CEQA PRELIMINARY HYDROLOGY/ ONSITE DRAINAGE STUDY
OCEAN BREEZE RANCH

County of San Diego, CA
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TM Tract No. 5615

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DECLARATION OF RESPONSIBLE CHARGE

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

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



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TABLE OF CONTENTS

1.0 INTRODUCTION 1

2. EXISTING AND PROPOSED DRAINAGE PATTERNS AND IMPROVEMENTS 3

2.1 Existing Drainage Patterns 3

2.2 Proposed Drainage Patterns and Improvements 6

3. HYDROLOGY CRITERIA, METHODOLOGY, AND RESULTS 11

3.1 Hydrology Criteria 11

3.2 Hydrologic Methodology 12

3.3 Description of Hydrologic Modeling Software 12

3.4 Hydrology Results 13

4.0 DETENTION METHODOLOGY 16

5. HYDRAULIC CRITERIA, METHODOLOGY, AND RESULTS 17

6. ENVIRONMENTAL IMPACTS 18

7. CONCLUSION 20

FIGURES

Figure 1: Project Vicinity Map 1

TABLES

Table 1: Hydrology Criteria 11
Table 2: Hydrology Results 14
Table 2 Continued: Hydrology Results 15

APPENDICES

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

2 100-year Existing Conditions Rational Method Computer Output

3 100-year Proposed Conditions Rational Method Computer Output

4 Exhibits

Site Plan Exhibit

A – Existing Condition Hydrology Maps

B – Proposed Condition Hydrology Maps

5 Onsite Floodplain for Onsite Drainage Area Over 25 Acres

1.0 INTRODUCTION

This drainage report supports the preliminary design of the proposed storm drain improvements associated with Ocean Breeze Ranch project (formerly known as Vessels Ranch), 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 1387.3 acres in size and is located west of Interstate 15, south of the San Luis Rey River and State Route 76 (SR 76), and north of West Lilac Road. The site is generally in between the cross streets of Camino del Cielo and Via Ararat Drive along West Lilac Road. Sullivan Middle School is located near the southeastern portion of the site. Figure 1 shows the vicinity map for the project.

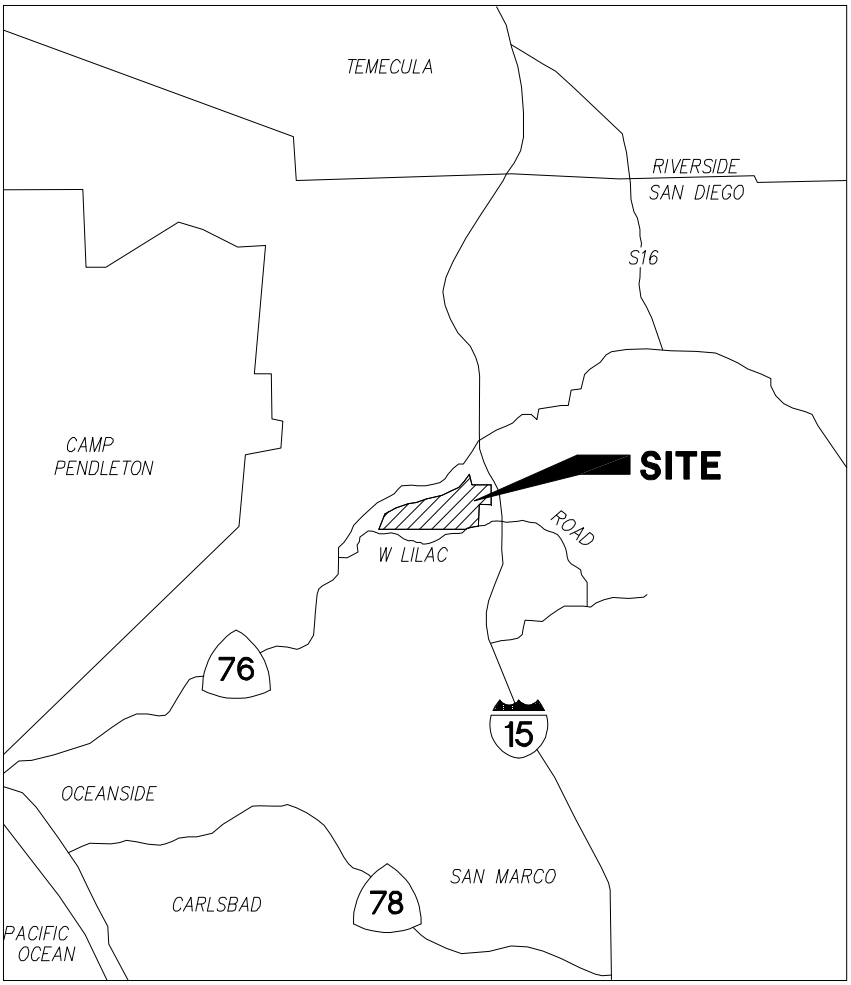


Figure 1: Project Vicinity Map

The site is currently a ranch with a few residences and agricultural farms and a large complex of barns for horses. The project includes preservation of the existing residences and barns, and development of large portions of the site into single family homes with the associated improvements including streets, landscaping, and utilities. In addition, the project also includes street widening improvements for offsite areas.

The purpose of this report is to determine hydrologic impact, if any, to the existing storm drain facilities or natural drainage, 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. *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.*

For information regarding storm water mitigation, refer to the Preliminary Storm Water Quality Management Plan (SWQMP) under a separate cover prepared by Project Design Consultants for the project treatment BMPs for Ocean Breeze Ranch.

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. See Exhibit A for the existing condition hydrology maps.

2.1 Existing Drainage Patterns

The site currently consists of a large agricultural ranch surrounding by steep hillsides. The site is mostly undeveloped and includes hillsides and pastures, tomato fields, barns, farm ponds, farm roads, and various scattered buildings throughout the site. Slopes vary from moderate to steep and cover is mostly brush and agricultural crops with some areas of dense trees. Under existing conditions, there are several farm ponds throughout the site that are presumed to be wet throughout the year. The site mostly drains to the north towards the San Luis Rey River. Some of the drainage sheet flows into the river, and other areas discharge into defined channels that drain offsite towards the river. There are a few areas near the southwest and southeast corners of the site that drain south towards West Lilac Road, and discharge into various culverts that cross the road and drain to the south and eventually drain to the San Luis Rey River further downstream.

The site drainage is affected by several areas of upstream runon. East of the Redondo Drive/West Lilac Road intersection, there is a large portion of runon that drains onto the property and drains to the north through the site via the steep valley channels. There is also another significant area of runon along the easterly property line that drains through the site along a stream that drains in a northwesterly direction toward the river. The runon areas are mostly low-density residential areas with agricultural and other improvements. The storm drain improvements consist of small roadway culverts and heavily vegetated channels, typical of the semi-rural character of the surrounding development.

For the purpose of the analysis within this report, onsite drainage is divided into twelve drainage areas, Systems 100E through 1800E. This includes Systems 500E and 550E, wherein a large basin is broken up into two separate systems along the berm of an existing pond. This was done allow for a simple pre- and post-project comparison of Rational Method results. The two systems, together exceed the 1 square mile threshold for the Rational Method. However, the

existing pond likely retains a lot of water from the upstream watershed, so the systems were analyzed separately.

The "E" in the system name refers to the existing condition drainage area in order to differentiate between the proposed (P) drainage areas. These systems have also been identified relative to the directional quadrant to which they discharge (ie. Northwestern, Northeastern, Southwestern, Southeastern) in order to facilitate a comparison with the post-project conditions. The quadrants are used for comparison points because in the post-project condition, there are multiple discharge locations. In all cases drainage is sent to the same quadrants however a system by system comparison is not possible due to the grading and adjustments to drainage areas. From west to east, beginning with basins draining to the north and then to the south, they include the following areas:

Northwestern Quadrant

System 100E: System 100E represents the area that drains northwesterly and discharges off the property near the San Luis Rey River near the most westerly part of the project. A large portion of the drainage area within this system is from offsite areas.

System 200E: System 200E represents the onsite area that drains northwesterly and discharges off the property near the San Luis Rey River downstream of (and west of) the existing horse barns.

Northeastern Quadrant

System 300E: System 300E represents the onsite area that drains northerly and discharges off the property near the San Luis Rey River upstream of (and east of) the existing horse barns.

System 400E: System 400E represents the onsite area that drains northerly and discharges off the property near the San Luis Rey River in between Systems 300E and 500E.

System 500E: System 500 represents the offsite area which drains into a pond located outside of the PA3 limits and south of the central section of Dulin Road.

System 550E: System 550E represents onsite area downstream of the pond draining System 500E northwesterly and discharges off the property near the San Luis Rey River upstream of (and east of) existing horse barns.

System 600E: System 600E represents the onsite area at the northeastern extents of the property that drains northerly and discharges off the property near the San Luis Rey River.

Southwestern Quadrant

System 700E: System 700E represents the onsite drainage area that drains to the south of West Lilac Road near the Camino Del Cielo intersection into an existing corrugated squash pipe.

System 800E: System 800E represents the onsite drainage area that drains to the south of West Lilac Road near the Redondo Drive intersection into an existing corrugated squash pipe.

Systems 950E & 960E: These systems represent the offsite drainage area consisting of roadway and parkway runoff near the T-intersection of Camino Del Rey and West Lilac Road.

Southeastern Quadrant

System 1100E: System 1100E represents the onsite graded area adjacent to Sullivan Middle School that drains to the south towards an existing desilting basin wherein runoff drains into an existing CMP inlet which is connected to an existing dual 24-inch storm drain. A portion of West Lilac Road street drainage drains into an existing type B-1 inlet which is also connected the dual storm drain. The inlet acts as the point of confluence for the farm hillside runoff and West Lilac roadway drainage. Drainage conveyed into the dual 24-inch storm drain systems discharge into a dense brush area located directly south of the school.

System 1800E: System 1800E represents a small patch of West Lilac Road drainage directly south of System 1100E.

2.2 Proposed Drainage Patterns and Improvements

The proposed project entails the construction of single-family housing developments including parks and trails, estate lots with access roads, and onsite/offsite widening improvements. There are three planning areas within the property boundary. Planning Area (PA) 1 and PA 2 will be comprised of single-family homes, public streets, and parks and trails. Onsite street widening improvements will be constructed south of PA 2 along West Lilac Road. PA 3 will consist of the future estate lots, a private access roadway (Dulin Road), and private streets. Additional onsite street widening improvements will be constructed along West Lilac Road located south of PA 3 and east of Sullivan Middle School. Offsite street widening improvements will be constructed at the 3-way intersection of Camino Del Rey and West Lilac Road. Refer to the Site Plan Exhibit in Appendix 4.

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. The improvements also include a bypass system to prevent the commingling of on-site runoff and run-on from undeveloped areas/hill slopes. The bypass system consists of earthen channels, toe and brow ditches, catch basins and crossing culverts.

Flow from both onsite and offsite drainage areas are conveyed to outfalls along either the San Luis Rey River or the roadside drainage ditches to the south of the property. For the proposed conditions, mostly all drainage is conveyed to the same quadrant of the site to closely match existing conditions.

See Exhibit B in Appendix 4 for the proposed condition hydrology maps. In order to provide a simple comparison between existing and proposed conditions, a naming convention was adopted similar to the existing conditions but with additional systems broken out to facilitate modeling of a complex drainage system. From west to east, beginning with basins draining to the north and then to the south, they include the following systems by quadrant:

Northwestern Quadrant

System 1000P: System 1000P consists of approximately half of PA2, wherein drainage from the six cul-de-sacs drain southerly towards sag inlets. Drainage is then treated via pollutant control basins (Basins 2C – 2G) prior to conveyance in a dual RCP pipe storm drain system along the park. The park is located along the southern perimeter of PA2. Adjacent undeveloped hillside run-on south of PA2 drains into catch basins via surface sheetflow or earthen channels. The run-on into the catch basins commingle with onsite treated drainage in the dual RCP storm drain system along the park. The commingled drainage is then conveyed westerly towards an outfall near the San Luis Rey River. Additional offsite hillside run-on drains into the storm drain via a brow ditch.

System 1300P: System 1300P consists of a little over a quarter of the PA2 site. This drainage system includes System 1500P. Onsite runoff drains via sheetflow into onsite inlets via gutter flow. Runoff is then conveyed westerly in an onsite storm drain system which outlets into a basin (Basin 2A) for pollutant treatment, which is located along the western side of PA2. Treated onsite drainage is then discharged to the west near the San Luis Rey River.

System 2000P: System 2000P represents a northeasterly portion of PA2, a stretch of Street A roadway (between PA1 and PA2), small section of Street B roadway (north of PA2), and a small portion of graded hillside (southwest of the Street A and B 3-way intersection). Drainage from the graded hillside and Street A roadway sheetflow towards the gutter. Gutter flows drain northerly towards inlets located south of the Street A and B, T-intersection (located east of the southeast corner of PA2). Runoff in the inlets drain northerly in an onsite storm drain system which outlets stormwater into a basin located near the northeast corner of PA2. Prior to the outlet of drainage into the basin (Basin 2B), there is a confluence with onsite flows from the lots and surface drainage from Streets A, C, and G. The basin, acting as a pollutant control BMP, treats additional onsite flows that are conveyed through two other separate storm drain systems and where storm water is captured via curb inlets. All treated stormwater from the basin discharges to the north near the San Luis Rey River.

System 240P: System 240P represents the off-site area to the southwest (represented in the existing condition model as System 100E), the undeveloped land (Lot B, bio-open space) in PA1, and the onsite treated flows from Basin 1A of PA1 (System 3000) which outlet into Lot B. System 3000 represents Planning Area 1, which includes the confluences of sub-systems 3500 and 3600.

System 270P: System 270P represents the westerly portion of Dulin Road (the private access road to Basin 3A). It also includes undeveloped land to the south of the road, that drains northerly and is bypassed under Dulin Road via a private storm drain (at Nodes 281 and 285). The run-on from the undeveloped land south of Dulin Road confluences with undeveloped land north of Dulin Road and drains downstream in a northwesterly direction.

Northeastern Quadrant

System 300P: System 300P represents a portion of the private estate lot access road and the future estate lots in Planning Area 3 that drain into a treatment basin, plus the adjacent undeveloped land to the north and south of the road, that drains northeasterly and discharges off the property near the San Luis Rey River.

System 400P: System 400P represents a portion of Dulin Road and the future adjacent estate lots to the south of the road, which drains into Basin 3C. Similar to System 300P, undeveloped land south of Dulin Road is bypassed under the road via a private storm drain pipe. Onsite treated flows into Basin 3C confluence with flows in the bypass storm drain at Node 405. At this point drainage is conveyed through a private pipe and discharged north of Basin 3C. Runoff then heads downstream in a northerly direction where it is discharged near the San Luis Rey River.

System 430P: System 430P represents offsite undeveloped land, a portion of Dulin Road, a future private road leading to the estate lots, and the adjacent estate lots to the south of the access road and along the private road. Drainage from the lots and roadway will outlet into the central basin which is located along the north perimeter of Dulin Road. Similar to System 400P, undeveloped land south of Dulin Road is bypassed in a private

underground storm drain system. It confluences with onsite treated drainage prior to discharge. At this point, runoff along with undeveloped land drainage (north of Dulin Road), heads downstream at a point south of the San Luis Rey River.

System 455P: System 455P represents the onsite project area including the future private road leading to the estate lots, and the adjacent estate lots to the south of the access road and along the private road. Drainage from the lots and roadway will outlet into the Basin 3D which is located along the north perimeter of Dulin Road. This system ties into the bypassed pipe within System 430P.

