO NODE    363.00 =     938.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    361.00 TO NODE    363.00 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.) =   12.32
 RAINFALL INTENSITY(INCH/HR) =   5.15
 TOTAL STREAM AREA(ACRES) =     1.97
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.83

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       31.12    11.79        5.303         16.37
    2        8.83    12.32        5.155          1.97

 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       39.57    11.79        5.303
    2       39.08    12.32        5.155

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      39.57   Tc(MIN.) =   11.79
```

```
 TOTAL AREA(ACRES) =       18.3
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    363.00 =    2032.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    363.00 TO NODE    365.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   274.03  DOWNSTREAM(FEET) =   273.60
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.61
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      39.57
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   11.86
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    365.00 =    2072.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    365.00 TO NODE    367.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    273.60  DOWNSTREAM(FEET) =    266.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   268.00   CHANNEL SLOPE =  0.0284
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.023
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.31
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.62
 AVERAGE FLOW DEPTH(FEET) =   0.44   TRAVEL TIME(MIN.) =   0.97
 Tc(MIN.) =   12.82
 SUBAREA AREA(ACRES) =     4.65       SUBAREA RUNOFF(CFS) =    7.47
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.393
 TOTAL AREA(ACRES) =       23.0         PEAK FLOW RATE(CFS) =      45.37

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   4.69
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    367.00 =    2340.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    367.00 TO NODE    368.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   266.00  DOWNSTREAM(FEET) =   264.50
 FLOW LENGTH(FEET) =    56.60   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.03
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      45.37
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.89
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    368.00 =    2396.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    367.00 TO NODE    368.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
```

```
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY      AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
      1        45.37     12.89        5.006        22.99
  LONGEST FLOWPATH FROM NODE    340.00 TO NODE    368.00 =    2396.60 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY      AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
      1        69.16     10.49        5.718        31.21
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    368.00 =    2333.92 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
      1      106.08       10.49        5.718
      2      105.93       12.89        5.006

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      106.08   Tc(MIN.) =   10.49
  TOTAL AREA(ACRES) =        54.2

****************************************************************************
  FLOW PROCESS FROM NODE    368.00 TO NODE    372.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   264.50  DOWNSTREAM(FEET) =   260.00
  FLOW LENGTH(FEET) =   406.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.62
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     106.08
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   11.03
  LONGEST FLOWPATH FROM NODE    340.00 TO NODE    372.00 =    2802.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    368.00 TO NODE    372.00 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.) =   11.03
  RAINFALL INTENSITY(INCH/HR) =   5.54
  TOTAL STREAM AREA(ACRES) =    54.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    106.08

****************************************************************************
  FLOW PROCESS FROM NODE    371.50 TO NODE    372.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  65
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   222.00
  UPSTREAM ELEVATION(FEET) =    277.00
  DOWNSTREAM ELEVATION(FEET) =    260.00
  ELEVATION DIFFERENCE(FEET) =     17.00
```

```
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.124
 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) =  7.339
 SUBAREA RUNOFF(CFS) =      1.81
 TOTAL AREA(ACRES) =      0.77   TOTAL RUNOFF(CFS) =      1.81

****************************************************************************
 FLOW PROCESS FROM NODE    371.50 TO NODE    372.00 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) =   7.34
 TOTAL STREAM AREA(ACRES) =     0.77
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.81

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       106.08    11.03        5.537         54.20
     2         1.81     7.12        7.339          0.77

 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        70.34     7.12        7.339
     2       107.45    11.03        5.537

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     107.45   Tc(MIN.) =   11.03
 TOTAL AREA(ACRES) =       55.0
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    372.00 =    2802.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    372.00 TO NODE    390.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    260.00  DOWNSTREAM(FEET) =    254.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   710.00   CHANNEL SLOPE =  0.0085
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.828
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     123.75
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.53
 AVERAGE FLOW DEPTH(FEET) =   1.16   TRAVEL TIME(MIN.) =   2.61
 Tc(MIN.) =   13.64
 SUBAREA AREA(ACRES) =    21.08       SUBAREA RUNOFF(CFS) =   32.57
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.370
 TOTAL AREA(ACRES) =       76.0         PEAK FLOW RATE(CFS) =     135.78
```

```
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.22   FLOW VELOCITY(FEET/SEC.) =   4.69
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    390.00 =    3512.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    390.00 TO NODE    390.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.828
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3698
 SUBAREA AREA(ACRES) =    0.00   SUBAREA RUNOFF(CFS) =    0.00
 TOTAL AREA(ACRES) =       76.0   TOTAL RUNOFF(CFS) =     135.78
 TC(MIN.) =   13.64
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       76.0  TC(MIN.) =     13.64
 PEAK FLOW RATE(CFS)   =     135.78
============================================================================
============================================================================
 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 1982-2010 Advanced Engineering Software (aes)
            Ver. 17.0 Release Date: 07/01/2010  License ID 1509

                          Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* PDC JOB 3631 CAMPUS PARK WEST                                         *
* SYSTEM 3000 (ONSITE PROPOSED CONDITIONS)                              *
* FILE: 3000P100                                                        *
 **************************************************************************

  FILE NAME: 3000P100.DAT
  TIME/DATE OF STUDY: 14:51 07/06/2012
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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   3500.00 TO NODE   3505.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    289.00
  DOWNSTREAM ELEVATION(FEET) =    288.30
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.469
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    54.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.89
TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.89

****************************************************************************
 FLOW PROCESS FROM NODE   3505.00 TO NODE   3520.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    288.30  DOWNSTREAM(FEET) =    285.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.0081
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.288
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.40
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.95
 AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   2.73
 Tc(MIN.) =    7.20
 SUBAREA AREA(ACRES) =     1.18       SUBAREA RUNOFF(CFS) =    6.88
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
 TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       7.58

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   2.44
 LONGEST FLOWPATH FROM NODE   3500.00 TO NODE   3520.00 =     420.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3520.00 TO NODE   3590.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    285.70  DOWNSTREAM(FEET) =    280.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0096
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.923
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.62
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.64
 AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   2.73
 Tc(MIN.) =    9.93
 SUBAREA AREA(ACRES) =     4.63       SUBAREA RUNOFF(CFS) =   21.94
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
 TOTAL AREA(ACRES) =        5.9         PEAK FLOW RATE(CFS) =      28.10