System 500P, 550P: Similar to existing conditions, System 500 remains the same. System 550 is similar to pre-project conditions but includes a slight change in acreage.

System 600P, 660P, 670P: These systems represent street drainage along the private Dulin Road that drains towards three proposed basins located along the north perimeter (of Dulin Road). Drainage enters into inlets which are connected to private storm drain systems that outlet drainage into the basins for pollutant treatment.

System 613P, 635P, 639P, 650P, 680P, and 690P: These systems represent offsite areas which drains northerly downstream towards Dulin Road but do not commingle with onsite private street drainage. All drainage from these systems are bypassed via private storm drain systems under Dulin Road with outfalls along the north perimeter of Dulin Road.

Southwestern Quadrant

System 700P: Under proposed conditions, there will be improvements along West Lilac Road wherein the road will be widened. Under existing conditions, the existing corrugated pipes are undersized and have extremely shallow cover. They also discharge to outfalls south of the road which cannot be extended without extensive offsite property acquisition. With the proposed road widening, extending these pipes would expose the soffits above the parkway. Therefore, for proposed conditions, it was determined the hillsides would drain downstream towards brow ditches along the north perimeter of West Lilac Road. The runoff in the brow ditches will drain into catch basins that will be

connected to a storm drain system that will convey bypassed drainage in a westerly direction. A stretch of West Lilac Road drainage and a portion of Street A drainage will sheet flow toward the gutter and flow westerly into an at grade inlet. The inlet collects the street drainage into a proposed basin (Basin 2H) for pollutant treatment. Treated flows then confluence with bypassed drainage prior to discharging to the west. Although the proposed condition flows alter the discharge location for the hillside areas that drain towards West Lilac Road, the proposed drainage location still drains to the San Luis Rey River and improves the drainage condition for the roadway and the downstream property owners south of West Lilac Road.

System 950P: System 950E represents the offsite drainage area consisting of roadway and parkway runoff near the T-intersection of Camino Del Rey and West Lilac Road. Under proposed conditions, the road will be widened along Camino Del Rey. A proprietary biofiltration unit will be incorporated for stormwater mitigation due to the increased impervious area. A storm drain system will be added to discharge the roadway drainage similar to existing conditions.

Southeastern Quadrant

System 1100P: Under proposed conditions, the existing temporary desilting basin will be removed and all the offsite graded area (adjacent to the middle school) will drain southwesterly towards a brow ditch that will direct flows into a catch basin that is tied to a proposed storm drain line. The storm drain line will connect into the existing storm drain inlet to match existing conditions. Roadway widening improvements are proposed along a section of West Lilac Road (along the southern perimeter of the onsite area between the middle school and Via Ararat Drive. A new proposed pad will be constructed and will flow into a basin (Basin 3I) for pollutant treatment and outlet to proposed storm drain pipe that travels along West Lilac Road. A new at grade inlet will be placed east of the existing inlet to capture drainage from the proposed street improvements. Runoff into the inlet will outlet into a basin (Basin 3H) for pollutant treatment and basin outflows will tie into the existing inlet. At this point, drainage will confluence with bypassed flows prior to conveyance into the existing dual pipe storm

drain system. Wherein, stormwater will drain southerly to the existing condition discharge point south of West Lilac Road.

System 1800P: System 1800E represents a small patch of roadway directly south of System 1100P that will have curb and gutter improvements incorporated under proposed conditions.

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 models used in the computations.

3.1 Hydrology Criteria

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

Table 1: Hydrology Criteria

Existing and Proposed Hydrology:	100-year storm frequency
Soil Type:	Hydrologic Soil Group A, B, C, and D per USDA web soil survey. (Appendix 1).
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 to the south and south east were calculated assuming a Low Density Residential (LDR) land cover of 1.0 dwelling units per acre (DU/A) based on a visual evaluation of the spacing of the housing from the aerial photography. For the existing condition, the onsite area was also assigned runoff

coefficients from the same categorization, as the presence of various access roads, support buildings, barns and agricultural fields would more closely match the 1.0 dwelling units per acre or 10% imperviousness categorization as opposed to 0% imperviousness within the Undisturbed Natural Terrain classification. For the proposed condition, a land use coverage map was developed that consisted of Medium Density Residential use at 7.3 DU/A for the single-family developments in Planning Areas 1, 2, and 3, a Commercial/Industrial of 95% impervious for the roadways and Medium Density Residential use at 4.3 DU/A for the development on the estate lots. For subareas with multiple soil types and/or land use designations, a composite runoff coefficient (C) was calculated for the drainage area.

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 and proposed peak 100-year discharges. For results of the analysis see Exhibit A and B in Appendix 4 for existing and proposed conditions hydrology maps, and Appendices 2 and 3 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

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 across the site that generally match the existing conditions. Site drainage improvements resulted in minor adjustments to outfall locations and/or the exact number of acres. The total runoff has been summarized for each system and compared according to the respective geographic quadrant. Table 2 summarizes the Rational Method hydrology results for each system for the existing and proposed conditions, first without detention taken into account, and then with detention based on matching pre-project conditions.

Northwestern Quadrant							
Existing Conditions			Proposed Conditions				
System ID	Area (ac.)	Flow Rate, Q (cfs)	System ID	Comment	Area (ac.)	Undetained Q (cfs)	Detained Q (cfs)
100	427.8	462.8	1000	Hillside bypass + onsite cul-de-sacs	86.4	187.9	187.9
200	197.3	176.9	1300	Includes Sys 1500P	18.3	68.4	≤21.0
			2000	Combination of Sys 2200P and Sys 2400P	17.4	67.9	≤18.0
				Offsite bypass + Sys 3000P (including Sys 3500P) + Sys 3600P	310.9	422.8	≤262.4
			270	Offsite bypass	180.4	150.4	150.4
Total	**625.1**	**639.7**	**Total**		**613.4**	**897.4**	**≤639.7**
Note: 11.7 acres area difference due to approximately 8 acres of drainage system redirected to Sys 700P and about 4 acres of drainage system to Sys 300P due to site constraints.							

Southwestern Quadrant						
Existing Conditions			Proposed Conditions			
System ID	Area (ac.)	Q (cfs)	System ID	Area (ac.)	Undetained Q (cfs)	Detained Q (cfs)
700	12.8	25.9	700 (at node 710)	38.8	85.5	≤63.3
800	19.1	37.7	950	7.5	38.3	≤35.0
950	3.1	15.7				
960	4.4	19.0				
Total	**39.4**	**98.3**	**Total**	**46.3**	**123.8**	**≤98.3**
Note: Acreage difference due to portion of roadway and undeveloped area redirected westerly along gutter in proposed conditions.						

Table 2 Continued: Hydrology Results

Northeastern Quadrant						
Existing Conditions			Proposed Conditions			
System ID	Area (ac.)	Flow Rate, Q (cfs)	System ID	Area (ac.)	Undetained Q (cfs)	Detained Q (cfs)
300	109.2	144.4	300	112.0	126.9	≤122.0
400	140.2	174.3	400	110.2	141.2	≤128.3
500	586.4	892.2	430	32.4	56.7	≤52.0
550	173.2	237.2	500	586.4	892.2	892.2
600	84.4	179.1	550	172.1	236.1	236.1
			600	1.6	7.3	≤5.4
			660	1.4	9.1	≤6.4
			670	2.0	7.7	≤3.0
			613	18.3	51.8	51.8
			635	11.7	21.5	21.5
			639	2.2	4.1	4.1
			650	6.7	13.0	13.0
			680	6.4	11.5	11.5
			690	34.8	79.4	79.4
Total	**1093.4**	**1628.7**	**Total**	**1098.2**	**1658.5**	**≤1628.7**
Southeastern Quadrant						
Existing Conditions			Proposed Conditions			
System ID	Area (ac.)	Flow Rate, Q (cfs)	System ID	Area (ac.)	Undetained Q (cfs)	Detained Q (cfs)
1100	24.6	51.1	1100	26.3	56.2	≤50.9
1800	0.8	3.7	1800	0.9	3.9	3.9
Total	**25.4**	**54.8**	**Total**	**26.4**	**60.1**	**≤54.8**

4.0 DETENTION METHODOLOGY

The basins were sized to attenuate post-project peak flow rates to pre-project levels for the 100-year storm event. Based on the Rational Method analyses, determination was made on a drainage basin by drainage basin basis as to the impacts of detention and whether analyses were warranted to demonstrate peak flow mitigation. By including a number of basins, the post-project peak flows will be able to be reduced to below pre-project levels. Detention results from routing the basin outflow hydrographs will be included during final engineering.

5. HYDRAULIC CRITERIA, METHODOLOGY, AND RESULTS

Hydraulic calculations for pipes, inlets, and ditches will be performed during final engineering.

Onsite floodplain exhibits are included in Appendix 5 showing the lines of inundation for the 100-year flood for the drainage basins over 25 acres. A preliminary floodplain evaluation for the San Luis Rey River has been prepared under a separate cover by Chang Consultants. All proposed culverts for the proposed Planning Areas will be designed to ensure the proposed roadways are flood free during the 100-year event.

6. ENVIRONMENTAL IMPACTS

This section summarizes the following questions for CEQA purposes.

Would the project:

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

   The project's drainage patterns mimic the existing conditions, so no substantial impacts will exist. The project does not propose to substantially alter the adjacent San Luis Rey River, but does proposes to raise a portion of the site 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 project proposes to detain stormwater onsite and does not increase peak flows; therefore, the project will not contribute runoff water that would substantially change the existing condition.

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 the San Luis Rey River (in the Chang Consultants Floodplain Study) shows that the proposed single family residential area is well above the river 100-year floodplain elevation.

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

No, all proposed building structures are outside of the proposed 100-year flood hazard area. Project 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.

7. CONCLUSION

This drainage report has been prepared in support of the preliminary design of the storm drain improvements for the Tentative Map for the Ocean Breeze Ranch 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 storm drain system will be sufficient to satisfy County criteria in the post-development condition.

APPENDIX 1

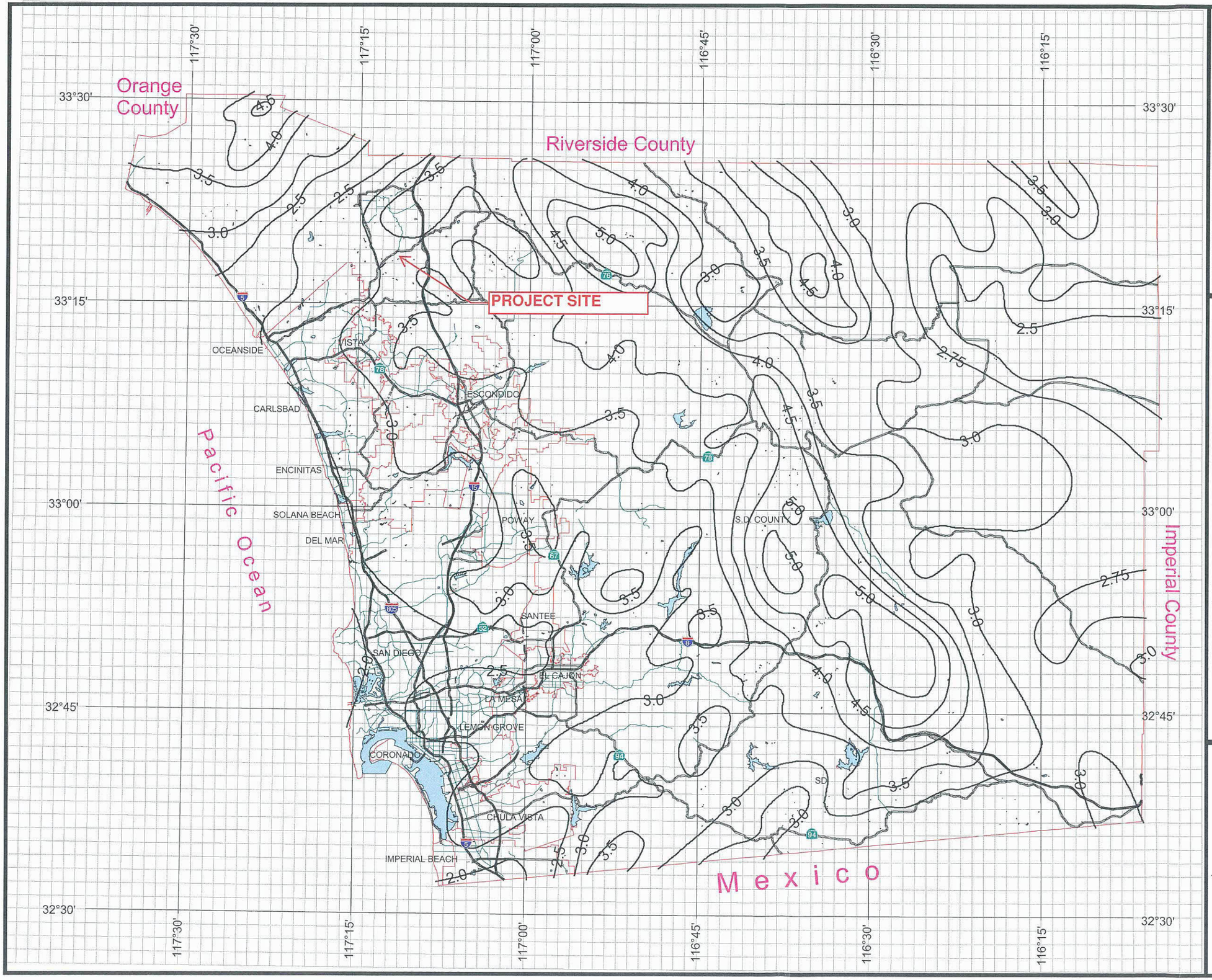
Isopluvials - Intensity-Duration Chart - Runoff Coefficients – NRCS Hydrologic Soil Groups

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

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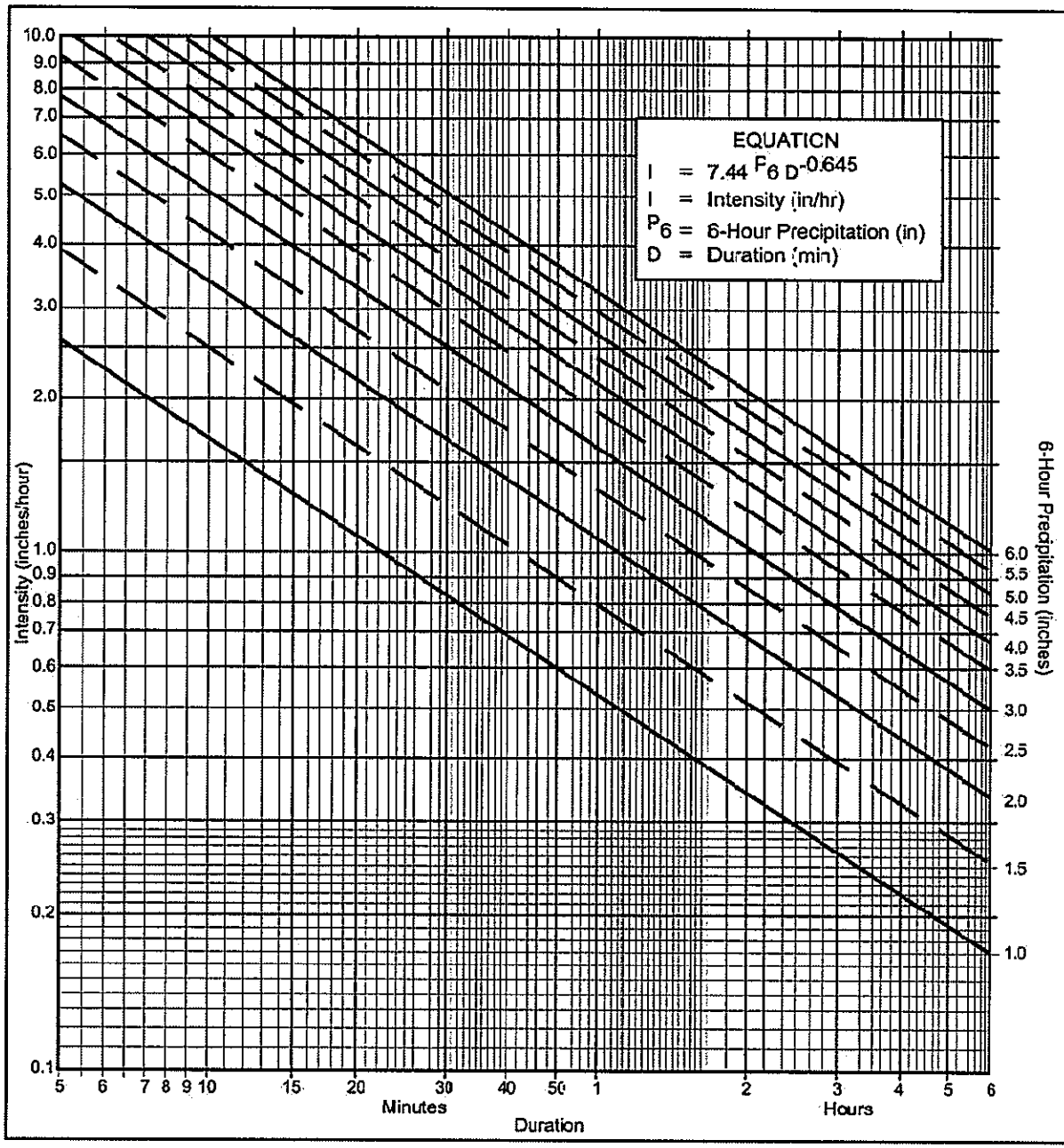
Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

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



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 = 3.3 in., P_{24} = 5.8, $\frac{P_6}{P_{24}}$ = 57 %(2)

(c) Adjusted P_6(2) = 3.3 in.