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   4.21
 LONGEST FLOWPATH FROM NODE   3500.00 TO NODE   3590.00 =    1016.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        5.9  TC(MIN.) =      9.93
 PEAK FLOW RATE(CFS)   =      28.10
```

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

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 ID 1509

                              Analysis prepared by:



 ************************** DESCRIPTION OF STUDY **************************
* PDC JOB 3631 CAMPUS PARK WEST                                           *
* PROPOSED CONDITIONS, SYSTEM 4000, "TM ALTERNATIVE"                      *
* FILE: 4000P100                                                          *
 *************************************************************************

  FILE NAME: 4000P100.DAT
  TIME/DATE OF STUDY: 13:43 10/03/2012
-----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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   4000.00 TO NODE   4005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    274.30
  DOWNSTREAM ELEVATION(FEET) =    273.10
  ELEVATION DIFFERENCE(FEET) =      1.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.916
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    66.18
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      2.21
TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      2.21

****************************************************************************
 FLOW PROCESS FROM NODE   4005.00 TO NODE   4008.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    273.10  DOWNSTREAM(FEET) =    268.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   290.00   CHANNEL SLOPE =  0.0148
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.100
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.07
 AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   1.19
 Tc(MIN.) =    5.10
 SUBAREA AREA(ACRES) =     2.07       SUBAREA RUNOFF(CFS) =   15.07
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
 TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =      17.25

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   4.99
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4008.00 =     375.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4008.00 TO NODE   4010.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   262.80  DOWNSTREAM(FEET) =   262.30
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.33
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.25
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.16
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4010.00 =     405.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4010.00 TO NODE   4010.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.039
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8000
 SUBAREA AREA(ACRES) =    0.51   SUBAREA RUNOFF(CFS) =    3.69
 TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =      20.82
 TC(MIN.) =    5.16
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   4010.00 TO NODE   4014.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   262.30  DOWNSTREAM(FEET) =   260.00
 FLOW LENGTH(FEET) =   387.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.62
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.82
 PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =    6.13
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4014.00 =     792.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4012.00 TO NODE   4014.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.084
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8056
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    1.76
 TOTAL AREA(ACRES) =       3.1   TOTAL RUNOFF(CFS) =      20.82
 TC(MIN.) =    6.13
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   4014.00 TO NODE   4014.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.084
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8102
 SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    1.69
 TOTAL AREA(ACRES) =       3.4   TOTAL RUNOFF(CFS) =      22.07
 TC(MIN.) =    6.13

****************************************************************************
 FLOW PROCESS FROM NODE   4014.00 TO NODE   4080.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   260.00  DOWNSTREAM(FEET) =   258.00
 FLOW LENGTH(FEET) =   188.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      22.07
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    6.51
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4080.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4080.00 TO NODE   4080.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8164
 SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    2.64
 TOTAL AREA(ACRES) =       3.8   TOTAL RUNOFF(CFS) =     23.87
 TC(MIN.) =    6.51

****************************************************************************
 FLOW PROCESS FROM NODE   4050.00 TO NODE   4080.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8085
 SUBAREA AREA(ACRES) =    3.45   SUBAREA RUNOFF(CFS) =   21.46
 TOTAL AREA(ACRES) =       7.2   TOTAL RUNOFF(CFS) =     45.33
 TC(MIN.) =    6.51

****************************************************************************
 FLOW PROCESS FROM NODE   4080.00 TO NODE   4080.00 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.) =    6.51
 RAINFALL INTENSITY(INCH/HR) =   7.78
 TOTAL STREAM AREA(ACRES) =     7.21
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     45.33

****************************************************************************
 FLOW PROCESS FROM NODE   4100.00 TO NODE   4150.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
 UPSTREAM ELEVATION(FEET) =    269.90
 DOWNSTREAM ELEVATION(FEET) =    265.70
 ELEVATION DIFFERENCE(FEET) =      4.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.920
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    64.89
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      7.30
 TOTAL AREA(ACRES) =      0.91   TOTAL RUNOFF(CFS) =      7.30

****************************************************************************
 FLOW PROCESS FROM NODE   4150.00 TO NODE   4180.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   260.00  DOWNSTREAM(FEET) =   259.00
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.30
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    3.15
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4180.00 =     372.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4180.00 TO NODE   4180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.52   SUBAREA RUNOFF(CFS) =    4.17
  TOTAL AREA(ACRES) =       1.4   TOTAL RUNOFF(CFS) =     11.47
  TC(MIN.) =    3.15

****************************************************************************
  FLOW PROCESS FROM NODE   4180.00 TO NODE   4185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   260.00  DOWNSTREAM(FEET) =   259.00
  FLOW LENGTH(FEET) =   103.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.95
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.47
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    3.40
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4185.00 =     475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4170.00 TO NODE   4185.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  97
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =   14.76
  TOTAL AREA(ACRES) =       3.3   TOTAL RUNOFF(CFS) =     26.23
  TC(MIN.) =    3.40

****************************************************************************
  FLOW PROCESS FROM NODE   4185.00 TO NODE   4080.00 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.) =     3.40
 RAINFALL INTENSITY(INCH/HR) =    9.22
 TOTAL STREAM AREA(ACRES) =      3.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.23

 ** CONFLUENCE DATA **
 STREAM      RUNOFF        Tc       INTENSITY       AREA
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)     (ACRE)
     1        45.33      6.51         7.776          7.21
     2        26.23      3.40         9.222          3.27

 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        49.87      3.40         9.222
     2        67.46      6.51         7.776

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       67.46   Tc(MIN.) =     6.51
 TOTAL AREA(ACRES) =        10.5
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4080.00 =      980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4185.00 TO NODE   4185.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8277
 SUBAREA AREA(ACRES) =     0.00   SUBAREA RUNOFF(CFS) =     0.00
 TOTAL AREA(ACRES) =        10.5   TOTAL RUNOFF(CFS) =      67.46
 TC(MIN.) =     6.51
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        10.5  TC(MIN.) =       6.51
 PEAK FLOW RATE(CFS)    =       67.46
============================================================================
============================================================================
 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 ID 1509

                          Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* PDC JOB 3631 CAMPUS PARK WEST                                         *
* PROPOSED CONDITIONS, SYSTEM 4000, "ALTERNATIVE 1 OPTION"              *
* FILE: 4001P100                                                        *
 ************************************************************************

  FILE NAME: 4001P100.DAT
  TIME/DATE OF STUDY: 13:52 10/03/2012
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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)  (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   4000.00 TO NODE   4005.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    274.30
  DOWNSTREAM ELEVATION(FEET) =    273.10
  ELEVATION DIFFERENCE(FEET) =      1.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.916
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    66.18
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      2.21
TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      2.21

****************************************************************************
 FLOW PROCESS FROM NODE   4005.00 TO NODE   4008.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    273.10  DOWNSTREAM(FEET) =    268.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   290.00   CHANNEL SLOPE =  0.0148
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.100
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.07
 AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   1.19
 Tc(MIN.) =    5.10
 SUBAREA AREA(ACRES) =     2.07       SUBAREA RUNOFF(CFS) =   15.07