(d) t_x = _____ min.

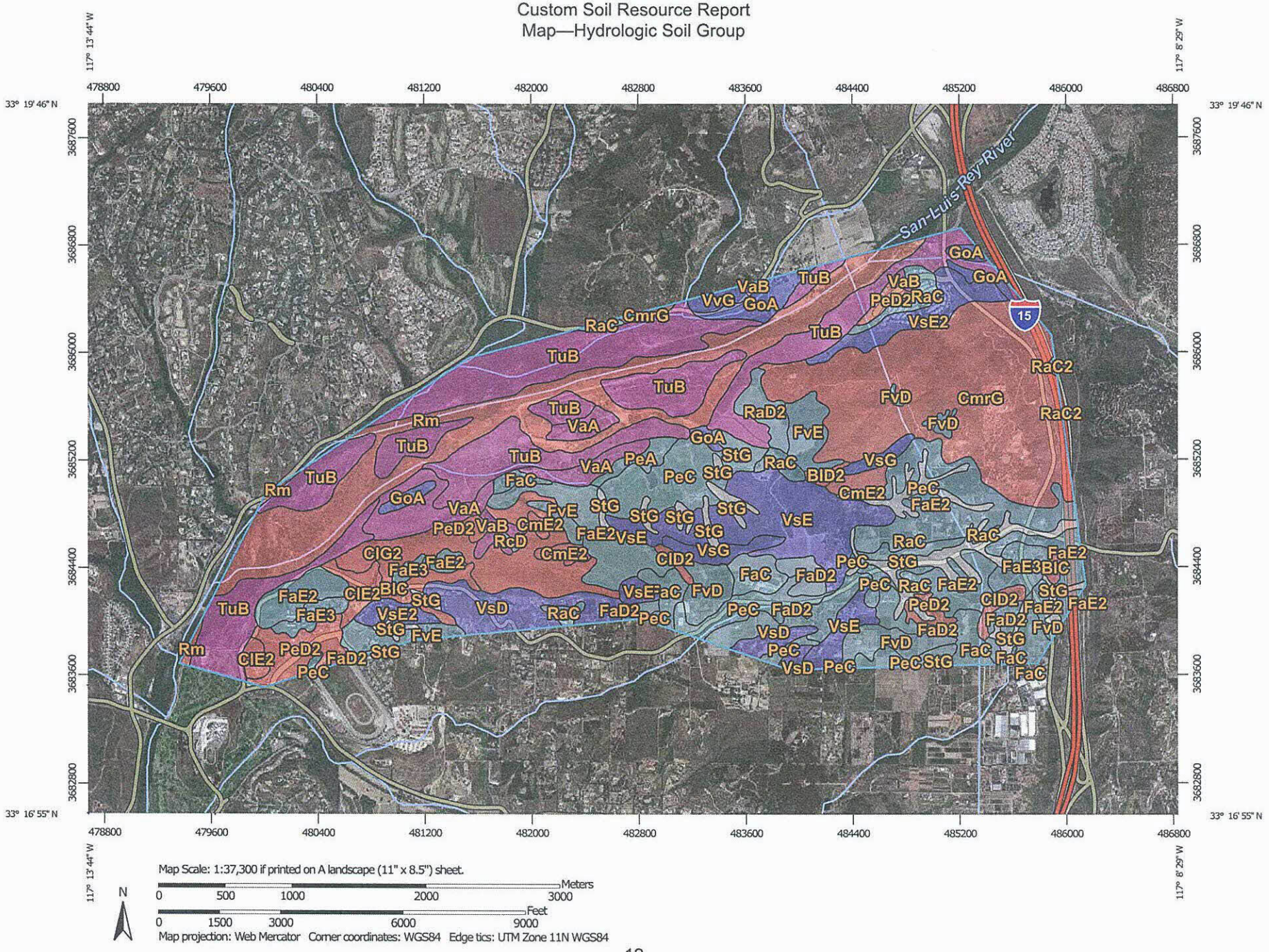
(e) I = _____ in./hr.

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

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



Map Scale: 1:37,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 500 1000 2000 3000

Feet: 0 1500 3000 6000 9000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

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

Date(s) aerial images were photographed: Data not available.

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.

Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BIC	Bonsall sandy loam, 2 to 9 percent slopes	D	52.8	1.4%
BID2	Bonsall sandy loam, 9 to 15 percent slopes, eroded	D	7.3	0.2%
CID2	Cieneba coarse sandy loam, 5 to 15 percent slopes, erod ed	D	19.7	0.5%
CIE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, ero ded	D	12.7	0.3%
CIG2	Cieneba coarse sandy loam, 30 to 65 percent slopes, ero ded	D	143.4	3.9%
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded	D	33.0	0.9%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	496.2	13.3%
FaC	Fallbrook sandy loam, 5 to 9 percent slopes	C	59.0	1.6%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	127.5	3.4%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	349.8	9.4%
FaE3	Fallbrook sandy loam, 9 to 30 percent slopes, severely eroded	C	53.4	1.4%
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	C	95.5	2.6%
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes	C	75.3	2.0%
GoA	Grangeville fine sandy loam, 0 to 2 percent slopes	B	63.1	1.7%
PeA	Placentia sandy loam, 0 to 2 percent slopes, warm MAAT, MLRA 19	C	17.0	0.5%
PeC	Placentia sandy loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	C	188.7	5.1%
PeD2	Placentia sandy loam, 9 to 15 percent slopes, eroded	D	82.0	2.2%

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RaC	Ramona sandy loam, 5 to 9 percent slopes	C	66.7	1.8%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	C	1.8	0.0%
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	C	28.7	0.8%
RcD	Ramona gravelly sandy loam, 9 to 15 percent slopes	C	2.8	0.1%
Rm	Riverwash	D	370.7	10.0%
StG	Steep gullied land		145.6	3.9%
TuB	Tujunga sand, 0 to 5 percent slopes	A	646.7	17.4%
VaA	Visalia sandy loam, 0 to 2 percent slopes	A	99.0	2.7%
VaB	Visalia sandy loam, 2 to 5 percent slopes	A	19.3	0.5%
VsD	Vista coarse sandy loam, 9 to 15 percent slopes	B	111.1	3.0%
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	220.6	5.9%
VsE2	Vista coarse sandy loam, 15 to 30 percent slopes, erode d	B	80.5	2.2%
VsG	Vista coarse sandy loam, 30 to 65 percent slopes	B	36.5	1.0%
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes	B	12.6	0.3%
Totals for Area of Interest			**3,718.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX 2

100-year Existing Conditions Rational Method Computer Output

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2012 Advanced Engineering Software (aes)
            Ver. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 100 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S100E100.DAT
  TIME/DATE OF STUDY: 18:08 05/23/2018
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    640.00
  DOWNSTREAM ELEVATION(FEET) =    600.00
  ELEVATION DIFFERENCE(FEET) =     40.00
  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) =  7.328
  SUBAREA RUNOFF(CFS) =      1.55
  TOTAL AREA(ACRES) =      0.66   TOTAL RUNOFF(CFS) =      1.55

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    330.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3300.00   CHANNEL SLOPE =  0.0818
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.725
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      88.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.66
  AVERAGE FLOW DEPTH(FEET) =   0.87   TRAVEL TIME(MIN.) =   6.35
  Tc(MIN.) =   12.87
  SUBAREA AREA(ACRES) =   107.60       SUBAREA RUNOFF(CFS) =  167.76
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.330
  TOTAL AREA(ACRES) =      108.3         PEAK FLOW RATE(CFS) =     168.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.) =  10.68
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    3400.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    110.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    330.00  DOWNSTREAM(FEET) =    245.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   775.00   CHANNEL SLOPE =  0.1097
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   6.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.484
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3130
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     181.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.90
  AVERAGE FLOW DEPTH(FEET) =   1.29   TRAVEL TIME(MIN.) =   1.09
  Tc(MIN.) =   13.96
  SUBAREA AREA(ACRES) =    18.15       SUBAREA RUNOFF(CFS) =   25.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.328
  TOTAL AREA(ACRES) =      126.4         PEAK FLOW RATE(CFS) =     185.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.31   FLOW VELOCITY(FEET/SEC.) =  11.91
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    4175.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   13.96
  RAINFALL INTENSITY(INCH/HR) =   4.48
  TOTAL STREAM AREA(ACRES) =   126.41
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    185.65

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    460.00
  DOWNSTREAM ELEVATION(FEET) =    450.00
  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) =  7.328
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    450.00  DOWNSTREAM(FEET) =    320.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1300.00   CHANNEL SLOPE =  0.1000
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.045
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.24
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   5.11
  Tc(MIN.) =   11.63
  SUBAREA AREA(ACRES) =    12.02       SUBAREA RUNOFF(CFS) =   19.41
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.320
  TOTAL AREA(ACRES) =       12.2         PEAK FLOW RATE(CFS) =      19.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   5.29
  LONGEST FLOWPATH FROM NODE    105.00 TO NODE    107.00 =    1400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    320.00  DOWNSTREAM(FEET) =    245.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   720.00   CHANNEL SLOPE =  0.1042
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.423
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3730
  S.C.S. CURVE NUMBER (AMC II) =   0
```



```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
  AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   2.63
  Tc(MIN.) =   14.26
  SUBAREA AREA(ACRES) =    12.05       SUBAREA RUNOFF(CFS) =   19.88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.346
  TOTAL AREA(ACRES) =       24.3         PEAK FLOW RATE(CFS) =      37.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   4.93
  LONGEST FLOWPATH FROM NODE    105.00 TO NODE    110.00 =    2120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 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.) =   14.26
  RAINFALL INTENSITY(INCH/HR) =   4.42
  TOTAL STREAM AREA(ACRES) =    24.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.18

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      185.65    13.96        4.484        126.41
      2       37.18    14.26        4.423         24.27

  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      222.04    13.96        4.484
      2      220.29    14.26        4.423

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     222.04   Tc(MIN.) =   13.96
  TOTAL AREA(ACRES) =      150.7
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    4175.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    245.00  DOWNSTREAM(FEET) =    210.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1450.00   CHANNEL SLOPE =  0.0241
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.891
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3740
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     236.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.04
  AVERAGE FLOW DEPTH(FEET) =   2.06   TRAVEL TIME(MIN.) =   3.43
  Tc(MIN.) =   17.39
```

```
  SUBAREA AREA(ACRES) =    19.65       SUBAREA RUNOFF(CFS) =   28.60
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.336
  TOTAL AREA(ACRES) =      170.3         PEAK FLOW RATE(CFS) =     222.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.01   FLOW VELOCITY(FEET/SEC.) =   6.90
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =    5625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =   17.39
  RAINFALL INTENSITY(INCH/HR) =   3.89
  TOTAL STREAM AREA(ACRES) =   170.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    222.40

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    658.00
  DOWNSTREAM ELEVATION(FEET) =    646.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  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) =  7.328
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    646.00  DOWNSTREAM(FEET) =    346.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2460.00   CHANNEL SLOPE =  0.1220
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.483
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3660
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      38.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.51
  AVERAGE FLOW DEPTH(FEET) =   0.60   TRAVEL TIME(MIN.) =   7.45
  Tc(MIN.) =   13.96
  SUBAREA AREA(ACRES) =    45.09       SUBAREA RUNOFF(CFS) =   73.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.366
  TOTAL AREA(ACRES) =       45.3         PEAK FLOW RATE(CFS) =      74.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.86   FLOW VELOCITY(FEET/SEC.) =   6.82
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =    2560.00 FEET.
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    210.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2300.00   CHANNEL SLOPE =  0.0609
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.456
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3940
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     104.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.52
  AVERAGE FLOW DEPTH(FEET) =   1.19   TRAVEL TIME(MIN.) =   6.94
  Tc(MIN.) =   20.90
  SUBAREA AREA(ACRES) =    44.36       SUBAREA RUNOFF(CFS) =   60.40
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.380
  TOTAL AREA(ACRES) =       89.6         PEAK FLOW RATE(CFS) =     117.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.) =   5.71
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    130.00 =    4860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =   20.90
  RAINFALL INTENSITY(INCH/HR) =   3.46
  TOTAL STREAM AREA(ACRES) =    89.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    117.64

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      222.40    17.39        3.891        170.33
      2      117.64    20.90        3.456         89.64

  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      320.27    17.39        3.891
      2      315.16    20.90        3.456

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     320.27   Tc(MIN.) =   17.39
  TOTAL AREA(ACRES) =      260.0
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =    5625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.891
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3910
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3551
  SUBAREA AREA(ACRES) =   31.05   SUBAREA RUNOFF(CFS) =   47.24
  TOTAL AREA(ACRES) =      291.0   TOTAL RUNOFF(CFS) =     402.11
  TC(MIN.) =   17.39

****************************************************************************
  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) =  3.891
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4050
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3609
  SUBAREA AREA(ACRES) =   38.52   SUBAREA RUNOFF(CFS) =   60.71
  TOTAL AREA(ACRES) =      329.5   TOTAL RUNOFF(CFS) =     462.81
  TC(MIN.) =   17.39

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    132.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    200.00  DOWNSTREAM(FEET) =    184.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2600.00   CHANNEL SLOPE =  0.0062
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =  15.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     492.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.33
  AVERAGE FLOW DEPTH(FEET) =   1.55   TRAVEL TIME(MIN.) =  10.00
  Tc(MIN.) =   27.39
  SUBAREA AREA(ACRES) =    73.72       SUBAREA RUNOFF(CFS) =   59.93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.346
  TOTAL AREA(ACRES) =      403.3         PEAK FLOW RATE(CFS) =     462.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.50   FLOW VELOCITY(FEET/SEC.) =   4.26
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    132.00 =    8225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3475
  SUBAREA AREA(ACRES) =   24.51   SUBAREA RUNOFF(CFS) =   26.33
  TOTAL AREA(ACRES) =      427.8   TOTAL RUNOFF(CFS) =     462.81
```



```
  TC(MIN.) =   27.39
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      427.8  TC(MIN.) =     27.39
  PEAK FLOW RATE(CFS)   =     462.81
================================================================================
================================================================================
  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 *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 200 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S200E100.DAT
  TIME/DATE OF STUDY: 14:43 05/26/2016
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3370
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    600.00
  DOWNSTREAM ELEVATION(FEET) =    590.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.375
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.433
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    590.00  DOWNSTREAM(FEET) =    208.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3000.00   CHANNEL SLOPE =  0.1273
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.804
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3620
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      40.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.30
  AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =  11.64
  Tc(MIN.) =   18.01
  SUBAREA AREA(ACRES) =    55.10       SUBAREA RUNOFF(CFS) =   75.87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.362
  TOTAL AREA(ACRES) =       55.3         PEAK FLOW RATE(CFS) =      76.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.94   FLOW VELOCITY(FEET/SEC.) =   5.17
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =    3100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.804
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3614
  SUBAREA AREA(ACRES) =   18.44   SUBAREA RUNOFF(CFS) =   25.25
  TOTAL AREA(ACRES) =       73.7   TOTAL RUNOFF(CFS) =     101.33
  TC(MIN.) =   18.01

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    208.00  DOWNSTREAM(FEET) =    200.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.985
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3960
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     138.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.25
  AVERAGE FLOW DEPTH(FEET) =   1.86   TRAVEL TIME(MIN.) =   8.21
  Tc(MIN.) =   26.23
  SUBAREA AREA(ACRES) =    61.98       SUBAREA RUNOFF(CFS) =   73.27
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.377
  TOTAL AREA(ACRES) =      135.7         PEAK FLOW RATE(CFS) =     152.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.95   FLOW VELOCITY(FEET/SEC.) =   3.32
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =    4700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.985
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3650
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3755
  SUBAREA AREA(ACRES) =   22.10   SUBAREA RUNOFF(CFS) =   24.08
  TOTAL AREA(ACRES) =      157.8   TOTAL RUNOFF(CFS) =     176.88
  TC(MIN.) =   26.23

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    200.00  DOWNSTREAM(FEET) =    195.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.333
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     184.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.05
  AVERAGE FLOW DEPTH(FEET) =   2.03   TRAVEL TIME(MIN.) =  12.20
  Tc(MIN.) =   38.43
  SUBAREA AREA(ACRES) =    24.26       SUBAREA RUNOFF(CFS) =   15.85
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.363
  TOTAL AREA(ACRES) =      182.0         PEAK FLOW RATE(CFS) =     176.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.99   FLOW VELOCITY(FEET/SEC.) =   2.03
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =    6200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    219.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.333
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3630
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3628
  SUBAREA AREA(ACRES) =   15.29   SUBAREA RUNOFF(CFS) =   12.95
  TOTAL AREA(ACRES) =      197.3   TOTAL RUNOFF(CFS) =     176.88
  TC(MIN.) =   38.43
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
  END OF STUDY SUMMARY:
```



```
  TOTAL AREA(ACRES)     =      197.3  TC(MIN.) =     38.43
  PEAK FLOW RATE(CFS)   =     176.88
============================================================================
============================================================================
  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 *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 300 - EXISTING 100                                             *
*                                                                       *
 ************************************************************************

  FILE NAME: S300E100.DAT
  TIME/DATE OF STUDY: 08:23 05/27/2016
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    630.00
  DOWNSTREAM ELEVATION(FEET) =    624.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.331
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.793
```



```
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    305.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    624.00  DOWNSTREAM(FEET) =    270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2000.00   CHANNEL SLOPE =  0.1770
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   6.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.260
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3580
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.34
  AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   3.57
  Tc(MIN.) =   10.90
  SUBAREA AREA(ACRES) =    38.36       SUBAREA RUNOFF(CFS) =   72.23
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.358
  TOTAL AREA(ACRES) =       38.7         PEAK FLOW RATE(CFS) =      72.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.85   FLOW VELOCITY(FEET/SEC.) =  11.36
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =    2100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    270.00  DOWNSTREAM(FEET) =    220.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1180.00   CHANNEL SLOPE =  0.0424
  CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.349
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3520
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      89.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.26
  AVERAGE FLOW DEPTH(FEET) =   1.26   TRAVEL TIME(MIN.) =   3.74
  Tc(MIN.) =   14.63
  SUBAREA AREA(ACRES) =    21.68       SUBAREA RUNOFF(CFS) =   33.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.356
  TOTAL AREA(ACRES) =       60.4         PEAK FLOW RATE(CFS) =      93.45

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.28   FLOW VELOCITY(FEET/SEC.) =   5.34
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =    3280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.349
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3470
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3532
  SUBAREA AREA(ACRES) =   26.56   SUBAREA RUNOFF(CFS) =   40.08
  TOTAL AREA(ACRES) =       86.9   TOTAL RUNOFF(CFS) =     133.54
  TC(MIN.) =   14.63

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    220.00  DOWNSTREAM(FEET) =    210.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00   CHANNEL SLOPE =  0.0091
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.812
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3230
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     147.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.52
  AVERAGE FLOW DEPTH(FEET) =   1.75   TRAVEL TIME(MIN.) =   3.32
  Tc(MIN.) =   17.96
  SUBAREA AREA(ACRES) =    22.24       SUBAREA RUNOFF(CFS) =   27.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.347
  TOTAL AREA(ACRES) =      109.2         PEAK FLOW RATE(CFS) =     144.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.73   FLOW VELOCITY(FEET/SEC.) =   5.50
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =    4380.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      109.2  TC(MIN.) =     17.96
  PEAK FLOW RATE(CFS)   =     144.41
============================================================================
============================================================================
  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 *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 400 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S400E100.DAT
  TIME/DATE OF STUDY: 15:37 05/26/2016
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    710.00
  DOWNSTREAM ELEVATION(FEET) =    705.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.790
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.532
```



```
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    705.00  DOWNSTREAM(FEET) =    430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   925.00   CHANNEL SLOPE =  0.2973
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.193
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.63
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   3.33
  Tc(MIN.) =   11.12
  SUBAREA AREA(ACRES) =    12.14       SUBAREA RUNOFF(CFS) =   21.43
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.341
  TOTAL AREA(ACRES) =       12.5         PEAK FLOW RATE(CFS) =      22.05

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   5.62
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =    1025.00 FEET.

****************************************************************************
  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) =    430.00  DOWNSTREAM(FEET) =    275.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00   CHANNEL SLOPE =  0.1409
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.467
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3430
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      64.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.27
  AVERAGE FLOW DEPTH(FEET) =   0.72   TRAVEL TIME(MIN.) =   2.93
  Tc(MIN.) =   14.04
  SUBAREA AREA(ACRES) =    55.66       SUBAREA RUNOFF(CFS) =   85.27
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.343
  TOTAL AREA(ACRES) =       68.1         PEAK FLOW RATE(CFS) =     104.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.93   FLOW VELOCITY(FEET/SEC.) =   7.22
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =    2125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    275.00  DOWNSTREAM(FEET) =    211.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2050.00   CHANNEL SLOPE =  0.0312
```

```
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.583
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3510
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     129.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.97
  AVERAGE FLOW DEPTH(FEET) =   1.24   TRAVEL TIME(MIN.) =   5.72
  Tc(MIN.) =   19.77
  SUBAREA AREA(ACRES) =    39.67       SUBAREA RUNOFF(CFS) =   49.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.346
  TOTAL AREA(ACRES) =      107.8         PEAK FLOW RATE(CFS) =     133.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.) =   6.01
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =    4175.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.583
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3510
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3469
  SUBAREA AREA(ACRES) =   32.42   SUBAREA RUNOFF(CFS) =   40.77
  TOTAL AREA(ACRES) =      140.2   TOTAL RUNOFF(CFS) =     174.27
  TC(MIN.) =   19.77
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      140.2  TC(MIN.) =     19.77
  PEAK FLOW RATE(CFS)   =     174.27
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 500 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S500E100.DAT
  TIME/DATE OF STUDY: 16:54 05/20/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    501.00 TO NODE    502.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3680
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    890.00
  DOWNSTREAM ELEVATION(FEET) =    880.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.116
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.635
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.44   TOTAL RUNOFF(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    880.00  DOWNSTREAM(FEET) =    680.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1250.00   CHANNEL SLOPE =  0.1600
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.314
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3750
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      66.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.95
  AVERAGE FLOW DEPTH(FEET) =   0.67   TRAVEL TIME(MIN.) =   2.09
  Tc(MIN.) =    8.21
  SUBAREA AREA(ACRES) =    54.69       SUBAREA RUNOFF(CFS) =  129.50
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.375
  TOTAL AREA(ACRES) =       55.1         PEAK FLOW RATE(CFS) =     130.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.97   FLOW VELOCITY(FEET/SEC.) =  12.27
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    503.00 =    1350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    510.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    680.00  DOWNSTREAM(FEET) =    305.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4525.00   CHANNEL SLOPE =  0.0829
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   6.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.303
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     337.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.31
  AVERAGE FLOW DEPTH(FEET) =   1.52   TRAVEL TIME(MIN.) =   6.67
  Tc(MIN.) =   14.88
  SUBAREA AREA(ACRES) =   262.06       SUBAREA RUNOFF(CFS) =  405.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.363
  TOTAL AREA(ACRES) =      317.2         PEAK FLOW RATE(CFS) =     494.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.85   FLOW VELOCITY(FEET/SEC.) =  12.58
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    510.00 =    5875.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    510.00 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.) =   14.88
  RAINFALL INTENSITY(INCH/HR) =   4.30
  TOTAL STREAM AREA(ACRES) =   317.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    494.92

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1000.00
  DOWNSTREAM ELEVATION(FEET) =    980.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.765
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.932
  SUBAREA RUNOFF(CFS) =      1.53
  TOTAL AREA(ACRES) =      0.47   TOTAL RUNOFF(CFS) =      1.53

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    507.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    980.00  DOWNSTREAM(FEET) =    750.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1290.00   CHANNEL SLOPE =  0.1783
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   6.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.057
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      28.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.19
  AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   2.99
  Tc(MIN.) =    8.76
  SUBAREA AREA(ACRES) =    21.35       SUBAREA RUNOFF(CFS) =   53.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =       21.8         PEAK FLOW RATE(CFS) =      54.19

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   8.90
  LONGEST FLOWPATH FROM NODE    505.00 TO NODE    507.00 =    1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    510.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =    305.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3950.00   CHANNEL SLOPE =  0.1127
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   6.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.016
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3790
  S.C.S. CURVE NUMBER (AMC II) =   0
```



```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     186.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.44
  AVERAGE FLOW DEPTH(FEET) =   1.41   TRAVEL TIME(MIN.) =   7.80
  Tc(MIN.) =   16.56
  SUBAREA AREA(ACRES) =   169.49       SUBAREA RUNOFF(CFS) =  258.00
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.383
  TOTAL AREA(ACRES) =      191.3         PEAK FLOW RATE(CFS) =     293.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.79   FLOW VELOCITY(FEET/SEC.) =   9.58
  LONGEST FLOWPATH FROM NODE    505.00 TO NODE    510.00 =    5340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    510.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.56
  RAINFALL INTENSITY(INCH/HR) =   4.02
  TOTAL STREAM AREA(ACRES) =   191.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    293.94

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      494.92    14.88        4.303        317.19
      2      293.94    16.56        4.016        191.31

  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      759.05    14.88        4.303
      2      755.88    16.56        4.016

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     759.05   Tc(MIN.) =   14.88
  TOTAL AREA(ACRES) =      508.5
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    510.00 =    5875.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    305.00  DOWNSTREAM(FEET) =    288.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   735.00   CHANNEL SLOPE =  0.0231
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.110
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3790
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     809.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.17
  AVERAGE FLOW DEPTH(FEET) =   2.44   TRAVEL TIME(MIN.) =   1.10
  Tc(MIN.) =   15.98
```

```
  SUBAREA AREA(ACRES) =    64.56       SUBAREA RUNOFF(CFS) =  100.57
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.371
  TOTAL AREA(ACRES) =      573.1         PEAK FLOW RATE(CFS) =     874.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.54   FLOW VELOCITY(FEET/SEC.) =  11.44
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    515.00 =    6610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    520.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.110
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3310
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3702
  SUBAREA AREA(ACRES) =   13.32   SUBAREA RUNOFF(CFS) =   18.12
  TOTAL AREA(ACRES) =      586.4   TOTAL RUNOFF(CFS) =     892.21
  TC(MIN.) =   15.98
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      586.4  TC(MIN.) =     15.98
  PEAK FLOW RATE(CFS)   =     892.21
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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            Ver. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 550 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S550E100.DAT
  TIME/DATE OF STUDY: 19:12 05/23/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    550.00 TO NODE    551.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3460
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    740.00
  DOWNSTREAM ELEVATION(FEET) =    730.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.300
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.490
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.31   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    551.00 TO NODE    560.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    730.00  DOWNSTREAM(FEET) =    247.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3360.00   CHANNEL SLOPE =  0.1437
  CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.566
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      71.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.70
  AVERAGE FLOW DEPTH(FEET) =   1.02   TRAVEL TIME(MIN.) =   7.27
  Tc(MIN.) =   13.57
  SUBAREA AREA(ACRES) =    82.18       SUBAREA RUNOFF(CFS) =  135.07
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.360
  TOTAL AREA(ACRES) =       82.5         PEAK FLOW RATE(CFS) =     135.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.43   FLOW VELOCITY(FEET/SEC.) =   9.22
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    560.00 =    3460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    559.00 TO NODE    560.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.566
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3910
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3725
  SUBAREA AREA(ACRES) =   56.22   SUBAREA RUNOFF(CFS) =  100.36
  TOTAL AREA(ACRES) =      138.7   TOTAL RUNOFF(CFS) =     235.92
  TC(MIN.) =   13.57

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    570.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    247.00  DOWNSTREAM(FEET) =    225.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1175.00   CHANNEL SLOPE =  0.0187
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.666
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3780
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     259.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.56
  AVERAGE FLOW DEPTH(FEET) =   2.63   TRAVEL TIME(MIN.) =   5.50
  Tc(MIN.) =   19.07
  SUBAREA AREA(ACRES) =    34.47       SUBAREA RUNOFF(CFS) =   47.77
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.374
  TOTAL AREA(ACRES) =      173.2          PEAK FLOW RATE(CFS) =     237.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.51   FLOW VELOCITY(FEET/SEC.) =   3.48
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    570.00 =    4635.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      173.2  TC(MIN.) =     19.07
  PEAK FLOW RATE(CFS)   =     237.23
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 600                                                            *
* EXISTING CONDITIONS 100 YEAR                                          *
 ************************************************************************

  FILE NAME: S600E100.DAT
  TIME/DATE OF STUDY: 07:47 05/24/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4010
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    810.00
  DOWNSTREAM ELEVATION(FEET) =    800.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.840
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.866
  SUBAREA RUNOFF(CFS) =      1.01
  TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      1.01