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
 TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =      17.25

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   4.99
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4008.00 =     375.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4008.00 TO NODE   4010.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   262.80  DOWNSTREAM(FEET) =   262.30
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.33
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.25
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.16
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4010.00 =     405.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4010.00 TO NODE   4010.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.039
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8000
 SUBAREA AREA(ACRES) =     0.51   SUBAREA RUNOFF(CFS) =     3.69
 TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =      20.82
 TC(MIN.) =    5.16
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   4010.00 TO NODE   4014.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   262.30  DOWNSTREAM(FEET) =   260.00
 FLOW LENGTH(FEET) =   387.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.62
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.82
 PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =    6.13
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4014.00 =     792.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4012.00 TO NODE   4014.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.084
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8056
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    1.76
 TOTAL AREA(ACRES) =       3.1   TOTAL RUNOFF(CFS) =     20.82
 TC(MIN.) =    6.13
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   4014.00 TO NODE   4014.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.084
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8102
 SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    1.69
 TOTAL AREA(ACRES) =       3.4   TOTAL RUNOFF(CFS) =     22.07
 TC(MIN.) =    6.13

****************************************************************************
 FLOW PROCESS FROM NODE   4014.00 TO NODE   4080.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   260.00  DOWNSTREAM(FEET) =   258.00
 FLOW LENGTH(FEET) =   188.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      22.07
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    6.51
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4080.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4080.00 TO NODE   4080.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8164
 SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    2.64
 TOTAL AREA(ACRES) =       3.8   TOTAL RUNOFF(CFS) =     23.87
 TC(MIN.) =    6.51

****************************************************************************
 FLOW PROCESS FROM NODE   4050.00 TO NODE   4080.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
 GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8071
 SUBAREA AREA(ACRES) =    4.90   SUBAREA RUNOFF(CFS) =   30.48
 TOTAL AREA(ACRES) =       8.7   TOTAL RUNOFF(CFS) =     54.35
 TC(MIN.) =    6.51

****************************************************************************
 FLOW PROCESS FROM NODE   4080.00 TO NODE   4080.00 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.) =    6.51
 RAINFALL INTENSITY(INCH/HR) =   7.78
 TOTAL STREAM AREA(ACRES) =     8.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    54.35

****************************************************************************
 FLOW PROCESS FROM NODE   4100.00 TO NODE   4150.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  96
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
 UPSTREAM ELEVATION(FEET) =    269.90
 DOWNSTREAM ELEVATION(FEET) =    265.70
 ELEVATION DIFFERENCE(FEET) =      4.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.920
 WARNING:  INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    64.89
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      7.30
 TOTAL AREA(ACRES) =      0.91   TOTAL RUNOFF(CFS) =      7.30

****************************************************************************
 FLOW PROCESS FROM NODE   4150.00 TO NODE   4180.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   260.00  DOWNSTREAM(FEET) =   259.00
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.30
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    3.15
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4180.00 =     372.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4180.00 TO NODE   4180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.54   SUBAREA RUNOFF(CFS) =    4.33
  TOTAL AREA(ACRES) =       1.5   TOTAL RUNOFF(CFS) =     11.63
  TC(MIN.) =    3.15

****************************************************************************
  FLOW PROCESS FROM NODE   4180.00 TO NODE   4185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   260.00  DOWNSTREAM(FEET) =   259.00
  FLOW LENGTH(FEET) =   103.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.97
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.63
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    3.40
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4185.00 =     475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4170.00 TO NODE   4185.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  97
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =   14.76
  TOTAL AREA(ACRES) =       3.3   TOTAL RUNOFF(CFS) =     26.39
  TC(MIN.) =    3.40

****************************************************************************
  FLOW PROCESS FROM NODE   4185.00 TO NODE   4080.00 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.) =    3.40
 RAINFALL INTENSITY(INCH/HR) =   9.22
 TOTAL STREAM AREA(ACRES) =     3.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.39

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       54.35     6.51        7.776          8.66
    2       26.39     3.40        9.222          3.29

 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       54.73     3.40       9.222
    2       76.61     6.51       7.776

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      76.61   Tc(MIN.) =    6.51
 TOTAL AREA(ACRES) =       11.9
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4080.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4185.00 TO NODE   4185.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8244
 SUBAREA AREA(ACRES) =    0.00   SUBAREA RUNOFF(CFS) =    0.00
 TOTAL AREA(ACRES) =       11.9   TOTAL RUNOFF(CFS) =      76.61
 TC(MIN.) =    6.51
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       11.9  TC(MIN.) =      6.51
 PEAK FLOW RATE(CFS)   =      76.61
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX 5

Rational Method Hydrographs

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 100, EXISTING CONDITIONS: S100E100.TXT
TIME OF CONCENTRATION 21 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 275 ACRES
RUNOFF COEFFICIENT 0.37
PEAK DISCHARGE 370.2 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	21	DISCHARGE (CFS) =	21.6
TIME (MIN) =	42	DISCHARGE (CFS) =	23.5
TIME (MIN) =	63	DISCHARGE (CFS) =	24.6
TIME (MIN) =	84	DISCHARGE (CFS) =	27.3
TIME (MIN) =	105	DISCHARGE (CFS) =	29
TIME (MIN) =	126	DISCHARGE (CFS) =	33.2
TIME (MIN) =	147	DISCHARGE (CFS) =	36
TIME (MIN) =	168	DISCHARGE (CFS) =	44
TIME (MIN) =	189	DISCHARGE (CFS) =	50.1
TIME (MIN) =	210	DISCHARGE (CFS) =	73.6
TIME (MIN) =	231	DISCHARGE (CFS) =	105.4
TIME (MIN) =	252	DISCHARGE (CFS) =	370.2
TIME (MIN) =	273	DISCHARGE (CFS) =	59.1
TIME (MIN) =	294	DISCHARGE (CFS) =	39.5
TIME (MIN) =	315	DISCHARGE (CFS) =	30.9
TIME (MIN) =	336	DISCHARGE (CFS) =	25.9
TIME (MIN) =	357	DISCHARGE (CFS) =	22.5
TIME (MIN) =	378	DISCHARGE (CFS) =	0

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 200, EXISTING CONDITIONS: S200E100.TXT
TIME OF CONCENTRATION 20 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 40.3 ACRES
RUNOFF COEFFICIENT 0.32
PEAK DISCHARGE 48.6 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	20	DISCHARGE (CFS) =	2.7
TIME (MIN) =	40	DISCHARGE (CFS) =	2.8
TIME (MIN) =	60	DISCHARGE (CFS) =	3.1
TIME (MIN) =	80	DISCHARGE (CFS) =	3.2
TIME (MIN) =	100	DISCHARGE (CFS) =	3.6
TIME (MIN) =	120	DISCHARGE (CFS) =	3.8
TIME (MIN) =	140	DISCHARGE (CFS) =	4.3
TIME (MIN) =	160	DISCHARGE (CFS) =	4.7
TIME (MIN) =	180	DISCHARGE (CFS) =	5.8
TIME (MIN) =	200	DISCHARGE (CFS) =	6.6
TIME (MIN) =	220	DISCHARGE (CFS) =	9.6
TIME (MIN) =	240	DISCHARGE (CFS) =	13.6
TIME (MIN) =	260	DISCHARGE (CFS) =	48.6
TIME (MIN) =	280	DISCHARGE (CFS) =	7.7
TIME (MIN) =	300	DISCHARGE (CFS) =	5.2
TIME (MIN) =	320	DISCHARGE (CFS) =	4
TIME (MIN) =	340	DISCHARGE (CFS) =	3.4
TIME (MIN) =	360	DISCHARGE (CFS) =	2.9
TIME (MIN) =	380	DISCHARGE (CFS) =	0

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 300, EXISTING CONDITIONS: S300E100.TXT
TIME OF CONCENTRATION 16 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 95.54 ACRES
RUNOFF COEFFICIENT 0.36
PEAK DISCHARGE 151.3 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	16	DISCHARGE (CFS) =	7.1
TIME (MIN) =	32	DISCHARGE (CFS) =	7.6
TIME (MIN) =	48	DISCHARGE (CFS) =	7.8
TIME (MIN) =	64	DISCHARGE (CFS) =	8.4
TIME (MIN) =	80	DISCHARGE (CFS) =	8.7
TIME (MIN) =	96	DISCHARGE (CFS) =	9.5
TIME (MIN) =	112	DISCHARGE (CFS) =	9.9
TIME (MIN) =	128	DISCHARGE (CFS) =	11
TIME (MIN) =	144	DISCHARGE (CFS) =	11.7
TIME (MIN) =	160	DISCHARGE (CFS) =	13.4
TIME (MIN) =	176	DISCHARGE (CFS) =	14.5
TIME (MIN) =	192	DISCHARGE (CFS) =	17.7
TIME (MIN) =	208	DISCHARGE (CFS) =	20.2
TIME (MIN) =	224	DISCHARGE (CFS) =	29.7
TIME (MIN) =	240	DISCHARGE (CFS) =	40.3
TIME (MIN) =	256	DISCHARGE (CFS) =	151.3
TIME (MIN) =	272	DISCHARGE (CFS) =	23.8
TIME (MIN) =	288	DISCHARGE (CFS) =	15.9
TIME (MIN) =	304	DISCHARGE (CFS) =	12.5
TIME (MIN) =	320	DISCHARGE (CFS) =	10.4
TIME (MIN) =	336	DISCHARGE (CFS) =	9.1
TIME (MIN) =	352	DISCHARGE (CFS) =	8.1
TIME (MIN) =	368	DISCHARGE (CFS) =	7.4
TIME (MIN) =	384	DISCHARGE (CFS) =	0

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 400, EXISTING CONDITIONS: S400E100.TXT
TIME OF CONCENTRATION 17 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 11.9 ACRES
RUNOFF COEFFICIENT 0.48
PEAK DISCHARGE 24.5 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	17	DISCHARGE (CFS) =	1.2
TIME (MIN) =	34	DISCHARGE (CFS) =	1.3
TIME (MIN) =	51	DISCHARGE (CFS) =	1.3
TIME (MIN) =	68	DISCHARGE (CFS) =	1.4
TIME (MIN) =	85	DISCHARGE (CFS) =	1.5
TIME (MIN) =	102	DISCHARGE (CFS) =	1.6
TIME (MIN) =	119	DISCHARGE (CFS) =	1.8
TIME (MIN) =	136	DISCHARGE (CFS) =	1.9