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    610.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    240.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1650.00   CHANNEL SLOPE =  0.3394
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  15.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.490
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3880
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      73.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.31
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   4.36
  Tc(MIN.) =   10.20
  SUBAREA AREA(ACRES) =    65.52       SUBAREA RUNOFF(CFS) =  139.57
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.388
  TOTAL AREA(ACRES) =       65.8         PEAK FLOW RATE(CFS) =     140.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   7.90
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =    1750.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.490
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3863
  SUBAREA AREA(ACRES) =   18.61   SUBAREA RUNOFF(CFS) =   38.82
  TOTAL AREA(ACRES) =       84.4   TOTAL RUNOFF(CFS) =     179.10
  TC(MIN.) =   10.20
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       84.4  TC(MIN.) =     10.20
  PEAK FLOW RATE(CFS)   =     179.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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

                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 700 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S700E100.DAT
  TIME/DATE OF STUDY: 16:50 05/26/2016
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    372.00
  DOWNSTREAM ELEVATION(FEET) =    360.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.765
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.932
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    705.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =    265.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   475.00   CHANNEL SLOPE =  0.2000
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.729
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.73
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   1.67
  Tc(MIN.) =    7.44
  SUBAREA AREA(ACRES) =     4.04       SUBAREA RUNOFF(CFS) =   10.33
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.382
  TOTAL AREA(ACRES) =        4.3         PEAK FLOW RATE(CFS) =      10.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   5.61
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    705.00 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    265.00  DOWNSTREAM(FEET) =    252.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0206
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.410
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4050
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.51
  AVERAGE FLOW DEPTH(FEET) =   0.79   TRAVEL TIME(MIN.) =   2.99
  Tc(MIN.) =   10.43
  SUBAREA AREA(ACRES) =     3.61       SUBAREA RUNOFF(CFS) =    7.91
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.392
  TOTAL AREA(ACRES) =        7.9         PEAK FLOW RATE(CFS) =      16.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   3.63
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =    1205.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    715.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    252.00  DOWNSTREAM(FEET) =    248.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0174
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.089
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.69
  AVERAGE FLOW DEPTH(FEET) =   1.11   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =   11.47
  SUBAREA AREA(ACRES) =     4.90       SUBAREA RUNOFF(CFS) =   10.22
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.399
  TOTAL AREA(ACRES) =       12.8         PEAK FLOW RATE(CFS) =      25.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.20   FLOW VELOCITY(FEET/SEC.) =   3.86
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    715.00 =    1435.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       12.8  TC(MIN.) =     11.47
  PEAK FLOW RATE(CFS)   =      25.94
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                      2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 19.0 Release Date: 06/01/2012  License ID 1509

                        Analysis prepared by:


 ************************ DESCRIPTION OF STUDY ************************
* OCEAN BREEZE RANCH                                                  *
* SYSTEM 800 - EXISTING 100 YR                                        *
*                                                                     *
 *********************************************************************

  FILE NAME: S800E100.DAT
  TIME/DATE OF STUDY: 16:57 05/26/2016
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    801.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    412.00
  DOWNSTREAM ELEVATION(FEET) =    390.00
  ELEVATION DIFFERENCE(FEET) =     22.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.315
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.358
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.75
```



```
**************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    810.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1285.00   CHANNEL SLOPE =  0.0934
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.203
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3780
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.71
  AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   5.77
  Tc(MIN.) =   11.08
  SUBAREA AREA(ACRES) =    10.07       SUBAREA RUNOFF(CFS) =   19.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.379
  TOTAL AREA(ACRES) =       10.3         PEAK FLOW RATE(CFS) =      20.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.64   FLOW VELOCITY(FEET/SEC.) =   4.36
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    810.00 =    1370.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    808.00 TO NODE    810.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.203
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3850
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3807
  SUBAREA AREA(ACRES) =    4.67   SUBAREA RUNOFF(CFS) =    9.36
  TOTAL AREA(ACRES) =       15.0   TOTAL RUNOFF(CFS) =      29.63
  TC(MIN.) =   11.08

**************************************************************************
  FLOW PROCESS FROM NODE    809.00 TO NODE    810.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.203
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3780
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3801
  SUBAREA AREA(ACRES) =    4.10   SUBAREA RUNOFF(CFS) =    8.06
  TOTAL AREA(ACRES) =       19.1   TOTAL RUNOFF(CFS) =      37.69
  TC(MIN.) =   11.08
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       19.1  TC(MIN.) =     11.08
  PEAK FLOW RATE(CFS)   =      37.69
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 950 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S950E100.DAT
  TIME/DATE OF STUDY: 01:19 07/30/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    950.00 TO NODE    951.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    186.50
  DOWNSTREAM ELEVATION(FEET) =    185.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.324
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```



```
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE    951.00 TO NODE    952.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  185.50  DOWNSTREAM ELEVATION(FEET) =  173.44
  STREET LENGTH(FEET) =   697.45   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 62.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  54.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.015
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.23
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   10.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.07
  STREET FLOW TRAVEL TIME(MIN.) =   3.74   Tc(MIN.) =    6.06
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.678
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6567
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.659
  SUBAREA AREA(ACRES) =    3.07      SUBAREA RUNOFF(CFS) =   15.48
  TOTAL AREA(ACRES) =        3.1        PEAK FLOW RATE(CFS) =      15.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.30
  FLOW VELOCITY(FEET/SEC.) =  3.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    952.00 =     747.45 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.1  TC(MIN.) =      6.06
  PEAK FLOW RATE(CFS)   =      15.68
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 960 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S960E100.DAT
  TIME/DATE OF STUDY: 01:26 07/30/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    960.00 TO NODE    961.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    175.20
  DOWNSTREAM ELEVATION(FEET) =    174.50
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.046
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```



```
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    961.00 TO NODE    962.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  174.50  DOWNSTREAM ELEVATION(FEET) =  171.32
  STREET LENGTH(FEET) =   220.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 23.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  18.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.015
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.14
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.02
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   1.22   Tc(MIN.) =    4.26
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4972
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.499
  SUBAREA AREA(ACRES) =    4.37      SUBAREA RUNOFF(CFS) =   18.89
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =      19.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.00
  FLOW VELOCITY(FEET/SEC.) =  3.55   DEPTH*VELOCITY(FT*FT/SEC.) =   1.59
  LONGEST FLOWPATH FROM NODE    960.00 TO NODE    962.00 =     280.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.4  TC(MIN.) =      4.26
  PEAK FLOW RATE(CFS)   =      19.04
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 1800 - EXISTING 100 YR                                         *
*                                                                       *
 ************************************************************************

  FILE NAME: 1800E100.DAT
  TIME/DATE OF STUDY: 17:50 12/05/2018
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   1800.00 TO NODE   1801.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    688.00
  DOWNSTREAM ELEVATION(FEET) =    687.03
  ELEVATION DIFFERENCE(FEET) =      0.97
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.940
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.038
  SUBAREA RUNOFF(CFS) =      0.21
```



```
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.21

**************************************************************************
  FLOW PROCESS FROM NODE   1801.00 TO NODE   1802.00 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  687.03  DOWNSTREAM ELEVATION(FEET) =  648.91
  STREET LENGTH(FEET) =   558.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.015
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.53
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
  STREET FLOW TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =    8.98
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.959
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.749
  SUBAREA AREA(ACRES) =    0.75      SUBAREA RUNOFF(CFS) =    3.49
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       3.66

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.72
  FLOW VELOCITY(FEET/SEC.) =  5.13   DEPTH*VELOCITY(FT*FT/SEC.) =   1.44
  LONGEST FLOWPATH FROM NODE   1800.00 TO NODE   1802.00 =     608.00 FEET.
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.8  TC(MIN.) =      8.98
  PEAK FLOW RATE(CFS)   =       3.66
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX 3

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
       (c) Copyright 1982-2012 Advanced Engineering Software (aes)
           Ver. 18.2 Release Date: 05/08/2012  License ID 1509

                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 1000                                                              *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: 1000P100.DAT
  TIME/DATE OF STUDY: 11:16 12/06/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   16.0     10.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    49.00
  UPSTREAM ELEVATION(FEET) =    208.54
  DOWNSTREAM ELEVATION(FEET) =    207.90
  ELEVATION DIFFERENCE(FEET) =      0.64
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.651
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1005.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  207.90  DOWNSTREAM ELEVATION(FEET) =  199.50
  STREET LENGTH(FEET) =   481.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       4.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.07
  STREET FLOW TRAVEL TIME(MIN.) =   2.59   Tc(MIN.) =    5.24
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.435
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.486
  SUBAREA AREA(ACRES) =    2.02      SUBAREA RUNOFF(CFS) =    8.18
  TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =       8.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.73
  FLOW VELOCITY(FEET/SEC.) =  3.61   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1005.00 =     530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1008.00 TO NODE   1005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.435
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4834
  SUBAREA AREA(ACRES) =    1.42   SUBAREA RUNOFF(CFS) =    5.75
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =      14.15
  TC(MIN.) =    5.24

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.435
  USER-SPECIFIED RUNOFF COEFFICIENT = .6600
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4921
  SUBAREA AREA(ACRES) =    0.18   SUBAREA RUNOFF(CFS) =    1.00
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =      15.15
  TC(MIN.) =    5.24

****************************************************************************
  FLOW PROCESS FROM NODE   1006.00 TO NODE   1015.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.44  DOWNSTREAM(FEET) =   196.17
  FLOW LENGTH(FEET) =    52.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.74
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.15
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    5.39
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =     582.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1006.00 TO NODE   1015.00 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.) =    5.39
  RAINFALL INTENSITY(INCH/HR) =   8.28
  TOTAL STREAM AREA(ACRES) =     3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.15

****************************************************************************
  FLOW PROCESS FROM NODE   1009.00 TO NODE   1010.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    412.00
  DOWNSTREAM ELEVATION(FEET) =    398.00
  ELEVATION DIFFERENCE(FEET) =     14.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.516
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1014.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    398.00  DOWNSTREAM(FEET) =    202.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   935.00   CHANNEL SLOPE =  0.2096
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   4.000
```



```
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.948
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.69
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   2.74
  Tc(MIN.) =    9.01
  SUBAREA AREA(ACRES) =     5.83       SUBAREA RUNOFF(CFS) =   12.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        5.9         PEAK FLOW RATE(CFS) =      12.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   6.96
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1014.00 =    1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1015.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   197.19  DOWNSTREAM(FEET) =   196.17
  FLOW LENGTH(FEET) =   202.41   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.53
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.26
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =    9.62
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1015.00 =    1237.41 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1015.00 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.) =    9.62
  RAINFALL INTENSITY(INCH/HR) =   5.70
  TOTAL STREAM AREA(ACRES) =     5.89
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.26

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       15.15     5.39        8.279          3.65
      2       12.26     9.62        5.702          5.89

  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       22.03     5.39       8.279
      2       22.69     9.62       5.702

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.69   Tc(MIN.) =    9.62
```

```
  TOTAL AREA(ACRES) =        9.5
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1015.00 =    1237.41 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1019.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.17  DOWNSTREAM(FEET) =   193.11
  FLOW LENGTH(FEET) =   606.05   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.43
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.69
  PIPE TRAVEL TIME(MIN.) =   1.57    Tc(MIN.) =   11.19
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1019.00 =    1843.46 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1019.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.19
  RAINFALL INTENSITY(INCH/HR) =   5.17
  TOTAL STREAM AREA(ACRES) =     9.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.69

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1018.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    207.93
  DOWNSTREAM ELEVATION(FEET) =    207.37
  ELEVATION DIFFERENCE(FEET) =      0.56
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.819
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1012.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  207.37  DOWNSTREAM ELEVATION(FEET) =  196.50
  STREET LENGTH(FEET) =   643.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       6.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.40
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.33
  STREET FLOW TRAVEL TIME(MIN.) =   3.15   Tc(MIN.) =    5.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.753
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.483
  SUBAREA AREA(ACRES) =    3.53      SUBAREA RUNOFF(CFS) =   13.14
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      13.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.00
  FLOW VELOCITY(FEET/SEC.) =  3.58   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE   1017.00 TO NODE   1012.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1012.00 TO NODE   1013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.753
  USER-SPECIFIED RUNOFF COEFFICIENT = .6600
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4913
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.87
  TOTAL AREA(ACRES) =        3.7   TOTAL RUNOFF(CFS) =      14.21
  TC(MIN.) =    5.97

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1019.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   193.50  DOWNSTREAM(FEET) =   193.11
  FLOW LENGTH(FEET) =    76.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.71
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.21
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    6.19
  LONGEST FLOWPATH FROM NODE   1017.00 TO NODE   1019.00 =     769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1019.00 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.) =    6.19
  RAINFALL INTENSITY(INCH/HR) =   7.57
```

```
  TOTAL STREAM AREA(ACRES) =     3.73
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.21

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1021.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    412.00
  DOWNSTREAM ELEVATION(FEET) =    388.00
  ELEVATION DIFFERENCE(FEET) =     24.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.516
  SUBAREA RUNOFF(CFS) =      1.29
  TOTAL AREA(ACRES) =      0.49   TOTAL RUNOFF(CFS) =      1.29

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1022.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    388.00  DOWNSTREAM(FEET) =    198.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   434.00   CHANNEL SLOPE =  0.4378
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.936
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.70
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   0.83
  Tc(MIN.) =    7.10
  SUBAREA AREA(ACRES) =     9.25       SUBAREA RUNOFF(CFS) =   22.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        9.7         PEAK FLOW RATE(CFS) =      23.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =  10.63
  LONGEST FLOWPATH FROM NODE   1020.00 TO NODE   1022.00 =     534.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1022.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.936
  USER-SPECIFIED RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4247
  SUBAREA AREA(ACRES) =    2.17   SUBAREA RUNOFF(CFS) =   11.44
  TOTAL AREA(ACRES) =       11.9   TOTAL RUNOFF(CFS) =      35.08
  TC(MIN.) =    7.10

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1019.00 IS CODE =  31
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   195.00  DOWNSTREAM(FEET) =   193.11
  FLOW LENGTH(FEET) =    26.17   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.39
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.08
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    7.12
  LONGEST FLOWPATH FROM NODE   1020.00 TO NODE   1019.00 =     560.17 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1019.00 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.) =    7.12
  RAINFALL INTENSITY(INCH/HR) =   6.92
  TOTAL STREAM AREA(ACRES) =    11.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     35.08

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       22.69    11.19        5.171          9.54
      2       14.21     6.19        7.573          3.73
      3       35.08     7.12        6.922         11.91

  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       60.23     6.19        7.573
      2       65.03     7.12        6.922
      3       58.61    11.19        5.171

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      65.03   Tc(MIN.) =    7.12
  TOTAL AREA(ACRES) =       25.2
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1019.00 =    1843.46 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1026.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   193.11  DOWNSTREAM(FEET) =   192.10
  FLOW LENGTH(FEET) =   201.54   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.21
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      65.03
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    7.53
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1026.00 =    2045.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1027.00 TO NODE   1026.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.677
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4324
  SUBAREA AREA(ACRES) =    2.91   SUBAREA RUNOFF(CFS) =    9.33
  TOTAL AREA(ACRES) =       28.1   TOTAL RUNOFF(CFS) =      81.09
  TC(MIN.) =    7.53

****************************************************************************
  FLOW PROCESS FROM NODE   1026.00 TO NODE   1034.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   192.10  DOWNSTREAM(FEET) =   189.77
  FLOW LENGTH(FEET) =   464.96   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.63
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.09
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =    8.43
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1034.00 =    2509.96 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1026.00 TO NODE   1034.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1028.00 TO NODE   1029.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    205.53
  DOWNSTREAM ELEVATION(FEET) =    203.40
  ELEVATION DIFFERENCE(FEET) =      2.13
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.102
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   1029.00 TO NODE   1030.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  203.40  DOWNSTREAM ELEVATION(FEET) =  196.50
  STREET LENGTH(FEET) =   758.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00
```



```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   15.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
  STREET FLOW TRAVEL TIME(MIN.) =   5.02   Tc(MIN.) =    7.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.923
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.482
  SUBAREA AREA(ACRES) =    3.12      SUBAREA RUNOFF(CFS) =   10.37
  TOTAL AREA(ACRES) =       3.1        PEAK FLOW RATE(CFS) =      10.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.00
  FLOW VELOCITY(FEET/SEC.) =  2.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE   1028.00 TO NODE   1030.00 =     818.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1031.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.923
  USER-SPECIFIED RUNOFF COEFFICIENT = .6600
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4970
  SUBAREA AREA(ACRES) =    0.28   SUBAREA RUNOFF(CFS) =    1.28
  TOTAL AREA(ACRES) =       3.4   TOTAL RUNOFF(CFS) =      11.77
  TC(MIN.) =    7.12

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1031.00 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.) =    7.12
  RAINFALL INTENSITY(INCH/HR) =   6.92
  TOTAL STREAM AREA(ACRES) =     3.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.77

****************************************************************************
  FLOW PROCESS FROM NODE   1047.00 TO NODE   1048.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    203.62
  DOWNSTREAM ELEVATION(FEET) =    202.89
  ELEVATION DIFFERENCE(FEET) =      0.73
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.004
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   1048.00 TO NODE   1049.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  202.89  DOWNSTREAM ELEVATION(FEET) =  196.80
  STREET LENGTH(FEET) =   699.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   5.29   Tc(MIN.) =    8.30
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.273
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.484
  SUBAREA AREA(ACRES) =    1.95      SUBAREA RUNOFF(CFS) =    5.87
  TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =       5.98

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.80
  FLOW VELOCITY(FEET/SEC.) =  2.54   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1049.00 =     759.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1049.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.273
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4820
  SUBAREA AREA(ACRES) =    1.96   SUBAREA RUNOFF(CFS) =    5.90
  TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =      11.88
  TC(MIN.) =    8.30
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   1049.00 TO NODE   1031.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    196.80  DOWNSTREAM(FEET) =    193.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =    20.00   CHANNEL SLOPE =  0.1800
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.88
  FLOW VELOCITY(FEET/SEC.) =  14.09   FLOW DEPTH(FEET) =   0.21
  TRAVEL TIME(MIN.) =   0.02   Tc(MIN.) =    8.32
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1031.00 =     779.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1049.00 TO NODE   1031.00 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.) =    8.32
  RAINFALL INTENSITY(INCH/HR) =   6.26
  TOTAL STREAM AREA(ACRES) =     3.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.88

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.77     7.12        6.923          3.42
      2       11.88     8.32        6.261          3.93

  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       21.94     7.12       6.923
      2       22.52     8.32       6.261

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.52   Tc(MIN.) =    8.32
  TOTAL AREA(ACRES) =        7.3
  LONGEST FLOWPATH FROM NODE   1028.00 TO NODE   1031.00 =     818.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1031.00 TO NODE   1034.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   190.23  DOWNSTREAM(FEET) =   187.77
  FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.84
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.52
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    8.45
```

```
  LONGEST FLOWPATH FROM NODE   1028.00 TO NODE   1034.00 =     911.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1031.00 TO NODE   1034.00 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       22.52     8.45       6.198        7.35
  LONGEST FLOWPATH FROM NODE   1028.00 TO NODE   1034.00 =     911.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       81.09     8.43       6.209       28.09
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1034.00 =    2509.96 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     103.56       8.43        6.209
      2     103.48       8.45        6.198

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     103.56   Tc(MIN.) =    8.43
  TOTAL AREA(ACRES) =       35.4

****************************************************************************
  FLOW PROCESS FROM NODE   1034.00 TO NODE   1033.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   189.77  DOWNSTREAM(FEET) =   189.40
  FLOW LENGTH(FEET) =    72.54   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.37
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     103.56
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    8.56
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1033.00 =    2582.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1034.00 TO NODE   1033.00 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.) =    8.56
  RAINFALL INTENSITY(INCH/HR) =   6.15
  TOTAL STREAM AREA(ACRES) =    35.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    103.56

****************************************************************************
  FLOW PROCESS FROM NODE   1056.00 TO NODE   1057.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```



```
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    376.00
  DOWNSTREAM ELEVATION(FEET) =    342.00
  ELEVATION DIFFERENCE(FEET) =     34.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.516
  SUBAREA RUNOFF(CFS) =      0.66
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
  FLOW PROCESS FROM NODE   1057.00 TO NODE   1058.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    342.00  DOWNSTREAM(FEET) =    196.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   331.00   CHANNEL SLOPE =  0.4411
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.023
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.94
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.69
  Tc(MIN.) =    6.96
  SUBAREA AREA(ACRES) =     5.75       SUBAREA RUNOFF(CFS) =   14.13
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        6.0         PEAK FLOW RATE(CFS) =      14.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   9.58
  LONGEST FLOWPATH FROM NODE   1056.00 TO NODE   1058.00 =     431.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1058.00 TO NODE   1033.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   190.00  DOWNSTREAM(FEET) =   189.40
  FLOW LENGTH(FEET) =    30.06   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.75
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.75
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.01
  LONGEST FLOWPATH FROM NODE   1056.00 TO NODE   1033.00 =     461.06 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1058.00 TO NODE   1033.00 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.) =    7.01
  RAINFALL INTENSITY(INCH/HR) =   6.99
  TOTAL STREAM AREA(ACRES) =     6.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.75

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      103.56     8.56        6.148         35.44
      2       14.75     7.01        6.990          6.00

  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       99.62     7.01       6.990
      2      116.53     8.56       6.148

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     116.53   Tc(MIN.) =    8.56
  TOTAL AREA(ACRES) =       41.4
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1033.00 =    2582.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1033.00 TO NODE   1060.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   189.40  DOWNSTREAM(FEET) =   188.15
  FLOW LENGTH(FEET) =   246.77   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.43
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     116.53
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    8.99
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1060.00 =    2829.27 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1059.00 TO NODE   1060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.954
  USER-SPECIFIED RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4451
  SUBAREA AREA(ACRES) =    1.92   SUBAREA RUNOFF(CFS) =    8.69
  TOTAL AREA(ACRES) =       43.4   TOTAL RUNOFF(CFS) =     116.53
  TC(MIN.) =    8.99
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1061.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   188.15  DOWNSTREAM(FEET) =   187.30
```



```
  FLOW LENGTH(FEET) =   167.09   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.45
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     116.53
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    9.29
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1061.00 =    2996.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1061.00 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.) =    9.29
  RAINFALL INTENSITY(INCH/HR) =   5.83
  TOTAL STREAM AREA(ACRES) =    43.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    116.53

****************************************************************************
  FLOW PROCESS FROM NODE   1062.00 TO NODE   1063.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    374.00
  DOWNSTREAM ELEVATION(FEET) =    356.00
  ELEVATION DIFFERENCE(FEET) =     18.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.516
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      0.71

****************************************************************************
  FLOW PROCESS FROM NODE   1063.00 TO NODE   1064.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    200.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   411.00   CHANNEL SLOPE =  0.3796
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.909
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.83
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   0.87
  Tc(MIN.) =    7.14
  SUBAREA AREA(ACRES) =     6.80       SUBAREA RUNOFF(CFS) =   16.44
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        7.1         PEAK FLOW RATE(CFS) =      17.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =   9.49
  LONGEST FLOWPATH FROM NODE   1062.00 TO NODE   1064.00 =     511.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1064.00 TO NODE   1061.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   194.00  DOWNSTREAM(FEET) =   187.30
  FLOW LENGTH(FEET) =    82.88   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.10
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.22
  LONGEST FLOWPATH FROM NODE   1062.00 TO NODE   1061.00 =     593.88 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1064.00 TO NODE   1061.00 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.) =    7.22
  RAINFALL INTENSITY(INCH/HR) =   6.86
  TOTAL STREAM AREA(ACRES) =     7.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      116.53     9.29        5.832         43.36
      2       17.10     7.22        6.859          7.07

  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      116.17     7.22       6.859
      2      131.07     9.29       5.832

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     131.07   Tc(MIN.) =    9.29
  TOTAL AREA(ACRES) =       50.4
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1061.00 =    2996.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1064.00 TO NODE   1061.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1041.00 TO NODE   1042.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```



```
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    206.20
  DOWNSTREAM ELEVATION(FEET) =    205.58
  ELEVATION DIFFERENCE(FEET) =      0.62
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.172
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   1042.00 TO NODE   1043.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  205.58  DOWNSTREAM ELEVATION(FEET) =  199.77
  STREET LENGTH(FEET) =   584.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       4.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   13.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
  STREET FLOW TRAVEL TIME(MIN.) =   3.97   Tc(MIN.) =    7.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.910
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.483
  SUBAREA AREA(ACRES) =    2.28      SUBAREA RUNOFF(CFS) =    7.56
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.00
  FLOW VELOCITY(FEET/SEC.) =  2.74   DEPTH*VELOCITY(FT*FT/SEC.) =   1.14
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1043.00 =     644.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1043.00 TO NODE   1044.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.80  DOWNSTREAM(FEET) =   196.76
  FLOW LENGTH(FEET) =     3.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       7.68
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    7.15
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1044.00 =     647.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1045.00 TO NODE   1044.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.905
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4995
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.60
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       8.28
  TC(MIN.) =    7.15

****************************************************************************
  FLOW PROCESS FROM NODE   1044.00 TO NODE   1070.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.76  DOWNSTREAM(FEET) =   195.50
  FLOW LENGTH(FEET) =   439.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.93
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.28
  PIPE TRAVEL TIME(MIN.) =   1.86    Tc(MIN.) =    9.01
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1070.00 =    1086.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1044.00 TO NODE   1070.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.01
  RAINFALL INTENSITY(INCH/HR) =   5.95
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.28

****************************************************************************
  FLOW PROCESS FROM NODE   1053.00 TO NODE   1054.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =  45
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    202.14
  DOWNSTREAM ELEVATION(FEET) =    201.37
  ELEVATION DIFFERENCE(FEET) =      0.77
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.649
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.339
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.23

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



```
  FLOW PROCESS FROM NODE   1054.00 TO NODE   1072.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  201.37  DOWNSTREAM ELEVATION(FEET) =  200.28
  STREET LENGTH(FEET) =   108.58   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       0.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.34
  STREET FLOW TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =   11.78
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.004
  USER-SPECIFIED RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =  51
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.318
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.58
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       0.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   6.20
  FLOW VELOCITY(FEET/SEC.) =  1.72   DEPTH*VELOCITY(FT*FT/SEC.) =   0.41
  LONGEST FLOWPATH FROM NODE   1053.00 TO NODE   1072.00 =     168.58 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1072.00 TO NODE   1070.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   195.61  DOWNSTREAM(FEET) =   195.50
  FLOW LENGTH(FEET) =    10.74   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.49
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.79
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.83
  LONGEST FLOWPATH FROM NODE   1053.00 TO NODE   1070.00 =     179.32 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1071.00 TO NODE   1070.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.990
  USER-SPECIFIED RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =  51
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3293
  SUBAREA AREA(ACRES) =    0.55   SUBAREA RUNOFF(CFS) =    0.93
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       1.73
  TC(MIN.) =   11.83

****************************************************************************
  FLOW PROCESS FROM NODE   1071.00 TO NODE   1070.00 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.) =   11.83
  RAINFALL INTENSITY(INCH/HR) =   4.99
  TOTAL STREAM AREA(ACRES) =     1.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.73

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.28     9.01        5.947          2.40
      2        1.73    11.83        4.990          1.05

  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        9.59     9.01        5.947
      2        8.67    11.83        4.990

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.59   Tc(MIN.) =    9.01
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1070.00 =    1086.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1073.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   195.50  DOWNSTREAM(FEET) =   190.80
  FLOW LENGTH(FEET) =   379.32   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.25
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.59
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =    9.88
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1073.00 =    1465.57 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1073.00 TO NODE   1074.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.603
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
```



```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4604
  SUBAREA AREA(ACRES) =    2.23   SUBAREA RUNOFF(CFS) =    6.00
  TOTAL AREA(ACRES) =        5.7   TOTAL RUNOFF(CFS) =      14.65
  TC(MIN.) =    9.88

****************************************************************************
  FLOW PROCESS FROM NODE   1074.00 TO NODE   1074.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.603
  USER-SPECIFIED RUNOFF COEFFICIENT = .6600
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4688
  SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    0.92
  TOTAL AREA(ACRES) =        5.9   TOTAL RUNOFF(CFS) =      15.58
  TC(MIN.) =    9.88

****************************************************************************
  FLOW PROCESS FROM NODE   1074.00 TO NODE   1061.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   187.50  DOWNSTREAM(FEET) =   187.30
  FLOW LENGTH(FEET) =    33.85   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.14
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.58
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    9.97
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1061.00 =    1499.42 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1074.00 TO NODE   1061.00 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       15.58     9.97        5.570         5.93
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1061.00 =    1499.42 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
      1      131.07     9.29        5.832        50.43
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1061.00 =    2996.36 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
      1     145.57        9.29        5.832
      2     140.75        9.97        5.570

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     145.57   Tc(MIN.) =    9.29
  TOTAL AREA(ACRES) =       56.4
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1061.00 TO NODE   1085.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   187.30  DOWNSTREAM(FEET) =   182.50
  FLOW LENGTH(FEET) =   960.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.07
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     145.57
  PIPE TRAVEL TIME(MIN.) =   1.59    Tc(MIN.) =   10.88
  LONGEST FLOWPATH FROM NODE   1009.00 TO NODE   1085.00 =    3956.56 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1082.00 TO NODE   1085.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.267
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4330
  SUBAREA AREA(ACRES) =    6.42   SUBAREA RUNOFF(CFS) =   13.86
  TOTAL AREA(ACRES) =       62.8   TOTAL RUNOFF(CFS) =     145.57
  TC(MIN.) =   10.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1083.00 TO NODE   1085.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.267
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3593
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4129
  SUBAREA AREA(ACRES) =   23.61   SUBAREA RUNOFF(CFS) =   44.68
  TOTAL AREA(ACRES) =       86.4   TOTAL RUNOFF(CFS) =     187.85
  TC(MIN.) =   10.88
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       86.4  TC(MIN.) =     10.88
  PEAK FLOW RATE(CFS)   =     187.85
============================================================================
============================================================================
  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 1982-2016 Advanced Engineering Software (aes)
           Ver. 23.0 Release Date: 07/01/2016  License ID 1509

                         Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                     *
* SYSTEM 1100 - PROPOSED 100 YR                                          *
*                                                                        *
 ************************************************************************

  FILE NAME: 1100P100.DAT
  TIME/DATE OF STUDY: 11:46 05/13/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   1100.00 TO NODE   1101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
  UPSTREAM ELEVATION(FEET) =    725.00
  DOWNSTREAM ELEVATION(FEET) =    708.00
  ELEVATION DIFFERENCE(FEET) =     17.00
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.027
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.708
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.52   TOTAL RUNOFF(CFS) =      1.44

****************************************************************************
  FLOW PROCESS FROM NODE   1101.00 TO NODE   1110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    708.00  DOWNSTREAM(FEET) =    618.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1035.00   CHANNEL SLOPE =  0.0865
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.938
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3590
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.74
  AVERAGE FLOW DEPTH(FEET) =   0.53   TRAVEL TIME(MIN.) =   3.00
  Tc(MIN.) =    9.03
  SUBAREA AREA(ACRES) =    11.55       SUBAREA RUNOFF(CFS) =   24.62
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.359
  TOTAL AREA(ACRES) =       12.1         PEAK FLOW RATE(CFS) =      25.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   6.82
  LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1110.00 =    1130.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1110.00 TO NODE   1113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   613.50  DOWNSTREAM(FEET) =   609.00
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.13
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.73
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.09
  LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1113.00 =    1189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1111.00 TO NODE   1113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.915
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  76
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3594
  SUBAREA AREA(ACRES) =    6.14   SUBAREA RUNOFF(CFS) =   13.07
  TOTAL AREA(ACRES) =       18.2   TOTAL RUNOFF(CFS) =      38.71
  TC(MIN.) =    9.09

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