TIME (MIN) =	153	DISCHARGE (CFS) =	2.1
TIME (MIN) =	170	DISCHARGE (CFS) =	2.3
TIME (MIN) =	187	DISCHARGE (CFS) =	2.8
TIME (MIN) =	204	DISCHARGE (CFS) =	3.2
TIME (MIN) =	221	DISCHARGE (CFS) =	4.7
TIME (MIN) =	238	DISCHARGE (CFS) =	6.1
TIME (MIN) =	255	DISCHARGE (CFS) =	24.5
TIME (MIN) =	272	DISCHARGE (CFS) =	3.8
TIME (MIN) =	289	DISCHARGE (CFS) =	2.5
TIME (MIN) =	306	DISCHARGE (CFS) =	2
TIME (MIN) =	323	DISCHARGE (CFS) =	1.7
TIME (MIN) =	340	DISCHARGE (CFS) =	1.4
TIME (MIN) =	357	DISCHARGE (CFS) =	1.3
TIME (MIN) =	374	DISCHARGE (CFS) =	0

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 100, PROPOSED CONDITIONS: S100P100.TXT
TIME OF CONCENTRATION 20 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 242.5 ACRES
RUNOFF COEFFICIENT 0.37
PEAK DISCHARGE 345.8 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	20	DISCHARGE (CFS) =	19
TIME (MIN) =	40	DISCHARGE (CFS) =	19.7
TIME (MIN) =	60	DISCHARGE (CFS) =	21.4
TIME (MIN) =	80	DISCHARGE (CFS) =	22.4
TIME (MIN) =	100	DISCHARGE (CFS) =	24.9
TIME (MIN) =	120	DISCHARGE (CFS) =	26.4
TIME (MIN) =	140	DISCHARGE (CFS) =	30.2
TIME (MIN) =	160	DISCHARGE (CFS) =	32.8
TIME (MIN) =	180	DISCHARGE (CFS) =	40.1
TIME (MIN) =	200	DISCHARGE (CFS) =	45.6
TIME (MIN) =	220	DISCHARGE (CFS) =	67
TIME (MIN) =	240	DISCHARGE (CFS) =	87
TIME (MIN) =	260	DISCHARGE (CFS) =	345.8
TIME (MIN) =	280	DISCHARGE (CFS) =	53.7
TIME (MIN) =	300	DISCHARGE (CFS) =	36
TIME (MIN) =	320	DISCHARGE (CFS) =	28.1
TIME (MIN) =	340	DISCHARGE (CFS) =	23.6
TIME (MIN) =	360	DISCHARGE (CFS) =	20.5
TIME (MIN) =	380	DISCHARGE (CFS) =	0

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 1000, PROPOSED CONDITIONS: S1000P100.TXT
TIME OF CONCENTRATION 8 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 23 ACRES
RUNOFF COEFFICIENT 0.63
PEAK DISCHARGE 102.5 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	8	DISCHARGE (CFS) =	3
TIME (MIN) =	16	DISCHARGE (CFS) =	3.1
TIME (MIN) =	24	DISCHARGE (CFS) =	3.2
TIME (MIN) =	32	DISCHARGE (CFS) =	3.2
TIME (MIN) =	40	DISCHARGE (CFS) =	3.3
TIME (MIN) =	48	DISCHARGE (CFS) =	3.4
TIME (MIN) =	56	DISCHARGE (CFS) =	3.5
TIME (MIN) =	64	DISCHARGE (CFS) =	3.6
TIME (MIN) =	72	DISCHARGE (CFS) =	3.7
TIME (MIN) =	80	DISCHARGE (CFS) =	3.8
TIME (MIN) =	88	DISCHARGE (CFS) =	3.9
TIME (MIN) =	96	DISCHARGE (CFS) =	4
TIME (MIN) =	104	DISCHARGE (CFS) =	4.2
TIME (MIN) =	112	DISCHARGE (CFS) =	4.3
TIME (MIN) =	120	DISCHARGE (CFS) =	4.6
TIME (MIN) =	128	DISCHARGE (CFS) =	4.7
TIME (MIN) =	136	DISCHARGE (CFS) =	5
TIME (MIN) =	144	DISCHARGE (CFS) =	5.2
TIME (MIN) =	152	DISCHARGE (CFS) =	5.5
TIME (MIN) =	160	DISCHARGE (CFS) =	5.7
TIME (MIN) =	168	DISCHARGE (CFS) =	6.2
TIME (MIN) =	176	DISCHARGE (CFS) =	6.5
TIME (MIN) =	184	DISCHARGE (CFS) =	7.3
TIME (MIN) =	192	DISCHARGE (CFS) =	7.7
TIME (MIN) =	200	DISCHARGE (CFS) =	8.8
TIME (MIN) =	208	DISCHARGE (CFS) =	9.6
TIME (MIN) =	216	DISCHARGE (CFS) =	11.7
TIME (MIN) =	224	DISCHARGE (CFS) =	13.3
TIME (MIN) =	232	DISCHARGE (CFS) =	19.5
TIME (MIN) =	240	DISCHARGE (CFS) =	23.7
TIME (MIN) =	248	DISCHARGE (CFS) =	102.5
TIME (MIN) =	256	DISCHARGE (CFS) =	15.7
TIME (MIN) =	264	DISCHARGE (CFS) =	10.5
TIME (MIN) =	272	DISCHARGE (CFS) =	8.2
TIME (MIN) =	280	DISCHARGE (CFS) =	6.9
TIME (MIN) =	288	DISCHARGE (CFS) =	6
TIME (MIN) =	296	DISCHARGE (CFS) =	5.3
TIME (MIN) =	304	DISCHARGE (CFS) =	4.8
TIME (MIN) =	312	DISCHARGE (CFS) =	4.5
TIME (MIN) =	320	DISCHARGE (CFS) =	4.1
TIME (MIN) =	328	DISCHARGE (CFS) =	3.9
TIME (MIN) =	336	DISCHARGE (CFS) =	3.6

TIME (MIN) =	344	DISCHARGE (CFS) =	3.4
TIME (MIN) =	352	DISCHARGE (CFS) =	3.3
TIME (MIN) =	360	DISCHARGE (CFS) =	3.1
TIME (MIN) =	368	DISCHARGE (CFS) =	0

Scenario Calculation Summary

Scenario Summary	
ID	27
Label	Watershed - 100
Notes	
Active Topology	Base Active Topology
Hydrology	Watershed - 100 - 100
Rainfall Runoff	Watershed - 100
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Watershed - 100

Output Summary			
Output Increment	1.000 min	Duration	5,520.000 min

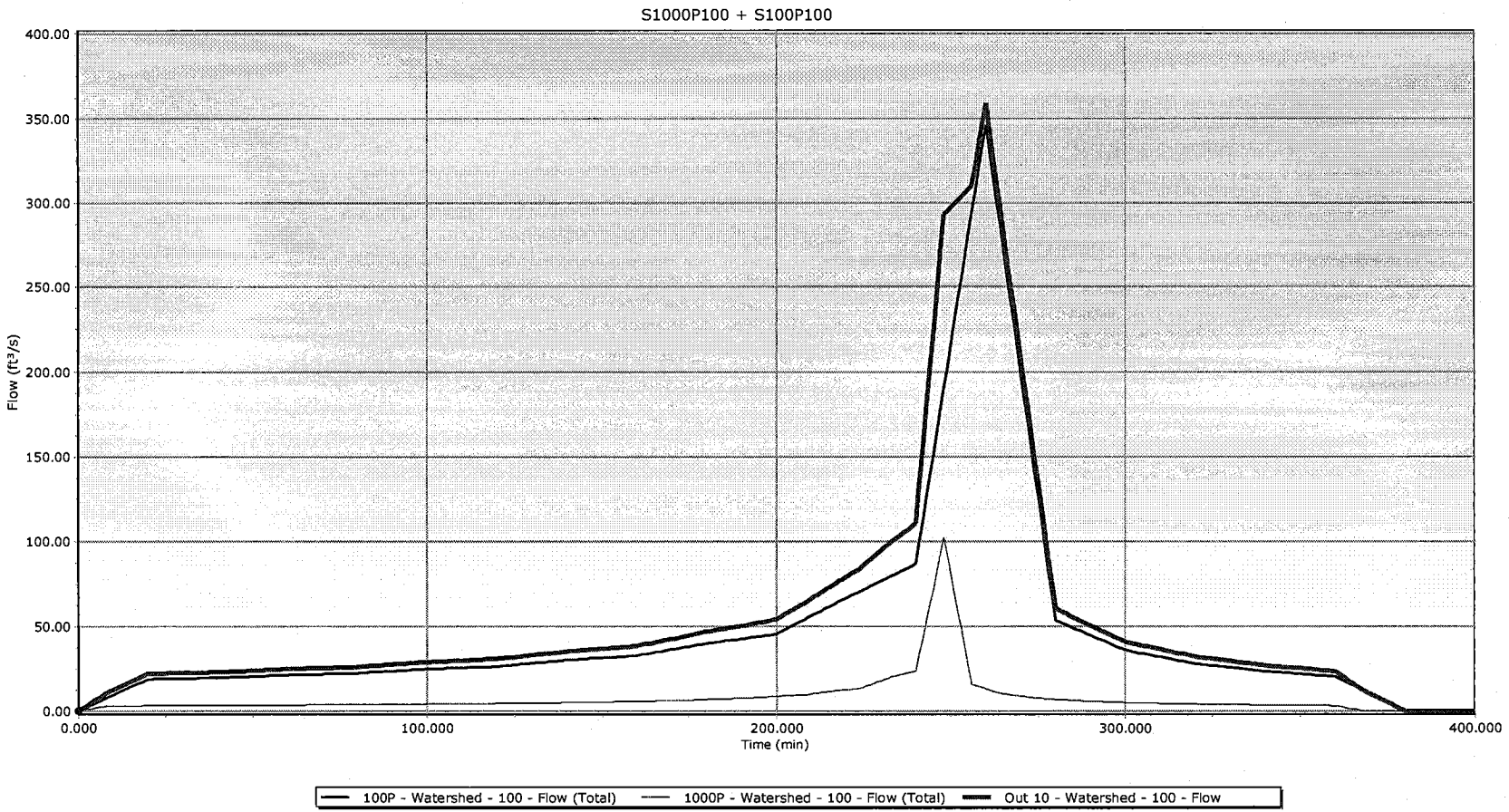
Rainfall Summary			
Return Event Tag	100	Rainfall Type	(N/A)
Total Depth	(N/A) in	Storm Event	(N/A)

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
1000P	Watershed - 100	0	None	4.198	248.000	102.50	(N/A)	(N/A)
100P	Watershed - 100	0	None	26.011	260.000	345.80	(N/A)	(N/A)
Out 10	Watershed - 100	0	None	30.209	260.000	358.90	(N/A)	(N/A)

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (min)	Peak Flow (ft^3/s)	End Point	Node Flow Direction


S1000P100 + S100P100
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Flow (ft³/s)
0.000
100.000
200.000
300.000
400.000
Time (min)
100P - Watershed - 100 - Flow (Total)
1000P - Watershed - 100 - Flow (Total)
Out 10 - Watershed - 100 - Flow

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 2000, PROPOSED CONDITIONS: S2000P100.TXT
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 63.3 ACRES
RUNOFF COEFFICIENT 0.75
PEAK DISCHARGE 280.1 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	10	DISCHARGE (CFS) =	9.9
TIME (MIN) =	20	DISCHARGE (CFS) =	10.1
TIME (MIN) =	30	DISCHARGE (CFS) =	10.5
TIME (MIN) =	40	DISCHARGE (CFS) =	10.7
TIME (MIN) =	50	DISCHARGE (CFS) =	11.2
TIME (MIN) =	60	DISCHARGE (CFS) =	11.5
TIME (MIN) =	70	DISCHARGE (CFS) =	12
TIME (MIN) =	80	DISCHARGE (CFS) =	12.3
TIME (MIN) =	90	DISCHARGE (CFS) =	13
TIME (MIN) =	100	DISCHARGE (CFS) =	13.3
TIME (MIN) =	110	DISCHARGE (CFS) =	14.2
TIME (MIN) =	120	DISCHARGE (CFS) =	14.6
TIME (MIN) =	130	DISCHARGE (CFS) =	15.7
TIME (MIN) =	140	DISCHARGE (CFS) =	16.3
TIME (MIN) =	150	DISCHARGE (CFS) =	17.7
TIME (MIN) =	160	DISCHARGE (CFS) =	18.6
TIME (MIN) =	170	DISCHARGE (CFS) =	20.6
TIME (MIN) =	180	DISCHARGE (CFS) =	21.8
TIME (MIN) =	190	DISCHARGE (CFS) =	25
TIME (MIN) =	200	DISCHARGE (CFS) =	27.1
TIME (MIN) =	210	DISCHARGE (CFS) =	33.1
TIME (MIN) =	220	DISCHARGE (CFS) =	37.8
TIME (MIN) =	230	DISCHARGE (CFS) =	55.4
TIME (MIN) =	240	DISCHARGE (CFS) =	78
TIME (MIN) =	250	DISCHARGE (CFS) =	280.1
TIME (MIN) =	260	DISCHARGE (CFS) =	44.5
TIME (MIN) =	270	DISCHARGE (CFS) =	29.7
TIME (MIN) =	280	DISCHARGE (CFS) =	23.3
TIME (MIN) =	290	DISCHARGE (CFS) =	19.5
TIME (MIN) =	300	DISCHARGE (CFS) =	17
TIME (MIN) =	310	DISCHARGE (CFS) =	15.1
TIME (MIN) =	320	DISCHARGE (CFS) =	13.7
TIME (MIN) =	330	DISCHARGE (CFS) =	12.6
TIME (MIN) =	340	DISCHARGE (CFS) =	11.7
TIME (MIN) =	350	DISCHARGE (CFS) =	11
TIME (MIN) =	360	DISCHARGE (CFS) =	10.3
TIME (MIN) =	370	DISCHARGE (CFS) =	0

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 300, PROPOSED CONDITIONS: S300P100.TXT
TIME OF CONCENTRATION 14 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 76 ACRES
RUNOFF COEFFICIENT 0.37
PEAK DISCHARGE 135.8 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	14	DISCHARGE (CFS) =	5.9
TIME (MIN) =	28	DISCHARGE (CFS) =	6.2
TIME (MIN) =	42	DISCHARGE (CFS) =	6.4
TIME (MIN) =	56	DISCHARGE (CFS) =	6.8
TIME (MIN) =	70	DISCHARGE (CFS) =	7
TIME (MIN) =	84	DISCHARGE (CFS) =	7.5
TIME (MIN) =	98	DISCHARGE (CFS) =	7.8
TIME (MIN) =	112	DISCHARGE (CFS) =	8.4
TIME (MIN) =	126	DISCHARGE (CFS) =	8.8
TIME (MIN) =	140	DISCHARGE (CFS) =	9.8
TIME (MIN) =	154	DISCHARGE (CFS) =	10.4
TIME (MIN) =	168	DISCHARGE (CFS) =	11.9
TIME (MIN) =	182	DISCHARGE (CFS) =	12.9
TIME (MIN) =	196	DISCHARGE (CFS) =	15.8
TIME (MIN) =	210	DISCHARGE (CFS) =	18
TIME (MIN) =	224	DISCHARGE (CFS) =	26.4
TIME (MIN) =	238	DISCHARGE (CFS) =	34.9
TIME (MIN) =	252	DISCHARGE (CFS) =	135.8
TIME (MIN) =	266	DISCHARGE (CFS) =	21.2
TIME (MIN) =	280	DISCHARGE (CFS) =	14.2
TIME (MIN) =	294	DISCHARGE (CFS) =	11.1
TIME (MIN) =	308	DISCHARGE (CFS) =	9.3
TIME (MIN) =	322	DISCHARGE (CFS) =	8.1
TIME (MIN) =	336	DISCHARGE (CFS) =	7.2
TIME (MIN) =	350	DISCHARGE (CFS) =	6.6
TIME (MIN) =	364	DISCHARGE (CFS) =	6
TIME (MIN) =	378	DISCHARGE (CFS) =	0

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 3000, PROPOSED CONDITIONS: S3000P100.TXT
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 5.93 ACRES
RUNOFF COEFFICIENT 0.8
PEAK DISCHARGE 28.1 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	10	DISCHARGE (CFS) =	1
TIME (MIN) =	20	DISCHARGE (CFS) =	1
TIME (MIN) =	30	DISCHARGE (CFS) =	1.1
TIME (MIN) =	40	DISCHARGE (CFS) =	1.1
TIME (MIN) =	50	DISCHARGE (CFS) =	1.1
TIME (MIN) =	60	DISCHARGE (CFS) =	1.1
TIME (MIN) =	70	DISCHARGE (CFS) =	1.2
TIME (MIN) =	80	DISCHARGE (CFS) =	1.2
TIME (MIN) =	90	DISCHARGE (CFS) =	1.3
TIME (MIN) =	100	DISCHARGE (CFS) =	1.3
TIME (MIN) =	110	DISCHARGE (CFS) =	1.4
TIME (MIN) =	120	DISCHARGE (CFS) =	1.5
TIME (MIN) =	130	DISCHARGE (CFS) =	1.6
TIME (MIN) =	140	DISCHARGE (CFS) =	1.6
TIME (MIN) =	150	DISCHARGE (CFS) =	1.8
TIME (MIN) =	160	DISCHARGE (CFS) =	1.9
TIME (MIN) =	170	DISCHARGE (CFS) =	2.1
TIME (MIN) =	180	DISCHARGE (CFS) =	2.2
TIME (MIN) =	190	DISCHARGE (CFS) =	2.5
TIME (MIN) =	200	DISCHARGE (CFS) =	2.7
TIME (MIN) =	210	DISCHARGE (CFS) =	3.3
TIME (MIN) =	220	DISCHARGE (CFS) =	3.8
TIME (MIN) =	230	DISCHARGE (CFS) =	5.5
TIME (MIN) =	240	DISCHARGE (CFS) =	7.7
TIME (MIN) =	250	DISCHARGE (CFS) =	28.1
TIME (MIN) =	260	DISCHARGE (CFS) =	4.4
TIME (MIN) =	270	DISCHARGE (CFS) =	3
TIME (MIN) =	280	DISCHARGE (CFS) =	2.3
TIME (MIN) =	290	DISCHARGE (CFS) =	1.9
TIME (MIN) =	300	DISCHARGE (CFS) =	1.7
TIME (MIN) =	310	DISCHARGE (CFS) =	1.5
TIME (MIN) =	320	DISCHARGE (CFS) =	1.4
TIME (MIN) =	330	DISCHARGE (CFS) =	1.3
TIME (MIN) =	340	DISCHARGE (CFS) =	1.2
TIME (MIN) =	350	DISCHARGE (CFS) =	1.1
TIME (MIN) =	360	DISCHARGE (CFS) =	1
TIME (MIN) =	370	DISCHARGE (CFS) =	0

Scenario Calculation Summary

Scenario Summary	
ID	27
Label	Watershed - 100
Notes	
Active Topology	Base Active Topology
Hydrology	Watershed - 100 - 100
Rainfall Runoff	Watershed - 100
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Watershed - 100

Output Summary			
Output Increment	1.000 min	Duration	5,520.000 min

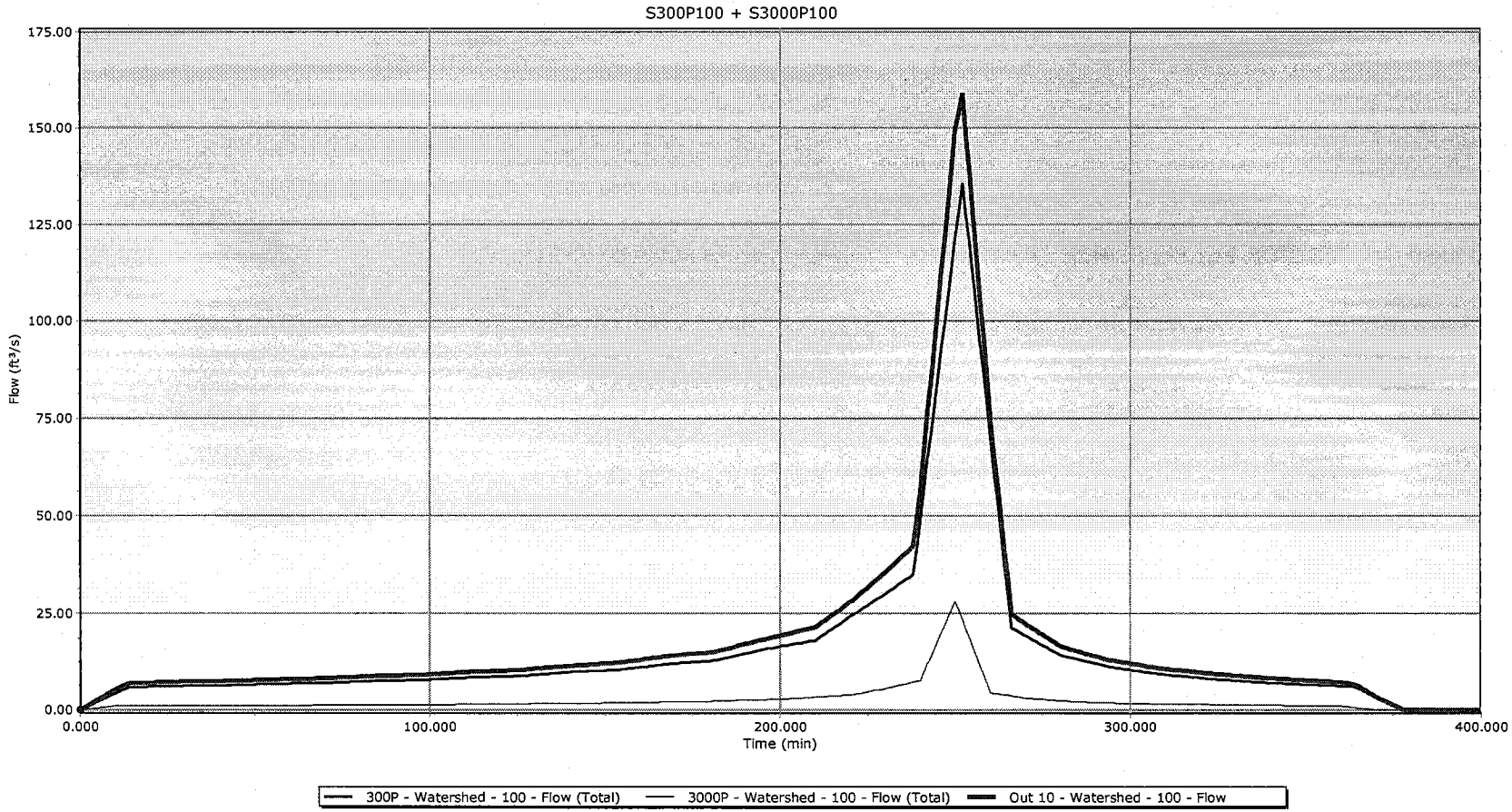
Rainfall Summary			
Return Event Tag	100	Rainfall Type	(N/A)
Total Depth	(N/A) in	Storm Event	(N/A)

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
3000P	Watershed - 100	0	None	1.376	250.000	28.10	(N/A)	(N/A)
300P	Watershed - 100	0	None	8.184	252.000	135.80	(N/A)	(N/A)
Out 10	Watershed - 100	0	None	9.560	252.000	159.16	(N/A)	(N/A)

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (min)	Peak Flow (ft^3/s)	End Point	Node Flow Direction


S300P100 + S3000P100
175.00
150.00
125.00
100.00
75.00
50.00
25.00
0.00
Flow (ft³/s)
0.000
100.000
200.000
300.000
400.000
Time (min)
300P - Watershed - 100 - Flow (Total)
3000P - Watershed - 100 - Flow (Total)
Out 10 - Watershed - 100 - Flow

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 4000, PROPOSED CONDITIONS: S4000P100.TXT
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 10.5 ACRES
RUNOFF COEFFICIENT 0.83