```
  FLOW PROCESS FROM NODE   1112.00 TO NODE   1113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.915
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  76
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3595
  SUBAREA AREA(ACRES) =    5.10   SUBAREA RUNOFF(CFS) =   10.86
  TOTAL AREA(ACRES) =       23.3   TOTAL RUNOFF(CFS) =      49.57
  TC(MIN.) =    9.09

****************************************************************************
  FLOW PROCESS FROM NODE   1113.00 TO NODE   1115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   609.00  DOWNSTREAM(FEET) =   606.37
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.55
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      49.57
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    9.20
  LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1115.00 =    1289.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1113.00 TO NODE   1115.00 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) =   5.87
  TOTAL STREAM AREA(ACRES) =    23.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.57

****************************************************************************
  FLOW PROCESS FROM NODE   1700.00 TO NODE   1701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  76
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    32.00
  UPSTREAM ELEVATION(FEET) =    688.00
  DOWNSTREAM ELEVATION(FEET) =    687.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.494
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.346
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE   1701.00 TO NODE   1120.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
```



```
  UPSTREAM ELEVATION(FEET) =  687.50  DOWNSTREAM ELEVATION(FEET) =  612.00
  STREET LENGTH(FEET) =  1337.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 40.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   4.74   Tc(MIN.) =   11.23
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.158
  USER-SPECIFIED RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.591
  SUBAREA AREA(ACRES) =    2.06      SUBAREA RUNOFF(CFS) =    6.38
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       6.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.38
  FLOW VELOCITY(FEET/SEC.) =  5.46   DEPTH*VELOCITY(FT*FT/SEC.) =   1.82
  LONGEST FLOWPATH FROM NODE   1700.00 TO NODE   1120.00 =    1369.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1114.00 TO NODE   1120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.158
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  76
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5243
  SUBAREA AREA(ACRES) =    0.87   SUBAREA RUNOFF(CFS) =    1.62
  TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =       8.14
  TC(MIN.) =   11.23

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE   1115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   607.50  DOWNSTREAM(FEET) =   606.37
  FLOW LENGTH(FEET) =    50.00   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.) =   8.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.14
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   11.33
  LONGEST FLOWPATH FROM NODE   1700.00 TO NODE   1115.00 =    1419.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1115.00 TO NODE   1115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.130
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5265
  SUBAREA AREA(ACRES) =    0.02   SUBAREA RUNOFF(CFS) =    0.09
  TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =       8.18
  TC(MIN.) =   11.33

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE   1115.00 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.) =   11.33
  RAINFALL INTENSITY(INCH/HR) =   5.13
  TOTAL STREAM AREA(ACRES) =     3.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.18

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       49.57     9.20        5.868         23.31
      2        8.18    11.33        5.130          3.03

  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       56.22     9.20       5.868
      2       51.53    11.33       5.130

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      56.22   Tc(MIN.) =    9.20
  TOTAL AREA(ACRES) =       26.3
  LONGEST FLOWPATH FROM NODE   1700.00 TO NODE   1115.00 =    1419.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       26.3  TC(MIN.) =      9.20
  PEAK FLOW RATE(CFS)   =      56.22
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* PROPOSED CONDITIONS                                                      *
* SYSTEM 1300                                                              *
 ****************************************************************************

  FILE NAME: 1300P100.DAT
  TIME/DATE OF STUDY: 12:10 12/06/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1300.00 TO NODE   1305.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    208.19
  DOWNSTREAM ELEVATION(FEET) =    207.41
  ELEVATION DIFFERENCE(FEET) =      0.78
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.938
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   1305.00 TO NODE   1310.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  207.41  DOWNSTREAM ELEVATION(FEET) =  204.83
  STREET LENGTH(FEET) =   268.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.68
  STREET FLOW TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =    5.08
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.607
  RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  72
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.459
  SUBAREA AREA(ACRES) =    0.91      SUBAREA RUNOFF(CFS) =    3.52
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.26
  FLOW VELOCITY(FEET/SEC.) =  2.39   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1310.00 =     328.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1310.00 TO NODE   1315.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   200.70  DOWNSTREAM(FEET) =   200.30
  FLOW LENGTH(FEET) =    31.34   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.81
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.67
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.17
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1315.00 =     359.34 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1320.00 TO NODE   1315.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.510
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5100
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  76
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4867
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    4.77
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       8.41
  TC(MIN.) =    5.17

****************************************************************************
  FLOW PROCESS FROM NODE   1315.00 TO NODE   1325.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   200.30  DOWNSTREAM(FEET) =   199.10
  FLOW LENGTH(FEET) =   227.94   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.41
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1325.00 =     587.28 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1315.00 TO NODE   1325.00 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.) =    5.91
  RAINFALL INTENSITY(INCH/HR) =   7.80
  TOTAL STREAM AREA(ACRES) =     2.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.41

****************************************************************************
  FLOW PROCESS FROM NODE   1330.00 TO NODE   1335.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    204.83
  DOWNSTREAM ELEVATION(FEET) =    204.38
  ELEVATION DIFFERENCE(FEET) =      0.45
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.032
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   1335.00 TO NODE   1340.00 IS CODE =  62
```



```
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  204.38  DOWNSTREAM ELEVATION(FEET) =  202.47
  STREET LENGTH(FEET) =   191.36   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.72
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.51
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
  STREET FLOW TRAVEL TIME(MIN.) =   1.56   Tc(MIN.) =    4.59
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.510
  SUBAREA AREA(ACRES) =    0.72      SUBAREA RUNOFF(CFS) =    3.13
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       3.28

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.55
  FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.87
  LONGEST FLOWPATH FROM NODE   1330.00 TO NODE   1340.00 =     241.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1340.00 TO NODE   1325.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   199.90  DOWNSTREAM(FEET) =   199.10
  FLOW LENGTH(FEET) =    27.14   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.28
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    4.65
  LONGEST FLOWPATH FROM NODE   1330.00 TO NODE   1325.00 =     268.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1345.00 TO NODE   1325.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5100
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  76
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5100
  SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    3.15
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       6.43
  TC(MIN.) =    4.65

****************************************************************************
  FLOW PROCESS FROM NODE   1345.00 TO NODE   1325.00 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.) =    4.65
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     1.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.41     5.91        7.804          2.03
      2        6.43     4.65        8.695          1.45

  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       13.05     4.65       8.695
      2       14.18     5.91       7.804

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.18   Tc(MIN.) =    5.91
  TOTAL AREA(ACRES) =        3.5
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1325.00 =     587.28 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1325.00 TO NODE   1350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   199.10  DOWNSTREAM(FEET) =   194.40
  FLOW LENGTH(FEET) =   476.04   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.25
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.18
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =    7.01
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1350.00 =    1063.32 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1325.00 TO NODE   1350.00 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.) =    7.01
  RAINFALL INTENSITY(INCH/HR) =   6.99
  TOTAL STREAM AREA(ACRES) =     3.48
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.18

****************************************************************************
  FLOW PROCESS FROM NODE   1355.00 TO NODE   1360.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    203.62
  DOWNSTREAM ELEVATION(FEET) =    202.45
  ELEVATION DIFFERENCE(FEET) =      1.17
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.205
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE   1360.00 TO NODE   1365.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  202.45  DOWNSTREAM ELEVATION(FEET) =  197.14
  STREET LENGTH(FEET) =   308.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.45
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =    4.03
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.509
  SUBAREA AREA(ACRES) =    1.18      SUBAREA RUNOFF(CFS) =    5.13
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       5.36

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.73
  FLOW VELOCITY(FEET/SEC.) =  3.27   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE   1355.00 TO NODE   1365.00 =     358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1365.00 TO NODE   1350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   194.90  DOWNSTREAM(FEET) =   194.40
  FLOW LENGTH(FEET) =     4.25   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.36
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    4.03
  LONGEST FLOWPATH FROM NODE   1355.00 TO NODE   1350.00 =     362.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1370.00 TO NODE   1350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  66
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5147
  SUBAREA AREA(ACRES) =    1.25   SUBAREA RUNOFF(CFS) =    5.65
  TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =      11.01
  TC(MIN.) =    4.03

****************************************************************************
  FLOW PROCESS FROM NODE   1370.00 TO NODE   1350.00 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.) =    4.03
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     2.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.01

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.18     7.01        6.994         3.48
      2       11.01     4.03        8.695         2.46

  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       22.41     4.03       8.695
```



```
      2       23.03     7.01       6.994

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.03   Tc(MIN.) =    7.01
  TOTAL AREA(ACRES) =        5.9
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1350.00 =    1063.32 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1350.00 TO NODE   1375.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   194.40  DOWNSTREAM(FEET) =   191.20
  FLOW LENGTH(FEET) =   399.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.64
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.03
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =    7.88
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1375.00 =    1462.32 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1350.00 TO NODE   1375.00 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.) =    7.88
  RAINFALL INTENSITY(INCH/HR) =   6.49
  TOTAL STREAM AREA(ACRES) =     5.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.03

****************************************************************************
  FLOW PROCESS FROM NODE   1380.00 TO NODE   1385.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    197.50
  DOWNSTREAM ELEVATION(FEET) =    196.62
  ELEVATION DIFFERENCE(FEET) =      0.88
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.823
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   1385.00 TO NODE   1375.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  196.62  DOWNSTREAM ELEVATION(FEET) =  192.79
  STREET LENGTH(FEET) =   394.51   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       2.68
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   10.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   2.95   Tc(MIN.) =    5.77
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.925
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  66
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.526
  SUBAREA AREA(ACRES) =    1.18      SUBAREA RUNOFF(CFS) =    4.86
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       5.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.05
  FLOW VELOCITY(FEET/SEC.) =  2.55   DEPTH*VELOCITY(FT*FT/SEC.) =   1.06
  LONGEST FLOWPATH FROM NODE   1380.00 TO NODE   1375.00 =     454.51 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1390.00 TO NODE   1375.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.925
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  66
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5228
  SUBAREA AREA(ACRES) =    1.28   SUBAREA RUNOFF(CFS) =    5.27
  TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =      10.28
  TC(MIN.) =    5.77

****************************************************************************
  FLOW PROCESS FROM NODE   1390.00 TO NODE   1375.00 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.) =    5.77
  RAINFALL INTENSITY(INCH/HR) =   7.92
  TOTAL STREAM AREA(ACRES) =     2.48
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.28

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       23.03     7.88        6.486          5.94
```



```
      2       10.28     5.77        7.925          2.48

  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       29.13     5.77        7.925
      2       31.44     7.88        6.486

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      31.44   Tc(MIN.) =    7.88
  TOTAL AREA(ACRES) =        8.4
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1375.00 =    1462.32 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1375.00 TO NODE   1395.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   191.20  DOWNSTREAM(FEET) =   190.00
  FLOW LENGTH(FEET) =    68.67   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.13
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.44
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.98
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1395.00 =    1530.99 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1375.00 TO NODE   1395.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1400.00 TO NODE   1405.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    275.69
  DOWNSTREAM ELEVATION(FEET) =    275.00
  ELEVATION DIFFERENCE(FEET) =      0.69
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.629
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1395.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =  275.00  DOWNSTREAM ELEVATION(FEET) =  193.67
  STREET LENGTH(FEET) =  1081.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       4.96
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    8.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
  STREET FLOW TRAVEL TIME(MIN.) =   3.14   Tc(MIN.) =    5.77
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.928
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.37      SUBAREA RUNOFF(CFS) =    9.45
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       9.66

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.95
  FLOW VELOCITY(FEET/SEC.) =  6.58   DEPTH*VELOCITY(FT*FT/SEC.) =   2.47
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1395.00 =    1131.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1395.00 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        9.66     5.77       7.928        1.40
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1395.00 =    1131.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       31.44     7.98       6.432        8.42
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1395.00 =    1530.99 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      32.39       5.77       7.928
      2      39.28       7.98       6.432

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      39.28   Tc(MIN.) =    7.98
  TOTAL AREA(ACRES) =        9.8
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   1395.00 TO NODE   1410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   190.00  DOWNSTREAM(FEET) =   189.50
  FLOW LENGTH(FEET) =    40.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.23
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.28
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    8.05
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1410.00 =    1571.49 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1395.00 TO NODE   1410.00 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.) =    8.05
  RAINFALL INTENSITY(INCH/HR) =   6.40
  TOTAL STREAM AREA(ACRES) =     9.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.28

****************************************************************************
  FLOW PROCESS FROM NODE   1415.00 TO NODE   1420.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    275.69
  DOWNSTREAM ELEVATION(FEET) =    275.00
  ELEVATION DIFFERENCE(FEET) =      0.69
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.629
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   1420.00 TO NODE   1410.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  275.00  DOWNSTREAM ELEVATION(FEET) =  193.67
  STREET LENGTH(FEET) =  1035.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       2.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.24
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.44
  STREET FLOW TRAVEL TIME(MIN.) =   3.29   Tc(MIN.) =    5.92
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.798
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.782
  SUBAREA AREA(ACRES) =    0.88      SUBAREA RUNOFF(CFS) =    5.35
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       5.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.05
  FLOW VELOCITY(FEET/SEC.) =  5.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.92
  LONGEST FLOWPATH FROM NODE   1415.00 TO NODE   1410.00 =    1085.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1420.00 TO NODE   1410.00 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.) =    5.92
  RAINFALL INTENSITY(INCH/HR) =   7.80
  TOTAL STREAM AREA(ACRES) =     0.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.49

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       39.28     8.05        6.398          9.82
      2        5.49     5.92        7.798          0.90

  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       34.39     5.92        7.798
      2       43.78     8.05        6.398

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      43.78   Tc(MIN.) =    8.05
  TOTAL AREA(ACRES) =       10.7
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1410.00 =    1571.49 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1410.00 TO NODE   1080.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   189.50  DOWNSTREAM(FEET) =   187.40
  FLOW LENGTH(FEET) =    29.22   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.62
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.78
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    8.07
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1080.00 =    1600.71 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1410.00 TO NODE   1080.00 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.) =    8.07
  RAINFALL INTENSITY(INCH/HR) =   6.39
  TOTAL STREAM AREA(ACRES) =    10.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     43.78

****************************************************************************
  FLOW PROCESS FROM NODE   1555.00 TO NODE   1080.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.20   RAIN INTENSITY(INCH/HOUR) =  5.87
  TOTAL AREA(ACRES) =     6.00   TOTAL RUNOFF(CFS) =     20.34

****************************************************************************
  FLOW PROCESS FROM NODE   1555.00 TO NODE   1080.00 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.) =    9.20
  RAINFALL INTENSITY(INCH/HR) =   5.87
  TOTAL STREAM AREA(ACRES) =     6.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.34

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       43.78     8.07        6.386         10.72
      2       20.34     9.20        5.867          6.00

  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       61.62     8.07        6.386
      2       60.57     9.20        5.867

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      61.62   Tc(MIN.) =    8.07
```

```
  TOTAL AREA(ACRES) =       16.7
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1080.00 =    1600.71 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1080.00 TO NODE   1081.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.386
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5858
  SUBAREA AREA(ACRES) =    1.56   SUBAREA RUNOFF(CFS) =    6.57
  TOTAL AREA(ACRES) =       18.3   TOTAL RUNOFF(CFS) =      68.38
  TC(MIN.) =    8.07

****************************************************************************
  FLOW PROCESS FROM NODE   1081.00 TO NODE   1085.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   184.30  DOWNSTREAM(FEET) =   182.50
  FLOW LENGTH(FEET) =   325.59   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.62
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      68.38
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    8.70
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1085.00 =    1926.30 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       18.3  TC(MIN.) =      8.70
  PEAK FLOW RATE(CFS)   =      68.38
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* PROPOSED CONDITIONS                                                      *
* SYSTEM 1500                                                              *
 ****************************************************************************

  FILE NAME: 1500P100.DAT
  TIME/DATE OF STUDY: 11:53 12/06/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     12.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1500.00 TO NODE   1505.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    207.00
  DOWNSTREAM ELEVATION(FEET) =    206.25
  ELEVATION DIFFERENCE(FEET) =      0.75
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.977
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   1505.00 TO NODE   1510.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  206.25  DOWNSTREAM ELEVATION(FEET) =  202.74
  STREET LENGTH(FEET) =   416.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  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) =       2.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   11.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.14
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
  STREET FLOW TRAVEL TIME(MIN.) =   3.24   Tc(MIN.) =    6.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.553
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5300
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.535
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    5.32
  TOTAL AREA(ACRES) =       1.4        PEAK FLOW RATE(CFS) =       5.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.95
  FLOW VELOCITY(FEET/SEC.) =  2.49   DEPTH*VELOCITY(FT*FT/SEC.) =   1.07
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1510.00 =     476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1510.00 TO NODE   1520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   197.00  DOWNSTREAM(FEET) =   196.50
  FLOW LENGTH(FEET) =    28.25   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.) =   7.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.46
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.28
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1520.00 =     504.25 FEET.