PEAK DISCHARGE 67.5 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	7	DISCHARGE (CFS) =	1.8
TIME (MIN) =	14	DISCHARGE (CFS) =	1.9
TIME (MIN) =	21	DISCHARGE (CFS) =	1.9
TIME (MIN) =	28	DISCHARGE (CFS) =	1.9
TIME (MIN) =	35	DISCHARGE (CFS) =	2
TIME (MIN) =	42	DISCHARGE (CFS) =	2
TIME (MIN) =	49	DISCHARGE (CFS) =	2.1
TIME (MIN) =	56	DISCHARGE (CFS) =	2.1
TIME (MIN) =	63	DISCHARGE (CFS) =	2.2
TIME (MIN) =	70	DISCHARGE (CFS) =	2.2
TIME (MIN) =	77	DISCHARGE (CFS) =	2.3
TIME (MIN) =	84	DISCHARGE (CFS) =	2.3
TIME (MIN) =	91	DISCHARGE (CFS) =	2.4
TIME (MIN) =	98	DISCHARGE (CFS) =	2.5
TIME (MIN) =	105	DISCHARGE (CFS) =	2.6
TIME (MIN) =	112	DISCHARGE (CFS) =	2.6
TIME (MIN) =	119	DISCHARGE (CFS) =	2.8
TIME (MIN) =	126	DISCHARGE (CFS) =	2.8
TIME (MIN) =	133	DISCHARGE (CFS) =	3
TIME (MIN) =	140	DISCHARGE (CFS) =	3.1
TIME (MIN) =	147	DISCHARGE (CFS) =	3.3
TIME (MIN) =	154	DISCHARGE (CFS) =	3.4
TIME (MIN) =	161	DISCHARGE (CFS) =	3.6
TIME (MIN) =	168	DISCHARGE (CFS) =	3.8
TIME (MIN) =	175	DISCHARGE (CFS) =	4.1
TIME (MIN) =	182	DISCHARGE (CFS) =	4.3
TIME (MIN) =	189	DISCHARGE (CFS) =	4.8
TIME (MIN) =	196	DISCHARGE (CFS) =	5
TIME (MIN) =	203	DISCHARGE (CFS) =	5.8
TIME (MIN) =	210	DISCHARGE (CFS) =	6.3
TIME (MIN) =	217	DISCHARGE (CFS) =	7.7
TIME (MIN) =	224	DISCHARGE (CFS) =	8.7
TIME (MIN) =	231	DISCHARGE (CFS) =	12.8
TIME (MIN) =	238	DISCHARGE (CFS) =	15.2
TIME (MIN) =	245	DISCHARGE (CFS) =	67.5
TIME (MIN) =	252	DISCHARGE (CFS) =	10.3
TIME (MIN) =	259	DISCHARGE (CFS) =	6.9
TIME (MIN) =	266	DISCHARGE (CFS) =	5.4
TIME (MIN) =	273	DISCHARGE (CFS) =	4.5
TIME (MIN) =	280	DISCHARGE (CFS) =	3.9
TIME (MIN) =	287	DISCHARGE (CFS) =	3.5
TIME (MIN) =	294	DISCHARGE (CFS) =	3.2

TIME (MIN) =	301	DISCHARGE (CFS) =	2.9
TIME (MIN) =	308	DISCHARGE (CFS) =	2.7
TIME (MIN) =	315	DISCHARGE (CFS) =	2.5
TIME (MIN) =	322	DISCHARGE (CFS) =	2.4
TIME (MIN) =	329	DISCHARGE (CFS) =	2.3
TIME (MIN) =	336	DISCHARGE (CFS) =	2.1
TIME (MIN) =	343	DISCHARGE (CFS) =	2
TIME (MIN) =	350	DISCHARGE (CFS) =	2
TIME (MIN) =	357	DISCHARGE (CFS) =	1.9
TIME (MIN) =	364	DISCHARGE (CFS) =	0

RATIONAL METHOD HYDROGRAPH PROGRAM

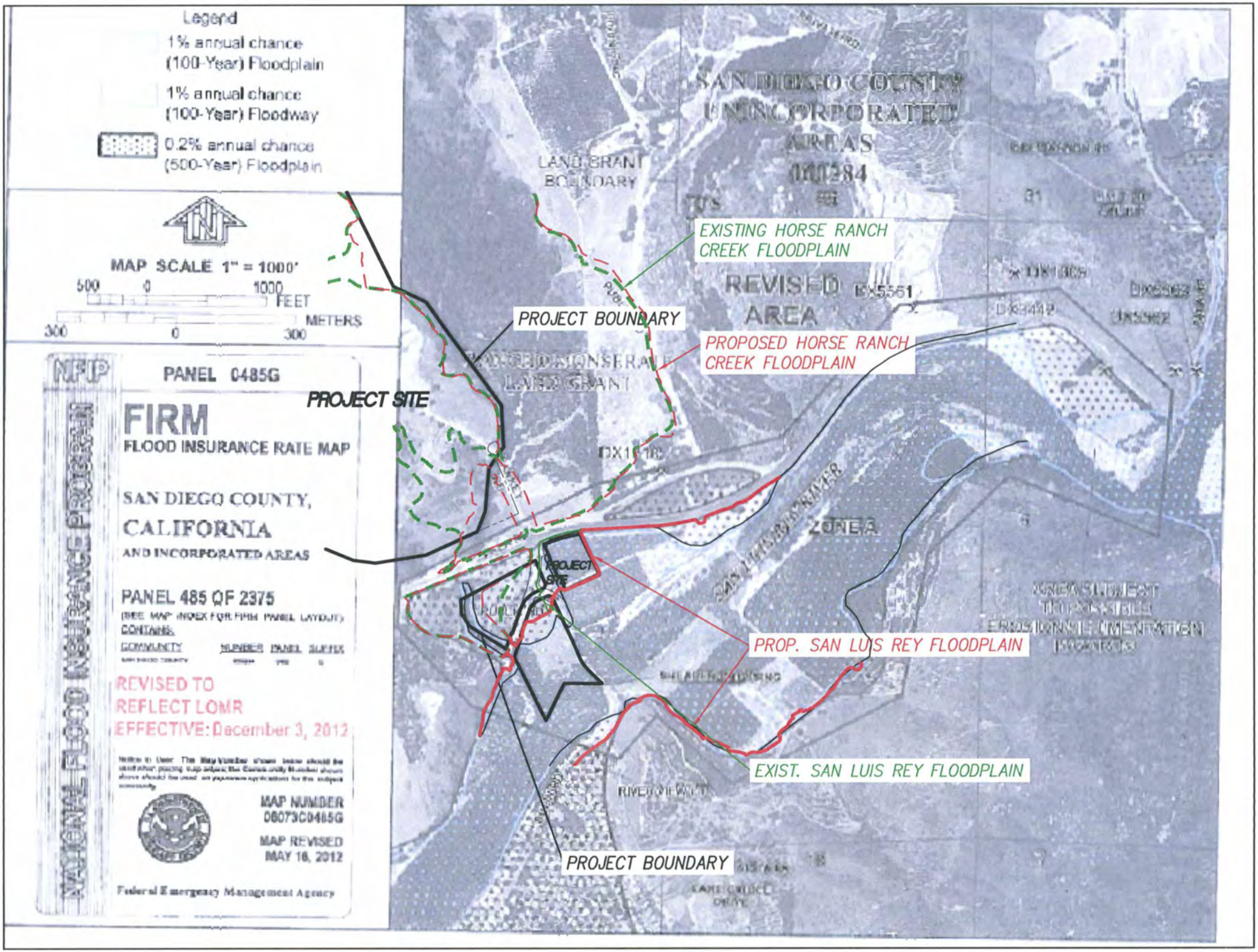
RUN DATE 10/3/2012
HYDROGRAPH FILE NAME SYSTEM 4000, ALTERNATE CONDITION OPTION #1: S4001P100.TXT
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 3.5 INCHES
BASIN AREA 11.9 ACRES
RUNOFF COEFFICIENT 0.82
PEAK DISCHARGE 76.6 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	7	DISCHARGE (CFS) =	2
TIME (MIN) =	14	DISCHARGE (CFS) =	2.1
TIME (MIN) =	21	DISCHARGE (CFS) =	2.1
TIME (MIN) =	28	DISCHARGE (CFS) =	2.2
TIME (MIN) =	35	DISCHARGE (CFS) =	2.2
TIME (MIN) =	42	DISCHARGE (CFS) =	2.3
TIME (MIN) =	49	DISCHARGE (CFS) =	2.3
TIME (MIN) =	56	DISCHARGE (CFS) =	2.4
TIME (MIN) =	63	DISCHARGE (CFS) =	2.4
TIME (MIN) =	70	DISCHARGE (CFS) =	2.5
TIME (MIN) =	77	DISCHARGE (CFS) =	2.6
TIME (MIN) =	84	DISCHARGE (CFS) =	2.6
TIME (MIN) =	91	DISCHARGE (CFS) =	2.7
TIME (MIN) =	98	DISCHARGE (CFS) =	2.8
TIME (MIN) =	105	DISCHARGE (CFS) =	2.9
TIME (MIN) =	112	DISCHARGE (CFS) =	3
TIME (MIN) =	119	DISCHARGE (CFS) =	3.1
TIME (MIN) =	126	DISCHARGE (CFS) =	3.2
TIME (MIN) =	133	DISCHARGE (CFS) =	3.4
TIME (MIN) =	140	DISCHARGE (CFS) =	3.5
TIME (MIN) =	147	DISCHARGE (CFS) =	3.7
TIME (MIN) =	154	DISCHARGE (CFS) =	3.8
TIME (MIN) =	161	DISCHARGE (CFS) =	4.1
TIME (MIN) =	168	DISCHARGE (CFS) =	4.2
TIME (MIN) =	175	DISCHARGE (CFS) =	4.6
TIME (MIN) =	182	DISCHARGE (CFS) =	4.8
TIME (MIN) =	189	DISCHARGE (CFS) =	5.3
TIME (MIN) =	196	DISCHARGE (CFS) =	5.6
TIME (MIN) =	203	DISCHARGE (CFS) =	6.5
TIME (MIN) =	210	DISCHARGE (CFS) =	7
TIME (MIN) =	217	DISCHARGE (CFS) =	8.6
TIME (MIN) =	224	DISCHARGE (CFS) =	9.8
TIME (MIN) =	231	DISCHARGE (CFS) =	14.3
TIME (MIN) =	238	DISCHARGE (CFS) =	16
TIME (MIN) =	245	DISCHARGE (CFS) =	76.6
TIME (MIN) =	252	DISCHARGE (CFS) =	11.5
TIME (MIN) =	259	DISCHARGE (CFS) =	7.7
TIME (MIN) =	266	DISCHARGE (CFS) =	6
TIME (MIN) =	273	DISCHARGE (CFS) =	5
TIME (MIN) =	280	DISCHARGE (CFS) =	4.4
TIME (MIN) =	287	DISCHARGE (CFS) =	3.9

TIME (MIN) =	294	DISCHARGE (CFS) =	3.6
TIME (MIN) =	301	DISCHARGE (CFS) =	3.3
TIME (MIN) =	308	DISCHARGE (CFS) =	3
TIME (MIN) =	315	DISCHARGE (CFS) =	2.8
TIME (MIN) =	322	DISCHARGE (CFS) =	2.7
TIME (MIN) =	329	DISCHARGE (CFS) =	2.5
TIME (MIN) =	336	DISCHARGE (CFS) =	2.4
TIME (MIN) =	343	DISCHARGE (CFS) =	2.3
TIME (MIN) =	350	DISCHARGE (CFS) =	2.2
TIME (MIN) =	357	DISCHARGE (CFS) =	2.1
TIME (MIN) =	364	DISCHARGE (CFS) =	0

APPENDIX 6

FEMA FIRM Panel


Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
MAP SCALE 1" = 1000'
500 0 1000 FEET
300 0 300 METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0485G
FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 485 OF 2375
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
REVISED TO REFLECT LOMR EFFECTIVE: December 3, 2012
MAP NUMBER 06073C0485G
MAP REVISED MAY 16, 2012
Federal Emergency Management Agency
PROJECT SITE
SAN DIEGO COUNTY UNINCORPORATED AREAS
060284
LAND GRANT BOUNDARY
EXISTING HORSE RANCH CREEK FLOODPLAIN
REVISED AREA
PROJECT BOUNDARY
PROPOSED HORSE RANCH CREEK FLOODPLAIN
PROJECT SITE
PROP. SAN LUIS REY FLOODPLAIN
EXIST. SAN LUIS REY FLOODPLAIN
PROJECT BOUNDARY

EXISTING HORSE RANCH CREEK FLOODPLAIN

PROJECT BOUNDARY

PROPOSED HORSE RANCH CREEK FLOODPLAIN

PROJECT SITE

PROP. SAN LUIS REY FLOODPLAIN

EXIST. SAN LUIS REY FLOODPLAIN

PROJECT BOUNDARY

SAN DIEGO COUNTY
UNINCORPORATED AREAS
060284

ZONE X

ZONE A

MAP SCALE 1" = 1000'

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0485G

FIRM

FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 485 OF 2375

MAP NUMBER
06073C0485G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

APPENDIX 7

Calculations for Caltrans Sump (Outfall #3)

PROJECTDESIGN CONSULTANTS
PLANNING ENGINEERING SURVEYING
701 B Street, Suite 720, San Diego, CA 92101
(619) 235-6471 • Fax (619) 234-0349

PAGE _____ OF _____
JOB NO. 3631.10
DRAWN BY CP DATE 4/23/10
CHECKED BY _____ DATE _____

PROJECT CPW
SUBJECT Sump

The following 5 pages are excerpts from the URS Roadway Study. Retention volume below 72" culvert = 11.0 AF per URS analysis. This could not be confirmed w/ PDC's topo.

See survey shot exhibit. Per field shots, upstream invert is actually lower than downstream invert.

Top 72" RCP = 262.42

ie 72" RCP = 262.42 − diameter − thickness of pipe
= 262.42 − 6 − 7/12
= 255.84' [NGVD 29]

OUTLET STRUCTURE INPUT DATA

Structure ID = CV
Structure Type = Culvert-Circular

No. Barrels	=	1	
Barrel Diameter	=	182.9	cm
Upstream Invert	=	78.980	m
Dnstream Invert	=	78.690	m
Horiz. Length	=	57.497	m
Barrel Length	=	57.498	m
Barrel Slope	=	.00504	m/m

NAVD88 = 259.12' NAVD 88
= 256.98 NGVD 29

OUTLET CONTROL DATA...

Mannings n	=	.0130	
Ke	=	.2000	(forward entrance loss)
Kb	=	.0008743	(per m of full flow)
Kr	=	.2000	(reverse entrance loss)
HW Convergence	=	.0003	+/- m

INLET CONTROL DATA...

Equation form	=	1
Inlet Control K	=	.0045
Inlet Control M	=	2.0000
Inlet Control c	=	.03170
Inlet Control Y	=	.6900
T1 ratio (HW/D)	=	1.093
T2 ratio (HW/D)	=	1.195
Slope Factor	=	-.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...
At T1 Elev = 80.978 m ---> Flow = 6.8641 cms
At T2 Elev = 81.165 m ---> Flow = 7.8446 cms

Elev. (ft) (NGVD 29)

Elevation (m)	Planimeter (sq.cm)	Area (sq.m)	A1+A2+sqr(A1*A2) (sq.m)	Volume (cu.m)	Volume Sum (cu.m)	
76.999	-----	.0	.0	.0	.0	
77.498	-----	2043.9	2043.9	340.6	340.6	
78.001	-----	8064.0	14167.6	2375.0	2715.6	
78.480	-----	11427.1	29090.4	4640.3	7355.9	
[256.98] 78.980	-----	13517.4	37372.8	6227.2	13583.1	= 11.01 AF
79.980	-----	20903.2	51230.0	17072.3	30655.4	
81.979	-----	27870.9	72911.0	48595.1	79250.5	

spilling into 72" culvert

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	76	R28.0-30.1	58	151

Hadi R. Samir 2/14/08
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER — HADI SAMIT — No. 46173 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

GRANITE CONSTRUCTION COMPANY
38000 MONROE STREET
INDIO, CALIFORNIA 92203

URS CORPORATION
1615 MURRAY CANYON RD, SUITE 1000
SAN DIEGO, CALIFORNIA 92108

DESIGN OVERSIGHT | CALCULATED/ DESIGNED BY | CHECKED BY

DATE	REVISION No.	DATE REVISED

(a) RIPRAP ENERGY DISSIPATOR (SEE DRAINAGE DETAIL ON SHEET DD-1)
(6) (b) CUTOFF WALL (SEE DRAINAGE DETAIL SHEET DD-4)
(c) CONCRETE TRAPEZOIDAL DITCH (SEE DRAINAGE DETAIL SHEET DD-3)

(7) (a) BIOSWALE (SEE DRAINAGE DETAIL SHEET DD-3)

(8) SEE DRAINAGE PROFILE SHEET DP-1

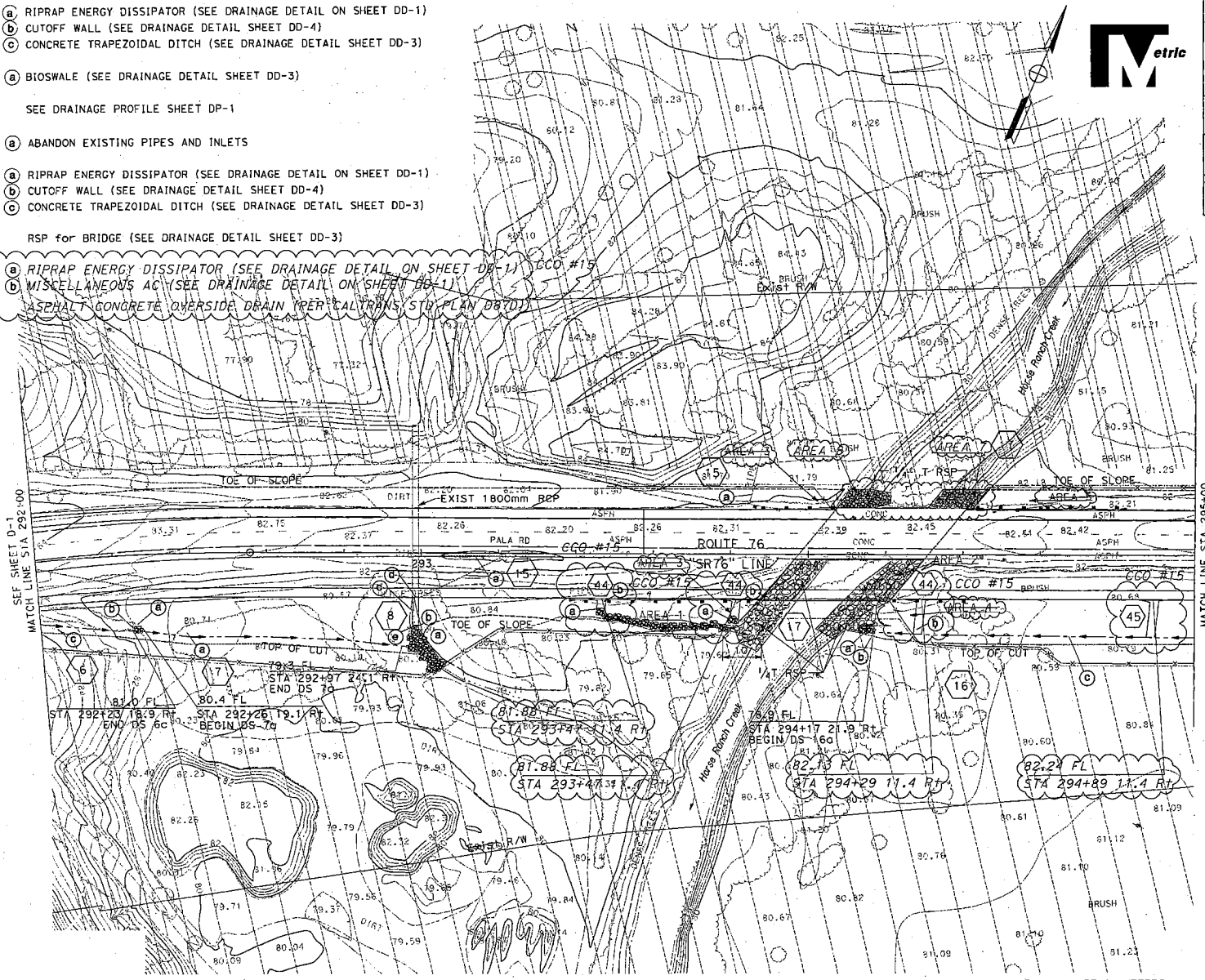
(15) (a) ABANDON EXISTING PIPES AND INLETS

(a) RIPRAP ENERGY DISSIPATOR (SEE DRAINAGE DETAIL ON SHEET DD-1)
(16) (b) CUTOFF WALL (SEE DRAINAGE DETAIL SHEET DD-4)
(c) CONCRETE TRAPEZOIDAL DITCH (SEE DRAINAGE DETAIL SHEET DD-3)

(17) RSP for BRIDGE (SEE DRAINAGE DETAIL SHEET DD-3)

(44) (a) RIPRAP ENERGY DISSIPATOR (SEE DRAINAGE DETAIL ON SHEET DD-1)
(b) MISCELLANEOUS AC (SEE DRAINAGE DETAIL ON SHEET DD-1)

(45) ASPHALT CONCRETE OVERSIDE DRAIN (PER CALTRANS STD PLAN D87D)



THIS PLAN ACCURATE FOR DRAINAGE WORK ONLY.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

11-08-NMC-0245

PERMIT NUMBER 11- ~~231504~~
CO SD RTE 76 PM R28.0-30.1
AS-BUILT PLANS FOR ROADWAY GEOMETRIC AND ABOVE GROUND FEATURES

STATE REPRESENTATIVE — DATE 3-15-11

DRAINAGE PLAN

SCALE 1:500

D-2

USERNAME => Daniel_Nutter
DGN FILE => ...\08 Drainage\1a002.dgn

CU 00000 | EA 231501

LAST REVISION 00-00-00 | DATE PLOTTED => 1/21/2011 | TIME PLOTTED => 11:33:56 PM

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	76	R28.0-30.1	64	161

Hadi R. Sami — 2/14/08
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — HADI SAMII — No. 46173 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

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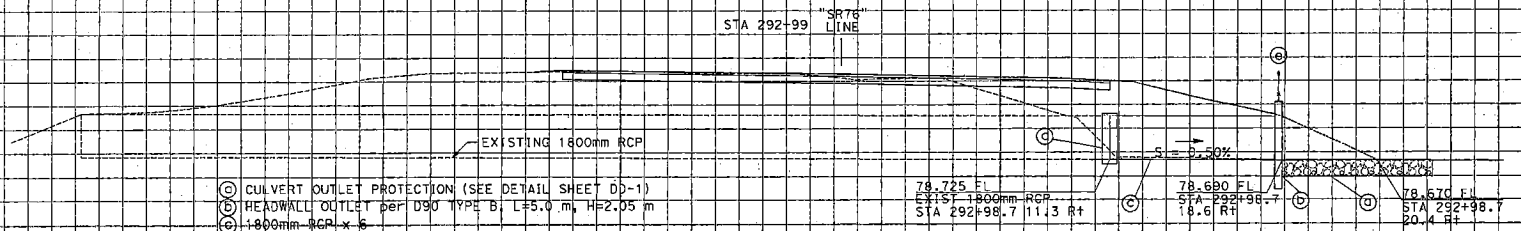
GRANITE CONSTRUCTION
38000 MONROE STREET
INDIO, CALIFORNIA 92203

URS CORPORATION
1615 MURRAY CANYON RD, SUITE 1000
SAN DIEGO, CALIFORNIA 92108

DATE	REVISION No.	DATE REVISED
XXX	XXX	

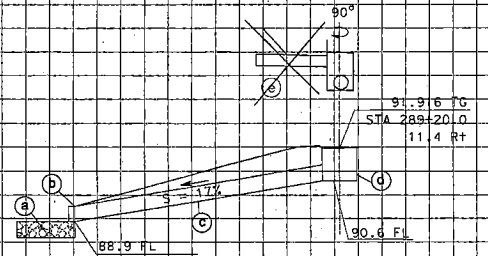
CALCULATED/ DESIGNED BY
CHECKED BY
DESIGN OVERSIGHT

NOTE:
1. FES SHALL BE TYPE A
2. STORM DRAIN FLOW LINE ELEVATIONS SHALL BE LOCATED AT THE LIMIT OF PAYMENT FOR THE STORM DRAIN



ⓒ CULVERT OUTLET PROTECTION (SEE DETAIL SHEET DD-1)
ⓑ HEADWALL OUTLET per D90 TYPE B, L=5.0 m, H=2.05 m
ⓒ 1800mm RCP x 6
ⓒ CONCRETE COLLAR (SEE DRAINAGE DETAIL SHEET DD-4)
ⓔ CABLE RAILING PER B11-47, L=5.0 m

DRAINAGE SYSTEM No. 8



ⓐ CULVERT OUTLET PROTECTION (SEE DETAIL ON SHEET DD-1)
ⓑ HEADWALL PER D89, L=2.5 m, H=1.1 m
ⓒ 600 mm RCP x 10
ⓓ INLET TYPE G1
ⓔ GRATED LINE DRAIN WITH REMOVABLE GRATES x 3 — NO GLD ON D-1 (ELIMINATED)

DRAINAGE SYSTEM No. 1

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

11-08.NMC-0245
PERMIT NUMBER 11-~~231564~~
CO SD RTE 76 PM R28.0-30.1
AS-BUILT PLANS FOR ROADWAY GEOMETRIC AND ABOVE GROUND FEATURES
STATE REPRESENTATIVE — DATE

DRAINAGE PROFILES

SCALE: HORIZ 1:100 VERT 1:100

DP-1

Station	
m^3	Exc Emb

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS — 0 20 40 60 80

USERNAME => Daniel_Nutter
DGN-FILE => ...\09 Drainage Profiles\ib001.dgn

CU 00000 | EA 231501

LAST REVISION 00-00-00 | DATE PLOTTED => 1/27/2011 | TIME PLOTTED => 1:31:53 PM

Vertical Control Monument
Second Order or Better

Horizontal Control Monument
Second Order or Better

Vertical Control Monument
Third Order

Horizontal Control Monument
Second Order or Better

Horizontal Control Monument & Bench Mark
Second Order or Better

Horizontal Control Monument
Third Order

Horizontal Control Monument & Bench Mark
Third Order

Bench Mark
Second Order or Better

Vertical Control Monument
Third Order

T 15 S / T 16 S — Found Section, Grant or Subdivision Corner.

Photograph, Nadir Point

Geographic Tick

DARIES IN ORDER OF PRECEDENCE

National

County

City (*Use at Border with County*)

within Bdry. Reservation

within Bdry. National, State or County Park

within Bdry. Land Grant

S / 3 — Township, Range, Section or Subdivision (*Name of Subdivision within Bdry.*)

426N

IED UNDER THE DIRECTION OF
UNTY ENGINEER OF THE
Y OF SAN DIEGO, CALIFORNIA.

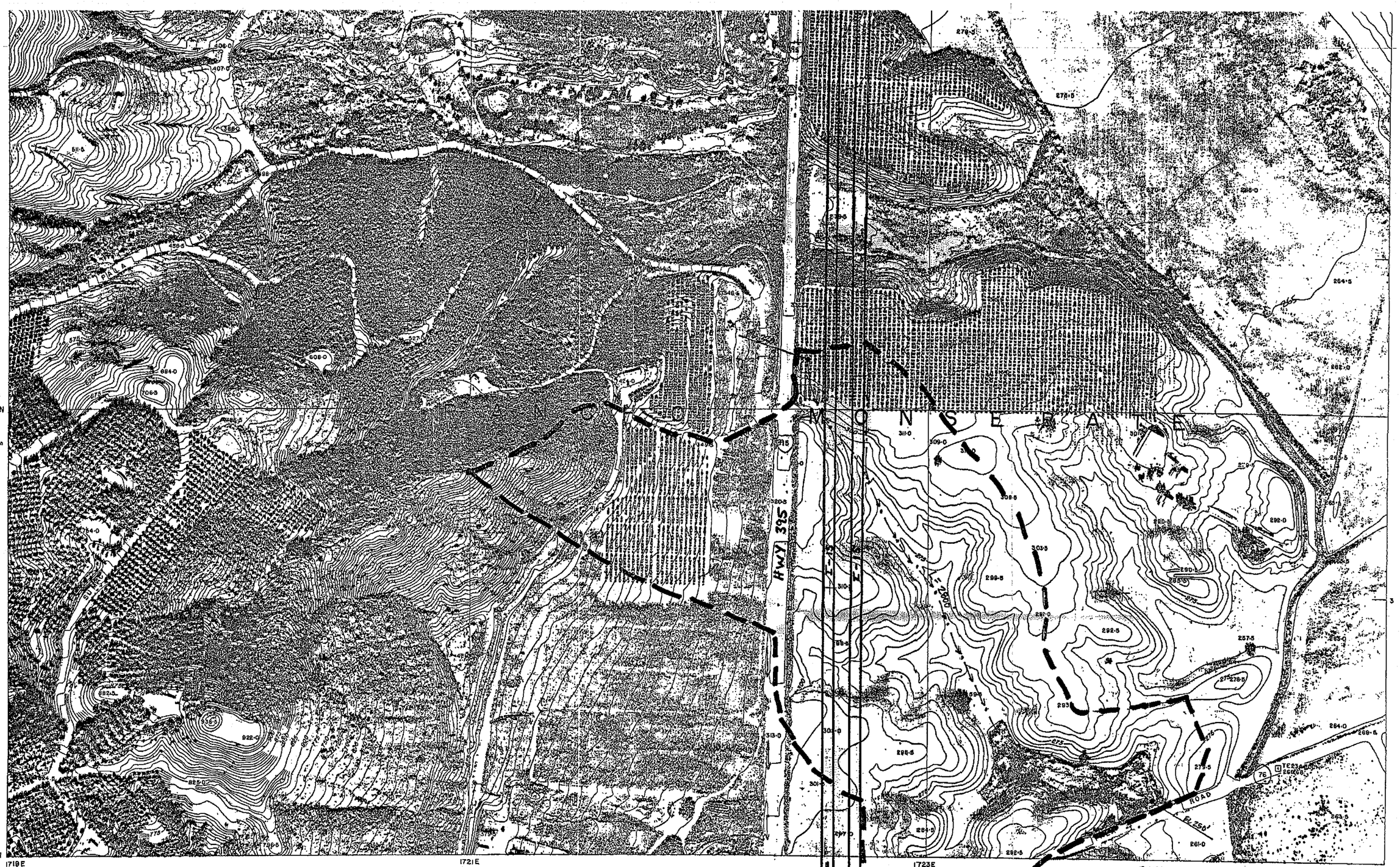
ONTROL DATA FURNISHED BY
UNTY OF SAN DIEGO.

NTAL CONTROL IS BASED ON
AMERICAN 1927 DATUM.

.INES SHOWN ARE APPROXIMATE.

RAPHY COMPILED BY PHOTO-
ETRIC METHODS FROM
RAPHY DATED: 12-2-73

PHOTO IMAGE PREPARED FROM
RAPHY DATED: 1-15-74



SCALE 1:2400

200 0 200 400 600 800 1000

CONTOUR INTERVAL 5 FEET

U. S. C. & G. S. SEA LEVEL DATUM OF 1929

TWO THOUSAND FOOT CALIFORNIA RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
THE RECTANGULAR COORDINATE VALUES ARE SHOWN ON THE SOUTH AND WEST MARGINS
THE GEOGRAPHIC VALUES ARE SHOWN ON THE NORTH AND EAST MARGINS

INDEX TO ADJOINING SHEETS

430-1713	430-1719	430-1725
426-1713	426-1719	426-1725
422-1713	422-1719	422-1725

PUGH - NOLTE & ASSOCIATES
PHOTOGRAMMETRIC ENGINEERS

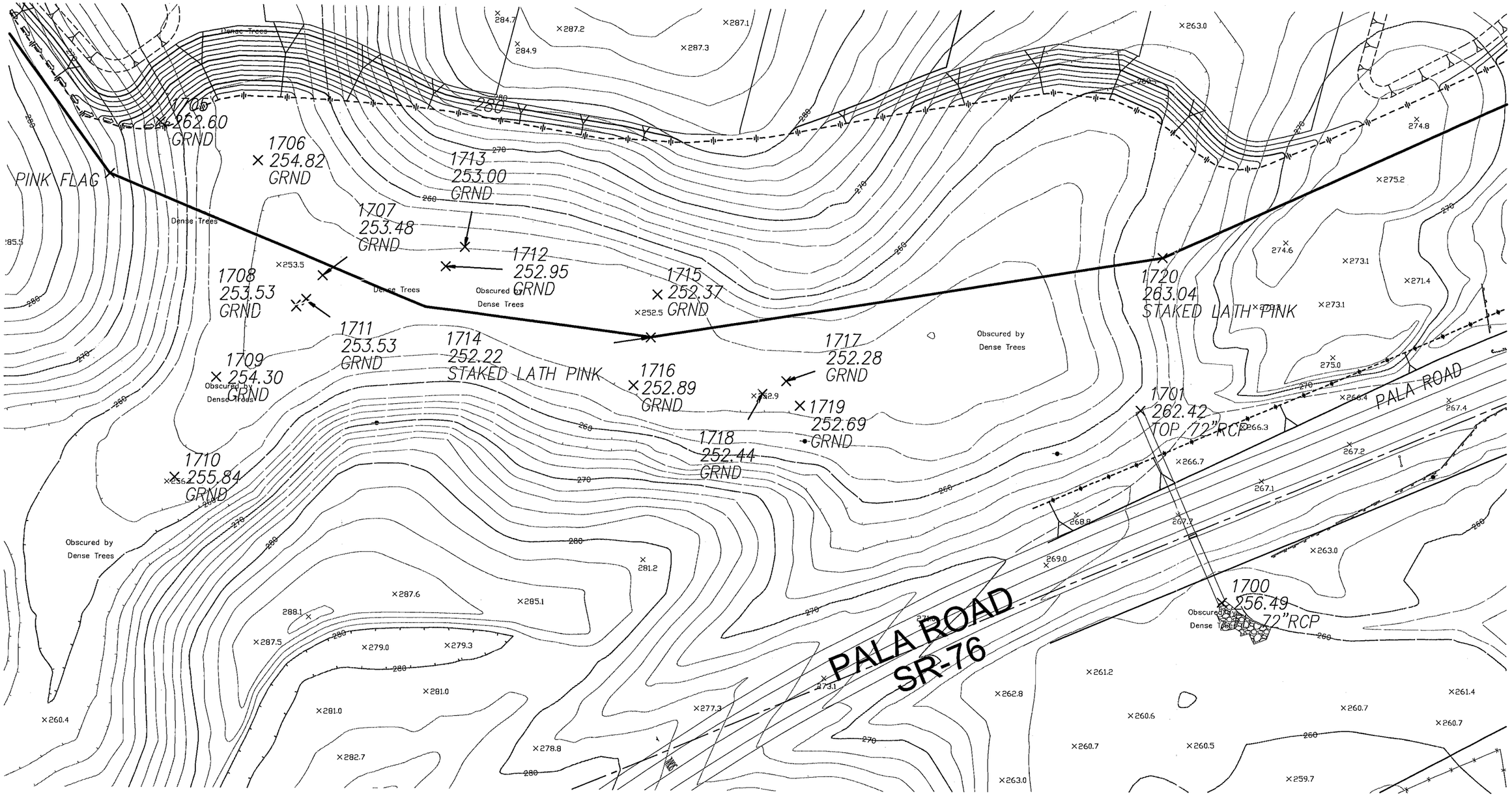
SAN DIEGO COUNTY
CALIFORNIA

EDITION OF 1973

EXHIBIT A

SHEET 3 OF 3

SHEET 426-17



1"=80'

N

PDC Survey Shots
of Sump Area

APPENDIX 8

Interstate 15 Storm Drain As-builts

COUNTY OF SAN DIEGO

RANCHO MONTE VISTA ESTATE

PALA MESA DRIVE

PALA MESA DRIVE OVERCROSSING
BR. NO. 57-913

"LT LN"

"RT LN"

"PMR"

"B-1"

"B-4"

HINGE ℄ R/W

SLOPE STAKE

See Detail "A" On Sht. 33 C.C.O. #43

See Detail "A" On Sht. 33 C.C.O. #43

Mod. Dike

"S" Dike (6")

2" Plastic Pipe Slotted

Cultivated

Orchard

Dry Wash

EXIST. 72" RCP

EXIST. 30" RCP

EXIST. 72" CSP

Escondido

Riverside

"AS BUILT"

CONTRACT 11-09

YEAR COMPLETED

DRAINAGE & CONTOUR

64 65 66 66-1 67 94

SCAL

SHEE

E. A. 096091

ct Engineer	Date	Design Engineer	Date	Approval Recommended By	Date		

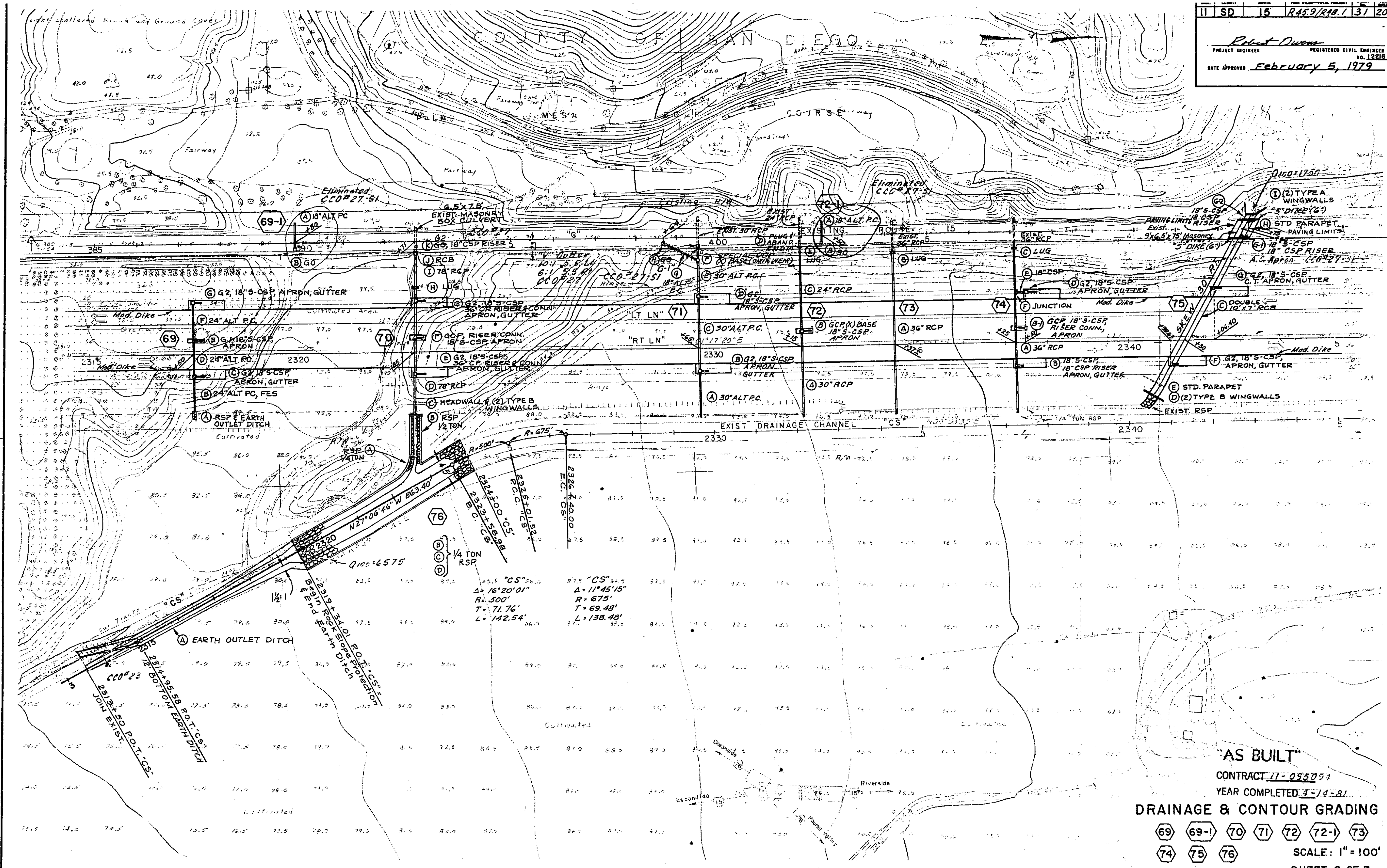
11	SD	15	R4

Robert Quass
PROJECT ENGINEER

DATE APPROVED Februa

11	SD	15	R45.9/R48.1	31	208

Robert Owens
PROJECT ENGINEER — REGISTERED CIVIL ENGINEER No. 12216
DATE APPROVED February 5, 1979



"AS BUILT"
CONTRACT 11-095094
YEAR COMPLETED 4-14-81

DRAINAGE & CONTOUR GRADING

69 69-1 70 71 72 72-1 73 74 75 76

SCALE: 1" = 100'

SHEET 6 OF 7

E.A. 095091

Project Engineer	Date	Design Engineer	Date	Approval Recommended By	Date
R. Owens		J.O. Gray		J.O. Grasberger	

11203-095091

30

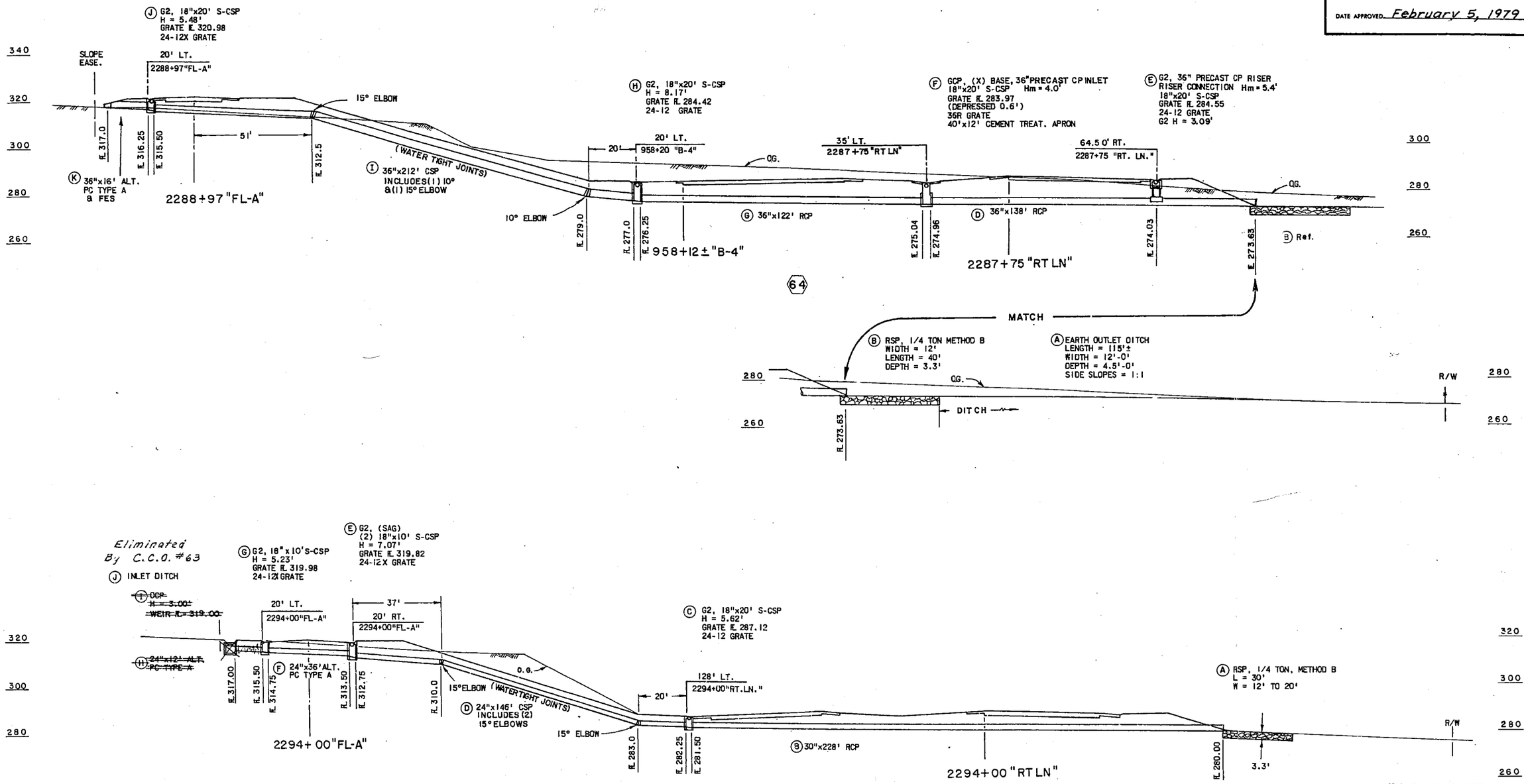
31

AS BUILT PLANS
Contract No 11-095094
Date Completed 4-14-81

11	SD	15	R45.9/R48.1	42	208

Robert Owens
PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO. 12216

DATE APPROVED. February 5, 1979



"AS BUILT"
CONTRACT 11-095094
YEAR COMPLETED 4-14-81

DRAINAGE PROFILES
64 65

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

SHEET 10 OF 19

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

11208 - 095091

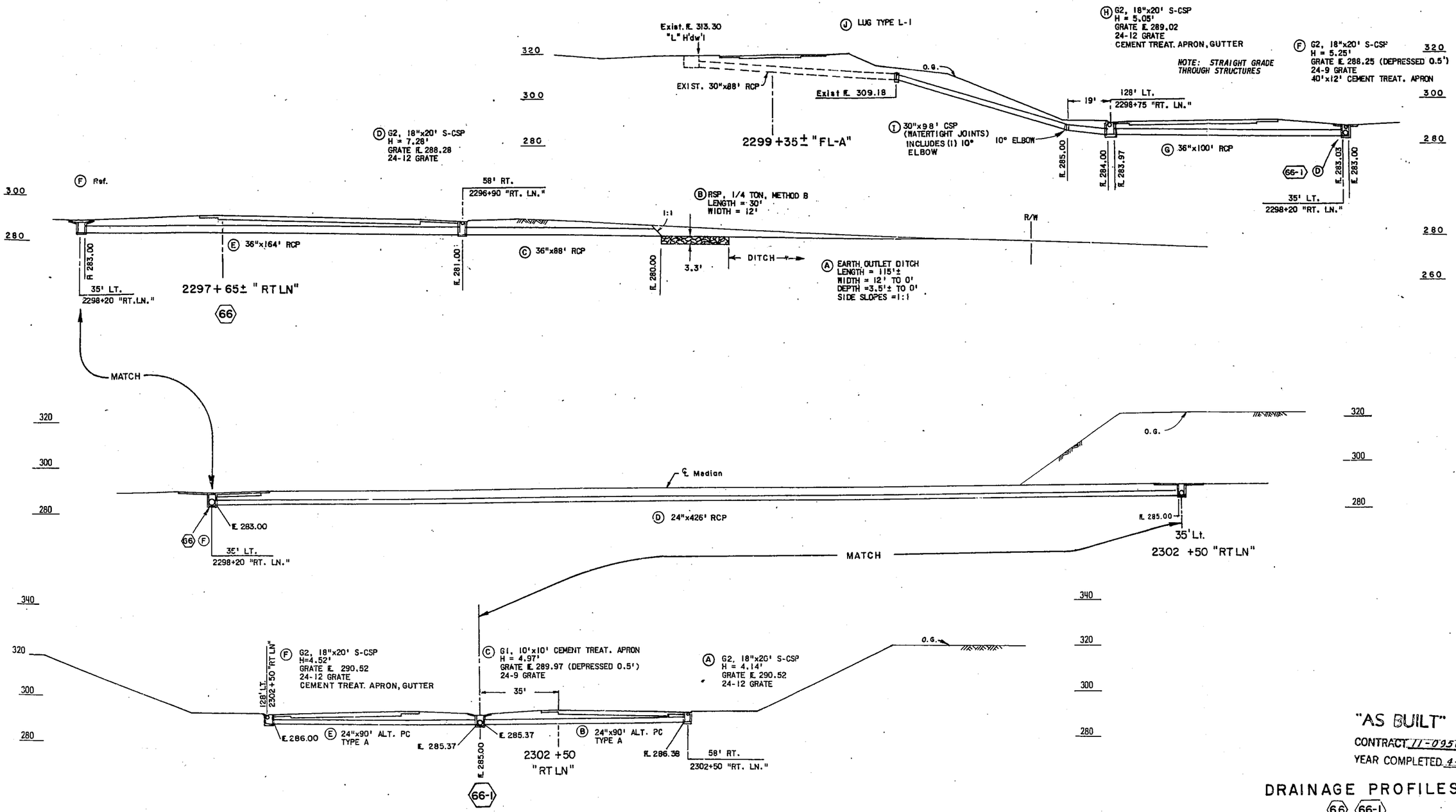
AS BUILT PLANS
Contract No 11-095094
Date Completed 4-14-81
Document No.

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.
DATE 5-7-82 SIGNATURE Donald Blackford TITLE SUPERVISOR OF MICROFILM SERVICES

11	SD	15	R45.9/R48.1	43	208

Robert Owens
PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO. 12216

DATE APPROVED February 5, 1979



"AS BUILT"
CONTRACT 11-095091
YEAR COMPLETED 4-14-81

DRAINAGE PROFILES

66 66-1

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

SHEET 11 OF 19

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

11203-095091

42

AS BUILT PLANS
Contract No. 11-095094
Date Completed 4-14-81
Document No.

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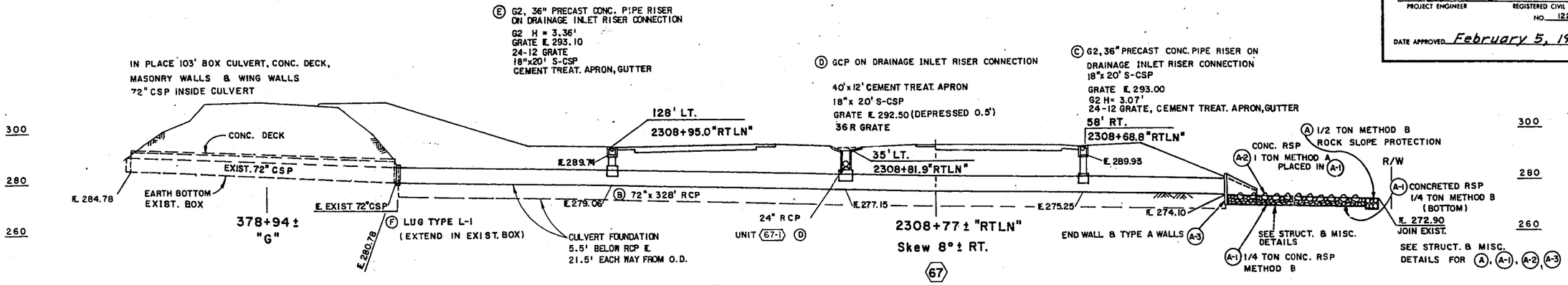
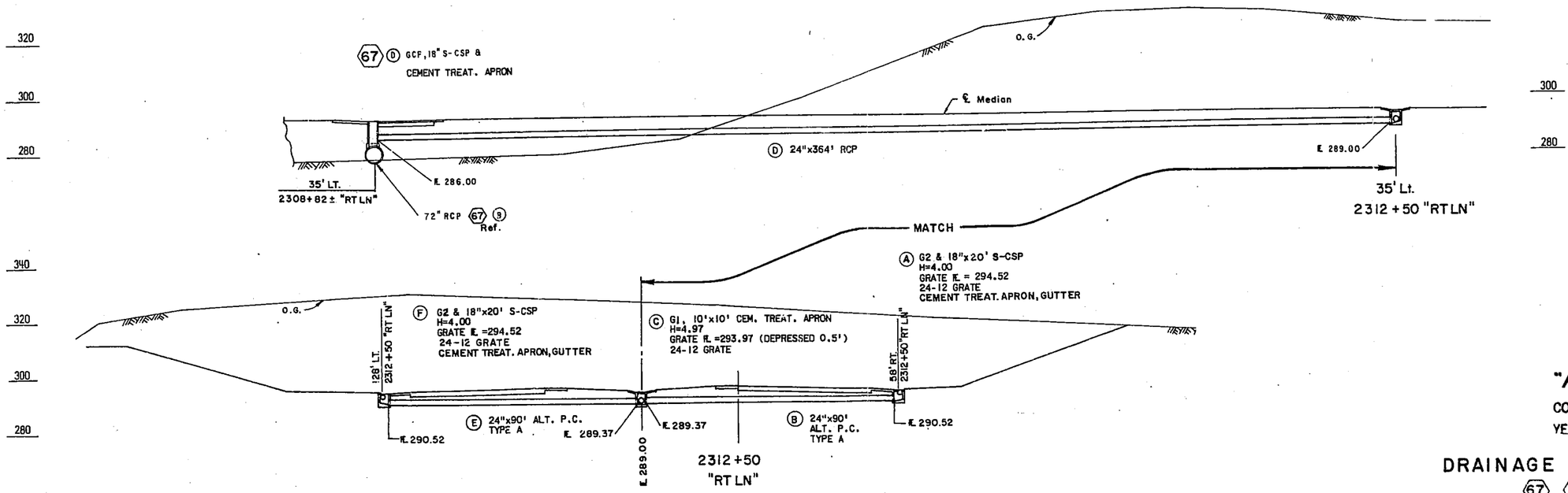
DATE 5-19-82 SIGNATURE Donald Blackford TITLE SUPERVISOR OF MICROFILM SERVICES

11	SD	15	R45.9/R48.1	44	208

Robert Owens
PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO. 12216

DATE APPROVED February 5, 1979





"AS BUILT"
CONTRACT 11-095094
YEAR COMPLETED 4-14-81

DRAINAGE PROFILES

67 67-1

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

SHEET 12 OF 19

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

11203-095091

43

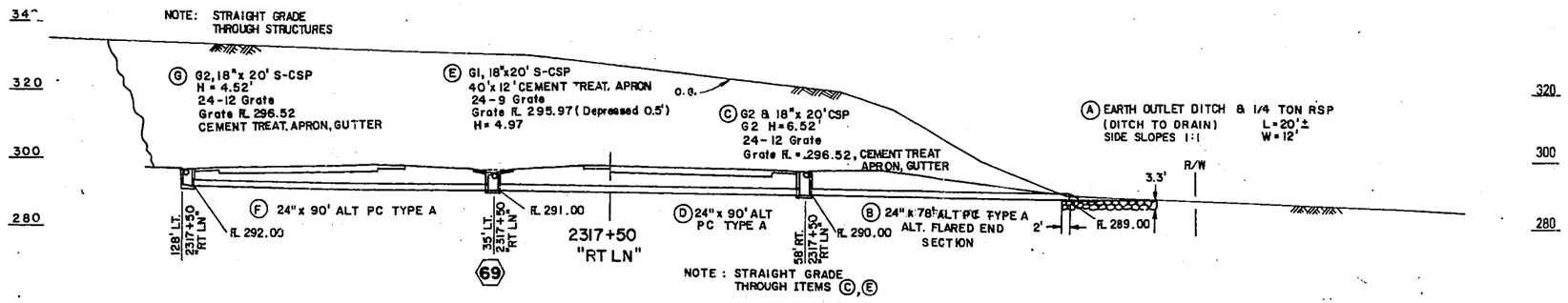
AS BUILT PLANS
Contract No. 11-095094
Date Completed 4-14-81

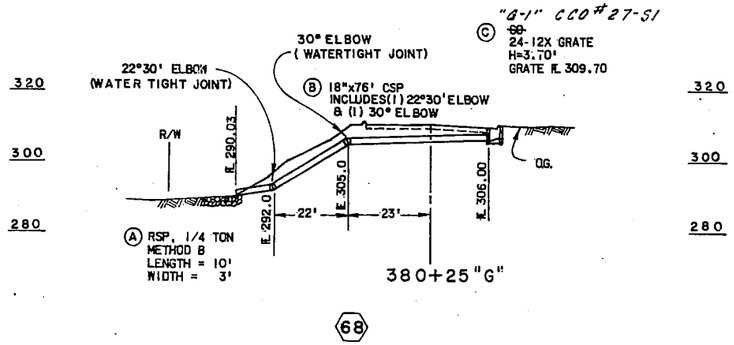
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.
DATE 5-7-82 SIGNATURE David Blackford TITLE SUPERVISOR OF MICROFILM SERVICES

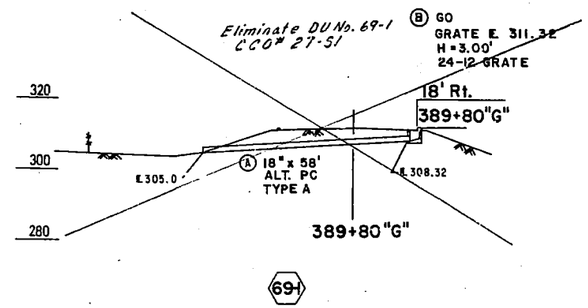
Dist.	County	Route	Total Project	Sheet No.	Total Sheets
11	SD	15	R45.9/R48.1	45	208

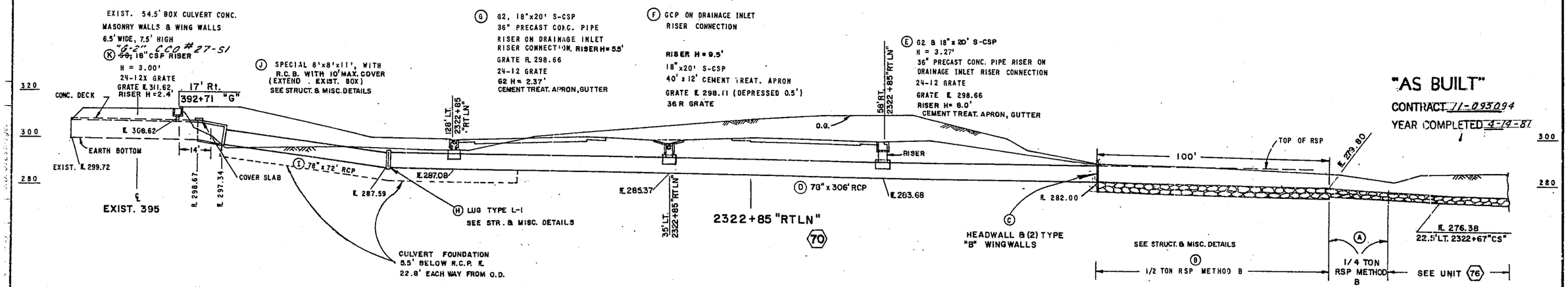
Robert Owens
PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO. 12216

DATE APPROVED February 5, 1979









DRAINAGE PROFILES
68 69 69-1 70

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

SHEET 13 OF 19

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

11203-095091

41

AS BUILT PLANS
Contract No 11-095094
Date Completed 4-14-87
Document No.

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

5-27-87 — SUPERVISOR OF MICROFILM SERVICES

APPENDIX 9

Floodplain Calculations for Minor Tributaries
(not including HRC or SLR River)

Cross Section for XS 100-1

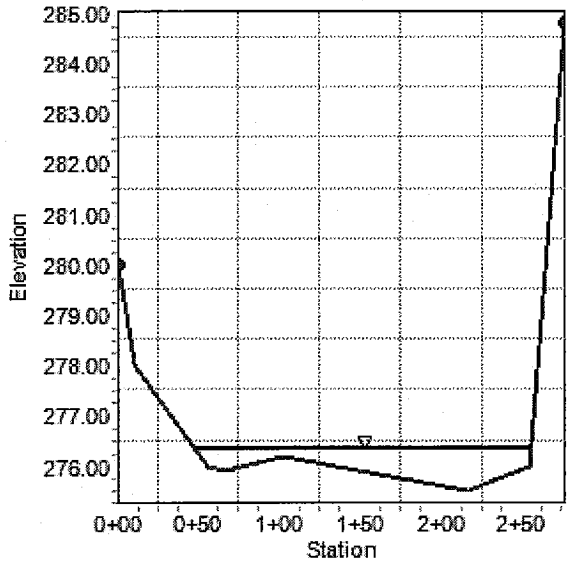
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03000	ft/ft
Normal Depth	0.83	ft
Discharge	343.50	ft³/s

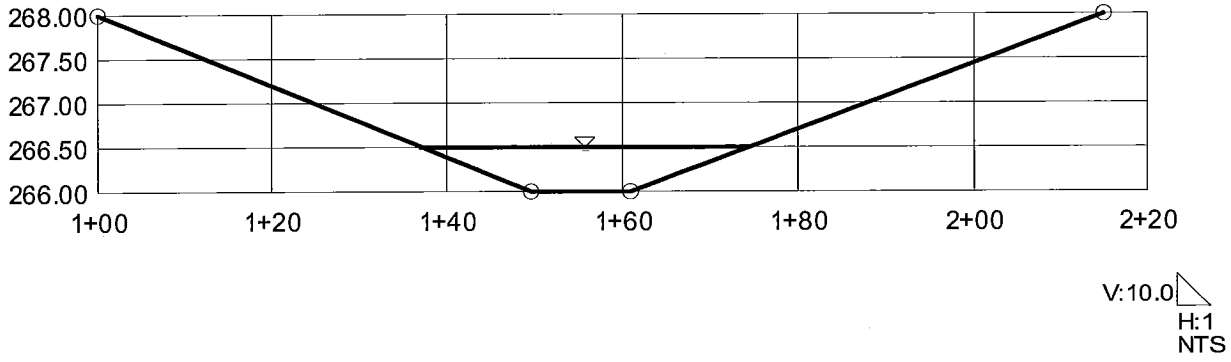
Cross Section Image



XS 300-1 (EX Q100)
Cross Section for Irregular Channel

Project Description	
Worksheet	XS 300-1
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.035	
Channel Slope	0.031000	ft/ft
Water Surface Elev	266.51	ft
Elevation Range	3.00 to 268.00	
Discharge	43.80	cfs



PROJECTDESIGN CONSULTANTS
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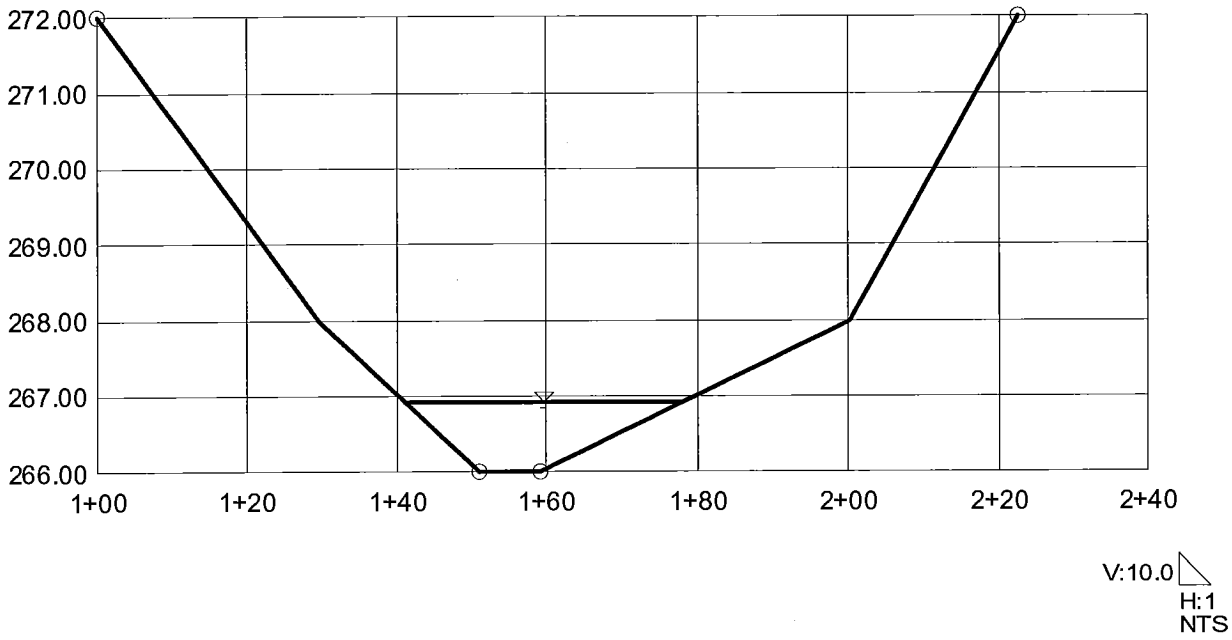
XS 300-2 (EX Q100)
Cross Section for Irregular Channel

Project Description	
Worksheet	XS 300-2
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

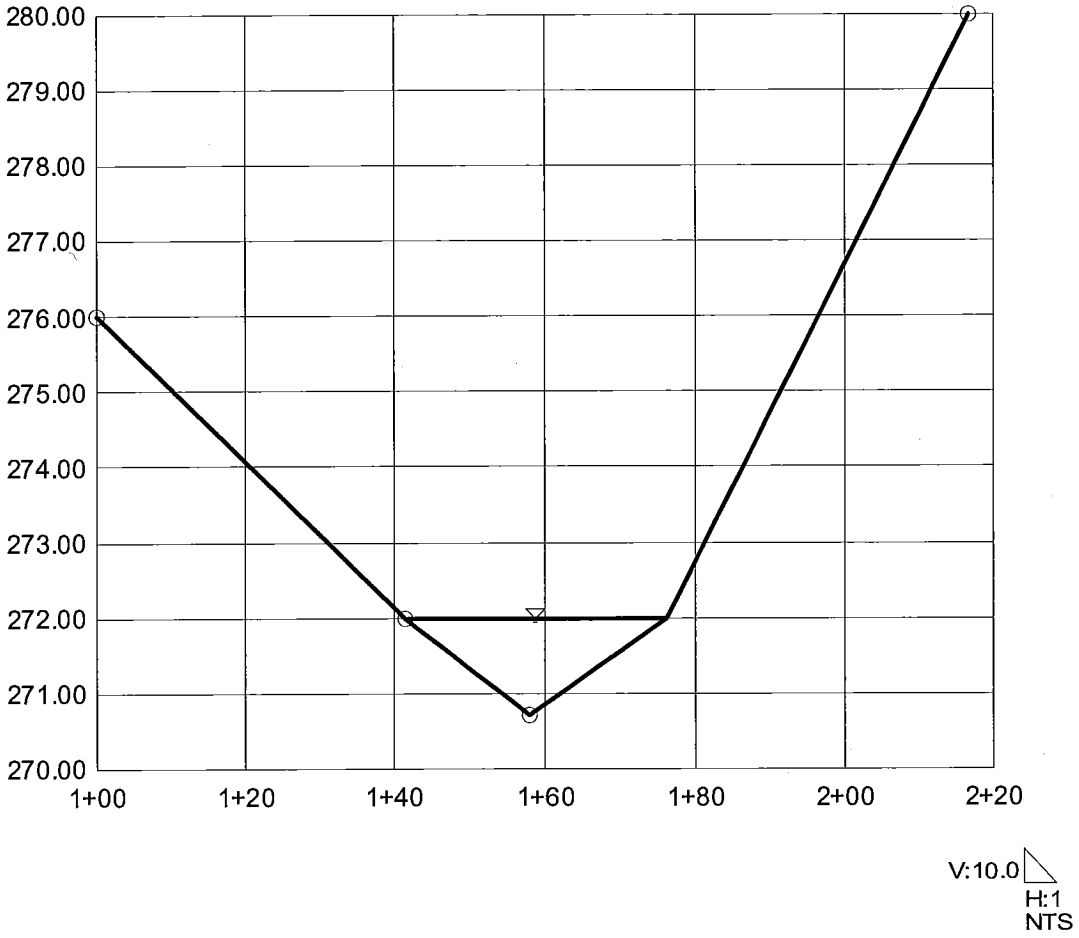
Section Data		
Mannings Coefficie	0.035	
Channel Slope	0.020000	ft/ft
Water Surface Elev	266.92	ft
Elevation Range	3.00 to 272.00	
Discharge	83.20	cfs



XS 300-3 (EX Q100)
Cross Section for Irregular Channel

Project Description	
Worksheet	XS 300-3
Flow Element	Irregular Chanı
Method	Manning's Forr
Solve For	Channel Depth

Section Data		
Mannings Coefficier	0.037	
Channel Slope	0.015000	ft/ft
Water Surface Elev	272.00	ft
Elevation Range	).70 to 280.00	
Discharge	83.20	cfs



APPENDIX 10

Preliminary Hydraulic Calculations of Outfalls to HRC

Culvert Calculator Report
Line A (Basin 1)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	288.00	ft	Headwater Depth/Height	1.69	
Computed Headwater Elev	286.42	ft	Discharge	91.40	cfs
Inlet Control HW Elev.	286.42	ft	Tailwater Elevation	279.85	ft
Outlet Control HW Elev.	286.04	ft	Control Type	Inlet Control	

HRC TW < ie

Grades					
Upstream Invert	280.50	ft	Downstream Invert	280.00	ft
Length	54.67	ft	Constructed Slope	0.009146	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.77	ft
Slope Type	Steep		Normal Depth	2.72	ft
Flow Regime	Supercritical		Critical Depth	2.96	ft
Velocity Downstream	11.20	ft/s	Critical Slope	0.007822	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	286.04	ft	Upstream Velocity Head	1.72	ft
Ke	0.50		Entrance Loss	0.86	ft

Inlet Control Properties					
Inlet Control HW Elev.	286.42	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	9.6	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
Line B

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	295.00	ft	Headwater Depth/Height	1.66	
Computed Headwater Elev	293.25	ft	Discharge	345.80	cfs
Inlet Control HW Elev.	293.25	ft	Tailwater Elevation	273.00	ft
Outlet Control HW Elev.	292.68	ft	Control Type	Inlet Control	

(in between Xsec 3642.177 + 3351.9519)

Grades					
Upstream Invert	283.31	ft	Downstream Invert	270.00	ft
Length	1,121.80	ft	Constructed Slope	0.011865	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	3.88	ft
Slope Type	Steep		Normal Depth	3.88	ft
Flow Regime	Supercritical		Critical Depth	5.04	ft
Velocity Downstream	17.90	ft/s	Critical Slope	0.006388	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	72 inch		Rise	6.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	292.68	ft	Upstream Velocity Head	2.89	ft
Ke	0.50		Entrance Loss	1.44	ft

Inlet Control Properties					
Inlet Control HW Elev.	293.25	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	28.3	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
Line C (Basin 2)

Solve For: Headwater Elevation

Culvert Summary				
Allowable HW Elevation	275.00 ft	Headwater Depth/Height	1.61	
Computed Headwater Elev	271.42 ft	Discharge	51.40	cfs
Inlet Control HW Elev.	270.78 ft	Tailwater Elevation	270.78	ft
Outlet Control HW Elev.	271.42 ft	Control Type	Outlet Control	

TW HEC Xsec 1630

Grades			
Upstream Invert	265.00 ft	Downstream Invert	256.00 ft
Length	196.00 ft	Constructed Slope	0.045918 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	14.78 ft
Slope Type	N/A	Normal Depth	1.11 ft
Flow Regime	N/A	Critical Depth	2.15 ft
Velocity Downstream	4.09 ft/s	Critical Slope	0.004008 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	271.42 ft	Upstream Velocity Head	0.26 ft
Ke	0.50	Entrance Loss	0.13 ft

Inlet Control Properties			
Inlet Control HW Elev.	270.78 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	12.6 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report
Line D

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	272.00 ft	Headwater Depth/Height	1.22		
Computed Headwater Elev	268.83 ft	Discharge	7.70 cfs		
Inlet Control HW Elev.	268.71 ft	Tailwater Elevation	267.96 ft		
Outlet Control HW Elev.	268.83 ft	Control Type	Entrance Control		

TW HRC Xsec 988

Grades					
Upstream Invert	267.00 ft	Downstream Invert	265.00 ft		
Length	26.00 ft	Constructed Slope	0.076923 ft/ft		

Hydraulic Profile					
Profile	CompositePressureProfileS1S2	Depth, Downstream	2.96 ft		
Slope Type	N/A	Normal Depth	0.53 ft		
Flow Regime	N/A	Critical Depth	1.08 ft		
Velocity Downstream	4.36 ft/s	Critical Slope	0.007214 ft/ft		

Section					
Section Shape	Circular	Mannings Coefficient	0.013		
Section Material	Concrete	Span	1.50 ft		
Section Size	18 inch	Rise	1.50 ft		
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	268.83 ft	Upstream Velocity Head	0.50 ft		
Ke	0.50	Entrance Loss	0.25 ft		

Inlet Control Properties					
Inlet Control HW Elev.	268.71 ft	Flow Control	Transition		
Inlet Type	Square edge w/headwall	Area Full	1.8 ft²		
K	0.00980	HDS 5 Chart	1		
M	2.00000	HDS 5 Scale	1		
C	0.03980	Equation Form	1		
Y	0.67000				

Culvert Calculator Report
Line E (Basin 3)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	273.00	ft	Headwater Depth/Height	2.27	
Computed Headwater Elev	272.43	ft	Discharge	228.30	cfs
Inlet Control HW Elev.	272.43	ft	Tailwater Elevation	267.96	ft
Outlet Control HW Elev.	271.81	ft	Control Type	Inlet Control	

TW HRC Xsec 988

Grades					
Upstream Invert	264.50	ft	Downstream Invert	264.00	ft
Length	43.78	ft	Constructed Slope	0.011421	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	3.14	ft
Slope Type	N/A		Normal Depth	3.12	ft
Flow Regime	N/A		Critical Depth	3.21	ft
Velocity Downstream	12.55	ft/s	Critical Slope	0.011201	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	271.81	ft	Upstream Velocity Head	2.38	ft
Ke	0.50		Entrance Loss	1.09	ft

Inlet Control Properties					
Inlet Control HW Elev.	272.43	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	19.2	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
Line F-1

Solve For: Headwater Elevation

Culvert Summary				
Allowable HW Elevation	282.00 ft	Headwater Depth/Height	1.81	
Computed Headwater Elev	268.14 ft	Discharge	135.55	cfs
Inlet Control HW Elev.	268.14 ft	Tailwater Elevation	263.32	ft → TW from Line G (sump analysis)
Outlet Control HW Elev.	267.57 ft	Control Type	Inlet Control	

Grades			
Upstream Invert	260.90 ft	Downstream Invert	258.00 ft
Length	81.49 ft	Constructed Slope	0.035587 ft/ft

Hydraulic Profile			
Profile	CompositePressureProfileS1S2	Depth, Downstream	2.35 ft
Slope Type	N/A	Normal Depth	2.00 ft
Flow Regime	N/A	Critical Depth	3.47 ft
Velocity Downstream	17.69 ft/s	Critical Slope	0.008158 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	267.57 ft	Upstream Velocity Head	2.13 ft
Ke	0.50	Entrance Loss	1.07 ft

Inlet Control Properties			
Inlet Control HW Elev.	268.14 ft	Flow Control	Submerged
Inlet Type	Square edge w/headwall	Area Full	12.6 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report
Line F (Basin 4)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	282.00	ft	Headwater Depth/Height	2.21	
Computed Headwater Elev	275.42	ft	Discharge	28.10	cfs
Inlet Control HW Elev.	275.42	ft	Tailwater Elevation	268.14	ft
Outlet Control HW Elev.	274.86	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	271.00	ft	Downstream Invert	268.00	ft
Length	28.00	ft	Constructed Slope	0.107143	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.07	ft
Slope Type	Steep		Normal Depth	0.85	ft
Flow Regime	Supercritical		Critical Depth	1.83	ft
Velocity Downstream	16.43	ft/s	Critical Slope	0.013430	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	274.86	ft	Upstream Velocity Head	1.35	ft
Ke	0.50		Entrance Loss	0.68	ft

Inlet Control Properties					
Inlet Control HW Elev.	275.42	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	3.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
72" Prop Q SR 76 (Discharge Pipe G)

Solve For: Headwater Elevation

Low point in SR76 edge of pvmt per PDC field survey

Culvert Summary					
Allowable HW Elevation	266.42	ft	Headwater Depth/Height	1.25	
Computed Headwater Elev	263.32	ft	Discharge	159.20	cfs
Inlet Control HW Elev.	262.34	ft	Tailwater Elevation	262.34	ft
Outlet Control HW Elev.	263.32	ft	Control Type	Outlet Control	

S300P + S 3000P combined

From separate HRC HEC-RAS run @ peak of onsite flows X sec 472

Grades					
Upstream Invert	255.84	ft	Downstream Invert	256.49	ft
Length	169.00	ft	Constructed Slope	-0.003846	ft/ft

From PDC field shots

Hydraulic Profile					
Profile	CompositeA2PressureProfile		Depth, Downstream	5.85	ft
Slope Type	Adverse		Normal Depth	0.00	ft
Flow Regime	Subcritical		Critical Depth	3.43	ft
Velocity Downstream	5.67	ft/s	Critical Slope	0.003631	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	72 inch		Rise	6.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	263.32	ft	Upstream Velocity Head	0.49	ft
Ke	0.50		Entrance Loss	0.25	ft

Inlet Control Properties					
Inlet Control HW Elev.	262.34	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	28.3	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
72" Existing Q SR 76 (Discharge Pipe G)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	266.42	ft	Headwater Depth/Height	1.23	
Computed Headwater Elev	263.23	ft	Discharge	151.30	cfs
Inlet Control HW Elev.	262.34	ft	Tailwater Elevation	262.34	ft
Outlet Control HW Elev.	263.23	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	255.84	ft	Downstream Invert	256.49	ft
Length	169.00	ft	Constructed Slope	-0.003846	ft/ft

Hydraulic Profile					
Profile	CompositeA2PressureProfile		Depth, Downstream	5.85	ft
Slope Type	Adverse		Normal Depth	0.00	ft
Flow Regime	Subcritical		Critical Depth	3.34	ft
Velocity Downstream	5.39	ft/s	Critical Slope	0.003570	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	72 inch		Rise	6.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	263.23	ft	Upstream Velocity Head	0.44	ft
Ke	0.50		Entrance Loss	0.22	ft

Inlet Control Properties					
Inlet Control HW Elev.	262.34	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	28.3	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

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EXCERPT FROM HRC FLOOD STUDY
(HEC HMS HYDROGRAPH OF HRC)

1-Jan-00	8:00	0.02	0.01	0.01	452.9	0	452.9
1-Jan-00	8:10	0.02	0.01	0.01	471.5	0	471.5
1-Jan-00	8:20	0.02	0.01	0.01	490.1	0	490.1
1-Jan-00	8:30	0.03	0.01	0.01	508.8	0	508.8
1-Jan-00	8:40	0.03	0.01	0.02	527.6	0	527.6
1-Jan-00	8:50	0.03	0.01	0.02	546.6	0	546.6
1-Jan-00	9:00	0.03	0.01	0.02	565.7	0	565.7
1-Jan-00	9:10	0.03	0.01	0.02	585	0	585
1-Jan-00	9:20	0.03	0.01	0.02	604.5	0	604.5
1-Jan-00	9:30	0.03	0.01	0.02	624.3	0	624.3
1-Jan-00	9:40	0.03	0.01	0.02	644.3	0	644.3
1-Jan-00	9:50	0.03	0.01	0.02	664.7	0	664.7
1-Jan-00	10:00	0.03	0.01	0.02	685.3	0	685.3
1-Jan-00	10:10	0.03	0.01	0.02	706.3	0	706.3
1-Jan-00	10:20	0.03	0.01	0.02	727.8	0	727.8
1-Jan-00	10:30	0.03	0.01	0.02	749.6	0	749.6
1-Jan-00	10:40	0.03	0.01	0.02	772	0	772
1-Jan-00	10:50	0.03	0.01	0.02	794.9	0	794.9
1-Jan-00	11:00	0.03	0.01	0.02	818.4	0	818.4
1-Jan-00	11:10	0.03	0.01	0.02	842.6	0	842.6
1-Jan-00	11:20	0.03	0.01	0.02	867.4	0	867.4
1-Jan-00	11:30	0.03	0.01	0.03	893	0	893
1-Jan-00	11:40	0.03	0.01	0.03	919.5	0	919.5
1-Jan-00	11:50	0.04	0.01	0.03	946.8	0	946.8
1-Jan-00	12:00	0.04	0.01	0.03	975.2	0	975.2
1-Jan-00	12:10	0.04	0.01	0.03	1004.4	0	1004.4
1-Jan-00	12:20	0.04	0.01	0.03	1034.3	0	1034.3
1-Jan-00	12:30	0.04	0.01	0.03	1064.6	0	1064.6
1-Jan-00	12:40	0.04	0.01	0.03	1095.2	0	1095.2
1-Jan-00	12:50	0.04	0.01	0.03	1126	0	1126
1-Jan-00	13:00	0.04	0.01	0.03	1157.6	0	1157.6
1-Jan-00	13:10	0.04	0.01	0.03	1190.6	0	1190.6
1-Jan-00	13:20	0.04	0.01	0.04	1225.4	0	1225.4
1-Jan-00	13:30	0.05	0.01	0.04	1262.8	0	1262.8
1-Jan-00	13:40	0.05	0.01	0.04	1303.2	0	1303.2
1-Jan-00	13:50	0.05	0.01	0.04	1347.1	0	1347.1
1-Jan-00	14:00	0.05	0.01	0.04	1395.2	0	1395.2
1-Jan-00	14:10	0.06	0.01	0.05	1448.7	0	1448.7
1-Jan-00	14:20	0.06	0.01	0.05	1509.4	0	1509.4
1-Jan-00	14:30	0.07	0.01	0.06	1578.8	0	1578.8
1-Jan-00	14:40	0.07	0.01	0.06	1659.1	0	1659.1
1-Jan-00	14:50	0.07	0.01	0.06	1751.5	0	1751.5
1-Jan-00	15:00	0.08	0.01	0.07	1855.7	0	1855.7
1-Jan-00	15:10	0.09	0.01	0.08	1972.4	0	1972.4
1-Jan-00	15:20	0.09	0.01	0.08	2103.5	0	2103.5
1-Jan-00	15:30	0.14	0.02	0.12	2258.9	0	2258.9
1-Jan-00	15:40	0.15	0.02	0.13	2450.8	0	2450.8
1-Jan-00	15:50	0.17	0.02	0.16	2693.1	0	2693.1
1-Jan-00	16:00	0.24	0.02	0.22	3016.7	0	3016.7
1-Jan-00	16:10	0.87	0.06	0.81	3593.4	0	3593.4
1-Jan-00	16:20	0.17	0.01	0.16	4403.2	0	4403.2
1-Jan-00	16:30	0.1	0.01	0.1	5400.8	0	5400.8

← Q in HRC @ peak of onsite flows

Peak of Systems 300P + 3000P occurs at t = 966 min ≈ 16:10

P:\3631\ENGR\REPORTS\DRAIN\HYDRO\REGIONAL\results.xls

Culvert Calculator Report
Line H

Solve For: Headwater Elevation

Culvert Summary				
Allowable HW Elevation	265.69 ft	Headwater Depth/Height	5.31	
Computed Headwater Elev	267.77 ft	Discharge	11.50 cfs	
Inlet Control HW Elev.	265.57 ft	Tailwater Elevation	265.57 ft	= TW HRC Xsec 472
Outlet Control HW Elev.	267.77 ft	Control Type	Outlet Control	

Grades			
Upstream Invert	259.80 ft	Downstream Invert	258.80 ft
Length	100.89 ft	Constructed Slope	0.009912 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	6.77 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	1.29 ft
Velocity Downstream	6.51 ft/s	Critical Slope	0.011064 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	267.77 ft	Upstream Velocity Head	0.66 ft
Ke	0.50	Entrance Loss	0.33 ft

Inlet Control Properties			
Inlet Control HW Elev.	265.57 ft	Flow Control	Submerged
Inlet Type	Square edge w/headwall	Area Full	1.8 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report
Line H-1

Solve For: Headwater Elevation

Culvert Summary				
Allowable HW Elevation	267.88 ft	Headwater Depth/Height	1.73	
Computed Headwater Elev	266.77 ft	Discharge	56.10 cfs	- from URS Roadway Report
Inlet Control HW Elev.	265.57 ft	Tailwater Elevation	265.57 ft	
Outlet Control HW Elev.	266.77 ft	Control Type	Outlet Control	

Grades			
Upstream Invert	261.57 ft	Downstream Invert	258.73 ft
Length	469.00 ft	Constructed Slope	0.006055 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	6.84 ft
Slope Type	N/A	Normal Depth	1.57 ft
Flow Regime	N/A	Critical Depth	1.71 ft
Velocity Downstream	3.97 ft/s	Critical Slope	0.004570 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev.	266.77 ft	Upstream Velocity Head	0.24 ft
Ke	0.50	Entrance Loss	0.12 ft

Inlet Control Properties			
Inlet Control HW Elev.	265.57 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	14.1 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report
Line H-1-Option 1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	267.88	ft	Headwater Depth/Height	1.99	
Computed Headwater Elev	267.55	ft	Discharge	56.10	cfs
Inlet Control HW Elev.	265.57	ft	Tailwater Elevation	265.57	ft
Outlet Control HW Elev.	267.55	ft	Control Type	Outlet Control	

– from URS Roadway Report

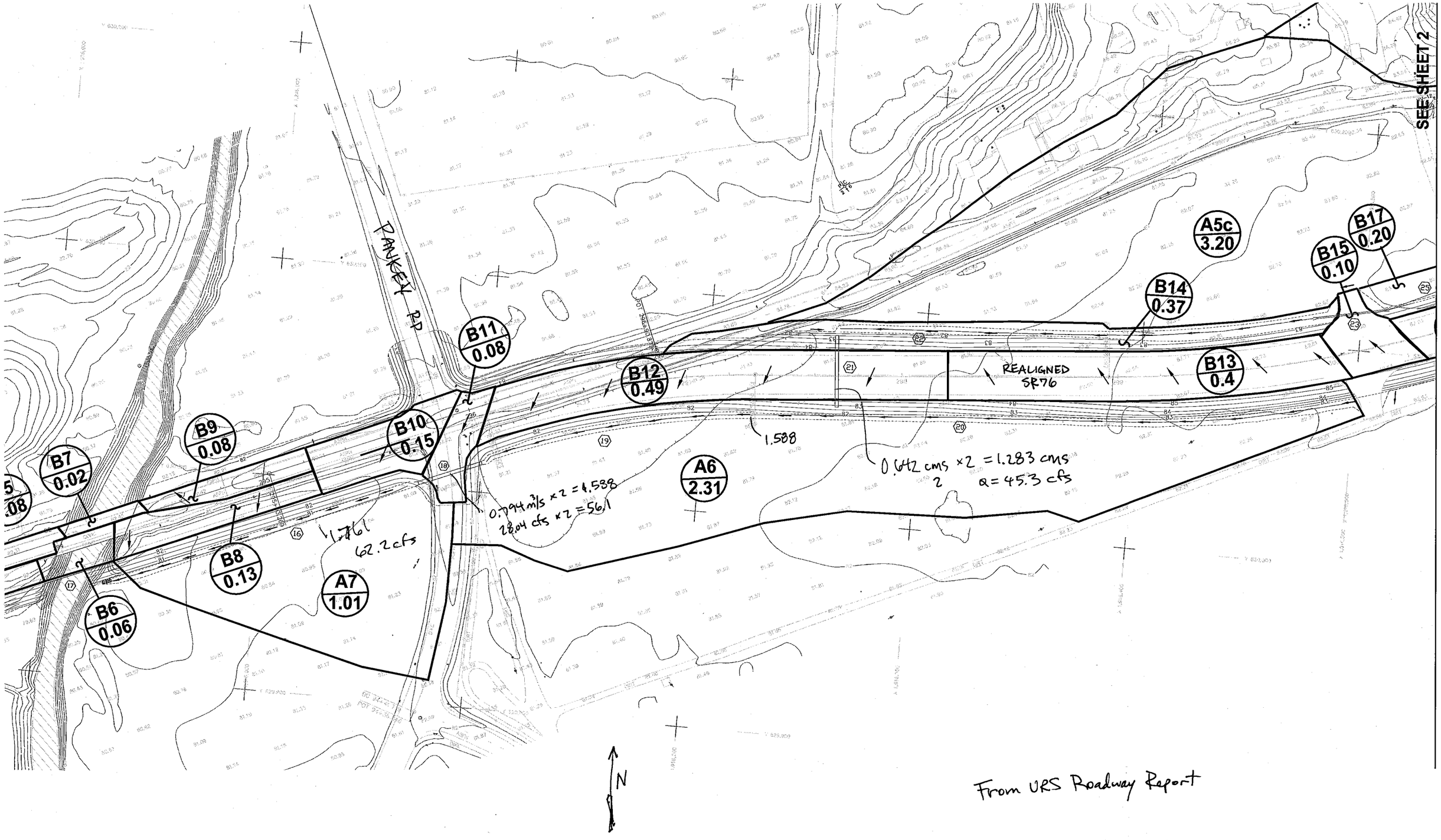
Grades					
Upstream Invert	261.57	ft	Downstream Invert	256.50	ft
Length	911.54	ft	Constructed Slope	0.005562	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	9.07	ft
Slope Type	N/A		Normal Depth	1.61	ft
Flow Regime	N/A		Critical Depth	1.71	ft
Velocity Downstream	3.97	ft/s	Critical Slope	0.004570	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	267.55	ft	Upstream Velocity Head	0.24	ft
Ke	0.50		Entrance Loss	0.12	ft

Inlet Control Properties					
Inlet Control HW Elev.	265.57	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	14.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				



From URS Roadway Report

Culvert Calculator Report
Line I-Option 1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	262.00	ft	Headwater Depth/Height	1.90	
Computed Headwater Elev	261.71	ft	Discharge	54.40	cfs
Inlet Control HW Elev.	260.32	ft	Tailwater Elevation	259.16	ft
Outlet Control HW Elev.	261.71	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	256.00	ft	Downstream Invert	250.00	ft
Length	176.10	ft	Constructed Slope	0.034072	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	9.16	ft
Slope Type	N/A		Normal Depth	1.40	ft
Flow Regime	N/A		Critical Depth	2.40	ft
Velocity Downstream	7.70	ft/s	Critical Slope	0.006992	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	261.71	ft	Upstream Velocity Head	0.92	ft
Ke	0.50		Entrance Loss	0.46	ft

Inlet Control Properties					
Inlet Control HW Elev.	260.32	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	7.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

APPENDIX 11

Excerpts from Pala Mesa Specific Plan

TEXT

PALA MESA
PRIVATE DEVELOPMENT PLAN

PREPARED
FOR
H/D DEVELOPMENT CORPORATION

BY

ALVIN W. RAY A.I.A.
PLANNING & ARCHITECTURE
3368 SECOND AVENUE
SAN DIEGO, CALIFORNIA 92103
299-1674

29 AUGUST 1973
(REVISED 15 FEBRUARY 1974)

CHAPTER V

RESIDENTIAL DENSITIES AND HOUSING TYPES, LODGE FACILITIES AND COMMERCIAL USES PROPOSED FOR EACH AREA

Design Character.

The design of the dwelling units, lodge units and recreational facilities will reflect the open space of the golf course and the existing character of the site and will incorporate minimum width private roads and extensive pedestrian circulation within each area as well as between the residential and lodge sites and the major recreational facilities. With the development's strong resort orientation emphasis will be placed upon creating a relaxed atmosphere. Buildings will be designed to harmonize with their natural surroundings by the use of natural materials and colors, roof lines, detailing and so on. The scale and design of buildings in the two commercial areas will be integrated with the resort and residential character of the entire PDP. There will be extensive landscaping throughout the site.

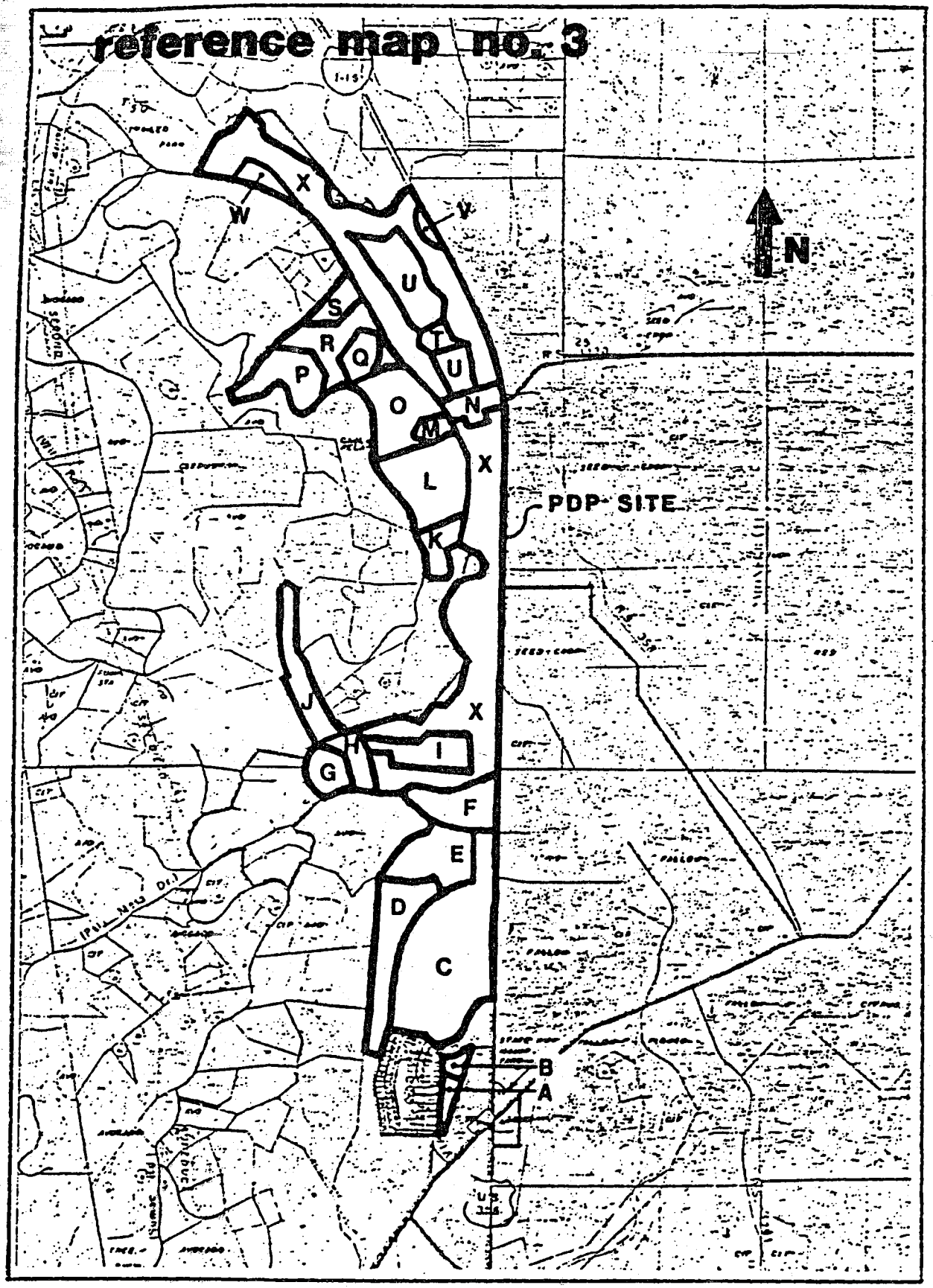
Residential Densities and Housing Types:

Area	Density	Housing Type
Area C 52.00 acres 260 d.u.	5.0 du/acre	Design: PRD, attached in clusters, possibly some detached No. bedrooms: majority 2 bdrm. Height: 2 story maximum Parking: per County requirements
Area E 17.50 acres 43 d.u.	2.5 du/acre	Design: PRD, attached in clusters No. bedrooms: 2 and 3 bedrooms Height: 2 story maximum Parking: per County requirements

Area	Density	Housing Type
Areas F, H, I 27.50 acres 165 d.u.	6.0 du/acre	Design: PRD, attached in clusters No. bedrooms: majority 2 bdrm. Height: 2 story maximum Parking: per County requirements
Area G 8.5 acres 9 d.u.	1.0 du/acre	Note: This area and Areas F, I and H will be combined under one Special Use Permit. Design: PRD, attached or detached No. bedrooms: majority 3 bdrm. Height: 2 story maximum Parking: 2 per dwelling unit
Area U 26 acres 186 d.u.	7.2 du/acre	Design: PRD, attached in clusters No. bedrooms: majority 2 bdrm. Height: 2 story maximum Parking: per County requirements and one golf cart space per unit
Area W 5.2 acres 28 d.u.	5.4 du/acre	Design: PRD, attached in clusters No. bedrooms: majority 2 & 3 bedrooms. Height: 2 story maximum Parking: per County requirements
Areas D, J', K, P, Q, S 79.40 acres 18 d.u.	1.0 du/ 4.4 acre	Detached single-family residences

ENCLOSURE E

PALA MESA PDP



1 in = 2,000 ft

TABULATION

Area	Approx. Acreage	Proposed Use	Existing Zone	Proposed Zone	Number of Dwelling and Lodge Units
A	2.50	Public Services	C	C	---
B	2.50	Neighborhood Commercial	C	C	---
C	52.00	Residential	R-1-A A-1-(1)	PRD (5)	260 d.u.
D	17.50	Residential Estates	A-1-(1)	A-1-(4)	3 d.u.
E	17.50	Residential	A-1-(1)	PRD (3)	43
F	9.75	Residential	R-1-A	PRD (6)	60
G	8.50	Residential	R-1-A	PRD (1)	9
H	5.25	Residential	R-1-A	PRD (6)	30
I	12.50	Residential	R-1-A	PRD (6)	75
J	11.00	Open Space and Reservoir Sites	A-1-(1)	Open Space Easement	---
J'	33.00	Residential Estates	A-1-(1)	A-1-(4)	8
K	5.75	Residential Estates	A-1-(1)	A-1-(4)	1
L	21.00	Lodge	A-1-(1) E-1-A	A-1-(1)	(50 Lodge Suites)
M	2.00	Recreation/Spa	A-1-(1)	A-1-(1)	---
N	6.00	Recreation - Clubhouse and Miscellaneous Facilities	E-1-A	E-1-A	---
O	28.00	Lodge	A-1-(1)	A-1-(1)	(83 Exist.Rms.) (25 Lodge Suites)

TABULATION (Cont'd.)

Area	Approx. Acreage	Proposed Use	Existing Zone	Proposed Zone	Number of Dwelling and Lodge Units
P	12.25	Residential Estates	A-1-(1)	A-1-(4)	2
Q	6.40	Residential Estates	A-1-(1)	A-1-(1)	2
R	13.90	Lodge	A-1-(1)	A-1-(1)	(25 Lodge Suites
S	2.00	Residential Estates	A-1-(1)	A-1-(1)	2
T	4.00	Recreation - Tennis	E-1-A	E-1-A	---
U	26.00	Residential	E-1-A	PRD (8)	186
V	1.50	Commercial Hwy. Serv.	E-1-A	C	---
	1.00	Mtce. Facility	E-1-A	C	---
W	5.20	Residential	E-1-A	PRD (6)	28
X	114.00	Open Space - Golf Course	E-1-A	Open Space Easement	---
Totals	421.00 Acres				709 d.u. (1.98 du/ac 100 Lodge Suite 83 Exist. Room

SUMMARY OF PROPOSED LAND USES:

PRD	136.70 Acres	691 d.u.'s
Residential Estates	76.90 Acres	18 d.u.'s
Lodge Suites	62.90 Acres	83 Existing Rooms +100 New Suites
Open Space & Recreation	137.00 Acres	
Commercial	7.50 Acres	
Total	421.00	

APPENDIX 12

Electronic Copies of URS Roadway & Hydraulic Studies

(For Reference)

APPENDIX 13

Drainage Exhibits

LEGEND:

- DRAINAGE SUBAREA
- FLOW DIRECTION
- HYDROLOGY NODE
- AREA FROM UPSTREAM TO DOWNSTREAM NODE (X.XX Ac.)
- DRAINAGE FLOWPATH

NOTES:

1. SEE EXHIBITS C AND D FOR LAND USE AND SOIL INFORMATION.
2. SUPPLEMENTAL TOPO IS SCANNED COUNTY TOPO AND USGS TOPO AND CAMPUS PARK TOPO (FROM LANDMARK).

SCALE: 1"=150'
JOB #: 3631.10
CREATED: 03/14/08

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

COUNTY OF SAN DIEGO

CAMPUS PARK WEST

OFFSITE DRAINAGE MAP
EXISTING CONDITIONS
EXHIBIT A-1

N

LEGEND:

- DRAINAGE SUBAREA
- FLOW DIRECTION
- HYDROLOGY NODE (#)
- AREA FROM UPSTREAM TO DOWNSTREAM NODE (X.XX Ac.)
- DRAINAGE FLOWPATH
- CROSS SECTION DESIGNATION (XS 300-1)

SEE EXHIBIT A-1 FOR CONTINUATION

EXISTING CONDITION MINOR TRIBUTARY FLOODPLAIN PER PDC'S ONSITE DRAINAGE STUDY

EXISTING CONDITION HORSE RANCH CREEK FLOODPLAIN PER PDC'S FLOODPLAIN STUDY

HORSE RANCH CREEK

OUTFALL #1

EXISTING CONDITION HORSE RANCH CREEK FLOODPLAIN PER PDC'S FLOODPLAIN STUDY

EXISTING N. PANKEY BRIDGE

EXISTING PANKEY RD

CALTRANS SR 76 REALIGNMENT & WIDENING

OUTFALL #2

EXISTING CONDITION MINOR TRIBUTARY FLOODPLAIN PER PDC'S ONSITE DRAINAGE STUDY

INTERSTATE 15

SUMP AREA

OUTFALL #3

EXISTING SR 76 BRIDGE

EXISTING 72" CULVERT

STATE ROUTE 76

PANKEY RD

OUTFALL #4

EXISTING S. PANKEY BRIDGE

SAN LUIS REY RIVER

100 YEAR EXISTING CONDITION FLOODPLAIN LIMITS PER SAN LUIS REY FLOODPLAIN STUDY (CHANG CONSULTANTS)

FEMA EFFECTIVE 100 YEAR FLOODPLAIN LIMITS PER URS STUDY "FEMA LETTER OF MAP REVISION (LOMR) – FOLLOW UP TO CLOMR CASE #12-09-0511P STATE ROUTE 76 WIDENING AND REALIGNMENT FROM INTERSTATE 15 TO 3.9 KM EAST SAN DIEGO COUNTY" DATED AUGUST 26, 2011. LOMR EFFECTIVE DATE: DECEMBER 3, 2012 (REPLACEMENT OF FEMA ZONE A 100-YEAR FLOODPLAIN LIMITS PER FIRM 06073C0485G)

100 YEAR COUNTY FLOODWAY LIMIT PER COUNTY FLOODPLAIN PANELS 422-1725, 426-1725, 422-1719 (DATED JAN. 20, 1978)

CALTRANS R/W

SCALE:	1"=150'
JOB #:	3631.10
CREATED:	03/14/08

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COUNTY OF SAN DIEGO
CAMPUS PARK WEST
ONSITE DRAINAGE MAP
EXISTING CONDITIONS
EXHIBIT A-2

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LEGEND:

- DRAINAGE SUBAREA
- FLOW DIRECTION
- HYDROLOGY NODE (#)
- AREA FROM UPSTREAM TO DOWNSTREAM NODE (X.XX Ac.)
- DRAINAGE FLOWPATH
- 100-YEAR FLOODPLAIN/INUNDATION LIMITS (PER ONSITE OR HORSE RANCH CK STUDY)
- CROSS SECTION DESIGNATION (XS 300-1)
- PROPOSED WATER QUALITY/HYDROMOD BASIN # (1)

N

SEE EXHIBIT A-1 FOR CONTINUATION

SEE INSET AT BOTTOM LEFT FOR "GRADING ALTERNATIVE #1"

GRADING ALTERNATIVE #1

SCALE:	1"=150'
JOB #:	3631.10
CREATED:	03/17/08

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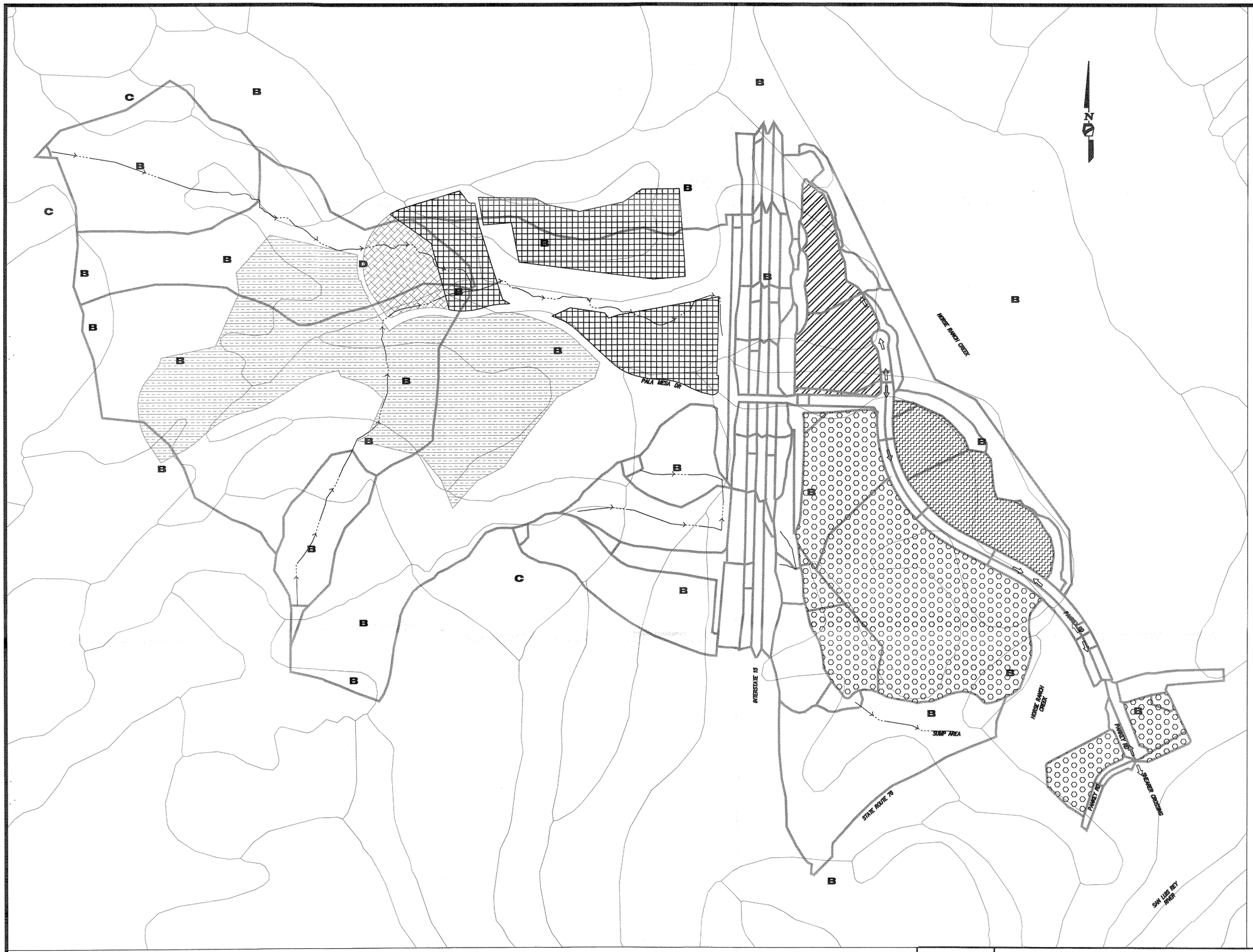
COUNTY OF SAN DIEGO
CAMPUS PARK WEST
DRAINAGE MAP
PROPOSED CONDITIONS
EXHIBIT B



LANDUSE LEGEND

- LOW DENSITY RESIDENTIAL <=1 DU/AC PER PALA MESA SPECIFIC PLAN
- LOW DENSITY RESIDENTIAL 2 DU/AC PER COUNTY GENERAL PLAN
- MEDIUM DENSITY RESIDENTIAL 6 DU/AC PER PALA MESA SPECIFIC PLAN
- PROPOSED HIGH DENSITY RESIDENTIAL 20 DU/AC PLANNING AREA PER TM
- PROPOSED GENERAL COMMERCIAL PLANNING AREA PER TM
- PROPOSED LIMITED INDUSTRIAL PLANNING AREA PER TM

NOTES

1. OFFSITE AREAS NOT HATCHED ARE ZONED FOR <= 1 DU/ACRE (OR SIMILAR PERCENT IMPERVIOUS COVER) PER GENERAL PLAN OR SPECIFIC PLAN. (EXCEPTION IS INTERSTATE 15 AREA).

2. ONSITE PROJECT DENSITIES/LANDUSES ARE PROPOSED PER THE CAMPUS PARK WEST TM. HATCHING IS APPROXIMATE TO THE PLANNING AREAS, SO NOT ALL DRAINAGE AREAS WITHIN THE BOUNDARIES REPRESENT THE OVERALL LAND USE (I.E. SOME LOTS WILL REMAIN OPEN SPACE). SEE DETAILED HYDROLOGY CALCULATIONS.

3. PROPOSED DRAINAGE BASINS AND NRCS SOIL TYPES ARE OVERLAID ON EXHIBIT FOR REFERENCE ONLY.

SCALE: 1"=300'

JOB #: 3631.10

CREATED: 11/6/08

PREPARED BY:

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COUNTY OF SAN DIEGO

CAMPUS PARK WEST

LAND USE MAP
PROPOSED + OFFSITE CONDITIONS
EXHIBIT C

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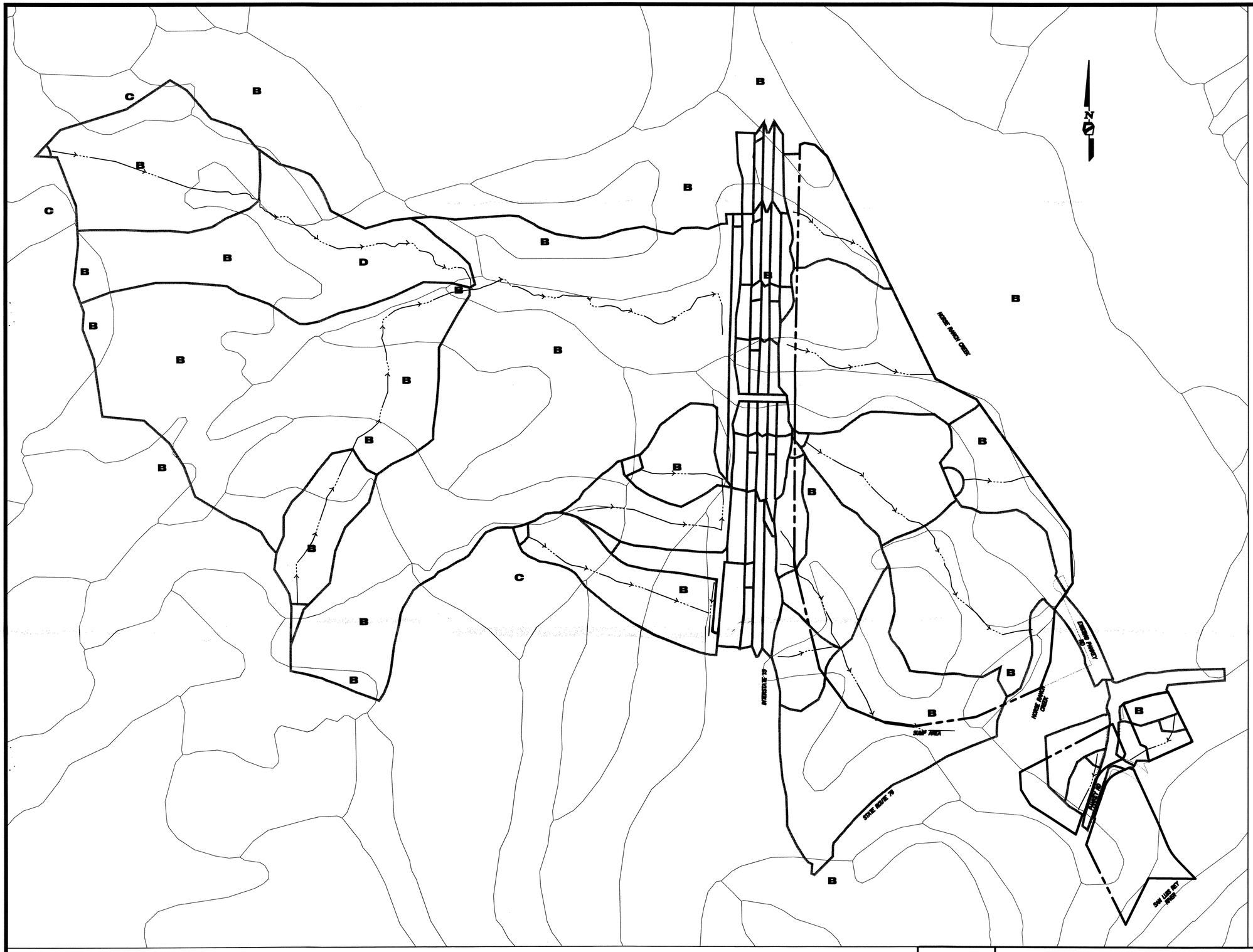

SOIL TYPE LEGEND

B NRCS HYDROLOGIC SOIL GROUP (FROM WEB SOIL SURVEY)

NOTES

1. EXISTING DRAINAGE BASINS ARE OVERLAID ON EXHIBIT FOR REFERENCE ONLY.

SCALE: 1"=300'

JOB #: 3631.10

CREATED: 11/6/08

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COUNTY OF SAN DIEGO

CAMPUS PARK WEST

SOIL TYPE MAP
ONSITE + OFFSITE AREAS
EXHIBIT D

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