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

```
  FLOW PROCESS FROM NODE   1525.00 TO NODE   1520.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.503
  USER-SPECIFIED RUNOFF COEFFICIENT = .6600
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5808
  SUBAREA AREA(ACRES) =    0.78   SUBAREA RUNOFF(CFS) =    3.86
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       9.28
  TC(MIN.) =    6.28

****************************************************************************
  FLOW PROCESS FROM NODE   1520.00 TO NODE   1530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.50  DOWNSTREAM(FEET) =   191.71
  FLOW LENGTH(FEET) =   479.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.57
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.28
  PIPE TRAVEL TIME(MIN.) =   1.21    Tc(MIN.) =    7.50
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1530.00 =     983.45 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1520.00 TO NODE   1530.00 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.) =    7.50
  RAINFALL INTENSITY(INCH/HR) =   6.69
  TOTAL STREAM AREA(ACRES) =     2.13
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.28

****************************************************************************
  FLOW PROCESS FROM NODE   1535.00 TO NODE   1540.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    202.74
  DOWNSTREAM ELEVATION(FEET) =    202.10
  ELEVATION DIFFERENCE(FEET) =      0.64
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.139
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE   1540.00 TO NODE   1545.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
```



```
============================================================================
  UPSTREAM ELEVATION(FEET) =  201.24  DOWNSTREAM ELEVATION(FEET) =  197.24
  STREET LENGTH(FEET) =   394.81   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.34
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.36
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.58
  STREET FLOW TRAVEL TIME(MIN.) =   3.32   Tc(MIN.) =    6.46
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.374
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.92
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       2.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.70
  FLOW VELOCITY(FEET/SEC.) =  2.17   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE   1535.00 TO NODE   1545.00 =     454.81 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1545.00 TO NODE   1530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   191.80  DOWNSTREAM(FEET) =   191.71
  FLOW LENGTH(FEET) =     8.25   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.25
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.48
  LONGEST FLOWPATH FROM NODE   1535.00 TO NODE   1530.00 =     463.06 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1550.00 TO NODE   1530.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
  USER-SPECIFIED RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6018
  SUBAREA AREA(ACRES) =    1.52   SUBAREA RUNOFF(CFS) =    6.04
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       8.27
```

```
  TC(MIN.) =    6.48

****************************************************************************
  FLOW PROCESS FROM NODE   1550.00 TO NODE   1530.00 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.) =    6.48
  RAINFALL INTENSITY(INCH/HR) =   7.35
  TOTAL STREAM AREA(ACRES) =     1.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.27

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.28     7.50        6.695          2.13
      2        8.27     6.48        7.353          1.87

  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       16.30     6.48       7.353
      2       16.82     7.50       6.695

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.82   Tc(MIN.) =    7.50
  TOTAL AREA(ACRES) =        4.0
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1530.00 =     983.45 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1530.00 TO NODE   1555.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   191.71  DOWNSTREAM(FEET) =   188.50
  FLOW LENGTH(FEET) =   462.76   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.63
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.82
  PIPE TRAVEL TIME(MIN.) =   1.16    Tc(MIN.) =    8.66
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1555.00 =    1446.21 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1530.00 TO NODE   1555.00 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.) =    8.66
  RAINFALL INTENSITY(INCH/HR) =   6.10
  TOTAL STREAM AREA(ACRES) =     4.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.82
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   1560.00 TO NODE   1565.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =  65
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    198.35
  DOWNSTREAM ELEVATION(FEET) =    197.25
  ELEVATION DIFFERENCE(FEET) =      1.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.886
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.000
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE   1565.00 TO NODE   1570.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  197.25  DOWNSTREAM ELEVATION(FEET) =  193.65
  STREET LENGTH(FEET) =   375.78   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  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) =       1.48
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    4.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.78
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.45
  STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   12.40
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.839
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  57
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.396
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    2.18
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       2.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.17
  FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
  LONGEST FLOWPATH FROM NODE   1560.00 TO NODE   1570.00 =     435.78 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1570.00 TO NODE   1555.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   188.90  DOWNSTREAM(FEET) =   188.50
  FLOW LENGTH(FEET) =    26.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.54
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.49
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   12.48
  LONGEST FLOWPATH FROM NODE   1560.00 TO NODE   1555.00 =     462.28 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1580.00 TO NODE   1555.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.819
  USER-SPECIFIED RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5247
  SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    2.60
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       5.08
  TC(MIN.) =   12.48

****************************************************************************
  FLOW PROCESS FROM NODE   1580.00 TO NODE   1555.00 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.) =   12.48
  RAINFALL INTENSITY(INCH/HR) =   4.82
  TOTAL STREAM AREA(ACRES) =     2.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.08

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.82     8.66        6.100          4.00
      2        5.08    12.48        4.819          2.01

  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       20.34     8.66       6.100
      2       18.37    12.48       4.819

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      20.34   Tc(MIN.) =    8.66
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1555.00 =    1446.21 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1555.00 TO NODE   1080.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   188.50  DOWNSTREAM(FEET) =   187.40
  FLOW LENGTH(FEET) =   204.42   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.33
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.34
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =    9.20
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1080.00 =    1650.63 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        6.0  TC(MIN.) =      9.20
  PEAK FLOW RATE(CFS)   =      20.34
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                *
* PROPOSED CONDITIONS                                                    *
* SYSTEM 2000                                                            *
 ************************************************************************

  FILE NAME: 2000P100.DAT
  TIME/DATE OF STUDY: 13:09 12/06/2018
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 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   2001.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    302.40
  DOWNSTREAM ELEVATION(FEET) =    301.26
  ELEVATION DIFFERENCE(FEET) =      1.14
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.589
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

**************************************************************************
  FLOW PROCESS FROM NODE   2001.00 TO NODE   2002.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  301.26  DOWNSTREAM ELEVATION(FEET) =  215.01
  STREET LENGTH(FEET) =  1628.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =      10.68
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.51
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.37
  STREET FLOW TRAVEL TIME(MIN.) =   4.63   Tc(MIN.) =    7.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.860
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =   20.47
  TOTAL AREA(ACRES) =        3.5        PEAK FLOW RATE(CFS) =      20.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.80
  FLOW VELOCITY(FEET/SEC.) =  6.83   DEPTH*VELOCITY(FT*FT/SEC.) =   3.28
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2002.00 =    1688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2003.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   206.84  DOWNSTREAM(FEET) =   206.56
  FLOW LENGTH(FEET) =    28.14   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.96
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.65
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    7.28
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2003.00 =    1716.14 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   2004.00 TO NODE   2003.00 IS CODE =  81
------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.824
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.99   SUBAREA RUNOFF(CFS) =    5.88
  TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =      26.42
  TC(MIN.) =    7.28

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2005.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   206.56  DOWNSTREAM(FEET) =   202.57
  FLOW LENGTH(FEET) =   398.74   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.56
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.42
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =    8.05
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2005.00 =    2114.88 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2006.00 TO NODE   2005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.393
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8368
  SUBAREA AREA(ACRES) =    2.21   SUBAREA RUNOFF(CFS) =   10.88
  TOTAL AREA(ACRES) =        6.7   TOTAL RUNOFF(CFS) =      35.63
  TC(MIN.) =    8.05

****************************************************************************
  FLOW PROCESS FROM NODE   2005.00 TO NODE   2007.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   202.57  DOWNSTREAM(FEET) =   196.84
  FLOW LENGTH(FEET) =   573.04   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.20
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.63
  PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =    9.09
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2007.00 =    2687.92 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2008.00 TO NODE   2007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.912
  USER-SPECIFIED RUNOFF COEFFICIENT = .5200
```



```
  S.C.S. CURVE NUMBER (AMC II) =  66
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7776
  SUBAREA AREA(ACRES) =    1.53   SUBAREA RUNOFF(CFS) =    4.70
  TOTAL AREA(ACRES) =        8.2   TOTAL RUNOFF(CFS) =      37.65
  TC(MIN.) =    9.09

****************************************************************************
  FLOW PROCESS FROM NODE   2007.00 TO NODE   2009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.84  DOWNSTREAM(FEET) =   195.01
  FLOW LENGTH(FEET) =   182.86   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.26
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.65
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    9.42
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2009.00 =    2870.78 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2007.00 TO NODE   2009.00 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.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   5.78
  TOTAL STREAM AREA(ACRES) =     8.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.65

****************************************************************************
  FLOW PROCESS FROM NODE   2010.00 TO NODE   2011.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    208.19
  DOWNSTREAM ELEVATION(FEET) =    207.51
  ELEVATION DIFFERENCE(FEET) =      0.68
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.076
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   2011.00 TO NODE   2012.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  207.51  DOWNSTREAM ELEVATION(FEET) =  200.80
  STREET LENGTH(FEET) =   478.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

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

```
  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) =       4.32
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.85
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
  STREET FLOW TRAVEL TIME(MIN.) =   2.80   Tc(MIN.) =    5.88
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.835
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.504
  SUBAREA AREA(ACRES) =    2.04      SUBAREA RUNOFF(CFS) =    7.99
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       8.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.93
  FLOW VELOCITY(FEET/SEC.) =  3.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE   2010.00 TO NODE   2012.00 =     538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2012.00 TO NODE   2009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   195.29  DOWNSTREAM(FEET) =   195.01
  FLOW LENGTH(FEET) =    28.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.13
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.95
  LONGEST FLOWPATH FROM NODE   2010.00 TO NODE   2009.00 =     566.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2012.00 TO NODE   2009.00 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.) =    5.95
  RAINFALL INTENSITY(INCH/HR) =   7.77
  TOTAL STREAM AREA(ACRES) =     2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.13

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       37.65     9.42        5.778          8.19
      2        8.13     5.95        7.773          2.06
```



```
  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       31.90     5.95        7.773
      2       43.69     9.42        5.778

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      43.69   Tc(MIN.) =    9.42
  TOTAL AREA(ACRES) =       10.2
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2009.00 =    2870.78 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2009.00 TO NODE   2013.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   195.01  DOWNSTREAM(FEET) =   194.93
  FLOW LENGTH(FEET) =     8.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.61
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.69
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    9.44
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2013.00 =    2879.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2013.00 TO NODE   2013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.772
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7335
  SUBAREA AREA(ACRES) =    0.82   SUBAREA RUNOFF(CFS) =    4.12
  TOTAL AREA(ACRES) =       11.1   TOTAL RUNOFF(CFS) =      46.87
  TC(MIN.) =    9.44

****************************************************************************
  FLOW PROCESS FROM NODE   2013.00 TO NODE   2014.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   194.93  DOWNSTREAM(FEET) =   193.00
  FLOW LENGTH(FEET) =    29.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.08
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      46.87
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    9.46
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2014.00 =    2908.53 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2013.00 TO NODE   2014.00 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.) =    9.46
  RAINFALL INTENSITY(INCH/HR) =   5.76
  TOTAL STREAM AREA(ACRES) =    11.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     46.87

****************************************************************************
  FLOW PROCESS FROM NODE   2203.00 TO NODE   2014.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.06   RAIN INTENSITY(INCH/HOUR) =  8.63
  TOTAL AREA(ACRES) =     2.60   TOTAL RUNOFF(CFS) =     11.30

****************************************************************************
  FLOW PROCESS FROM NODE   2203.00 TO NODE   2014.00 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.) =    5.06
  RAINFALL INTENSITY(INCH/HR) =   8.63
  TOTAL STREAM AREA(ACRES) =     2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.30

****************************************************************************
  FLOW PROCESS FROM NODE   2403.00 TO NODE   2014.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.20   RAIN INTENSITY(INCH/HOUR) =  7.57
  TOTAL AREA(ACRES) =     2.20   TOTAL RUNOFF(CFS) =     10.17

****************************************************************************
  FLOW PROCESS FROM NODE   2403.00 TO NODE   2014.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.20
  RAINFALL INTENSITY(INCH/HR) =   7.57
  TOTAL STREAM AREA(ACRES) =     2.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.17

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       46.87     9.46        5.763         11.07
      2       11.30     5.06        8.628          2.60
      3       10.17     6.20        7.568          2.20

  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       50.90     5.06        8.628
      2       55.77     6.20        7.568
      3       62.16     9.46        5.763

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      62.16   Tc(MIN.) =    9.46
  TOTAL AREA(ACRES) =       15.9
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2014.00 =    2908.53 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2014.00 TO NODE   2015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.763
  USER-SPECIFIED RUNOFF COEFFICIENT = .6600
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6772
  SUBAREA AREA(ACRES) =    1.52   SUBAREA RUNOFF(CFS) =    5.78
  TOTAL AREA(ACRES) =       17.4   TOTAL RUNOFF(CFS) =      67.86
  TC(MIN.) =    9.46

****************************************************************************
  FLOW PROCESS FROM NODE   2015.00 TO NODE   2016.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   192.50  DOWNSTREAM(FEET) =   190.90
  FLOW LENGTH(FEET) =   102.74   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.85
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      67.86
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    9.59
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2016.00 =    3011.27 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       17.4  TC(MIN.) =      9.59
  PEAK FLOW RATE(CFS)   =      67.86
==============================================================================
==============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                *
* PROPOSED CONDITIONS                                                    *
* SYSTEM 2200                                                            *
 ************************************************************************

  FILE NAME: 2200P100.DAT
  TIME/DATE OF STUDY: 12:10 11/28/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 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   2200.00 TO NODE   2201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    207.93
  DOWNSTREAM ELEVATION(FEET) =    207.30
  ELEVATION DIFFERENCE(FEET) =      0.63
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.155
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.13
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      1.13

**************************************************************************
  FLOW PROCESS FROM NODE   2201.00 TO NODE   2202.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  207.30  DOWNSTREAM ELEVATION(FEET) =  204.62
  STREET LENGTH(FEET) =   155.11   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =    9.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =    4.05
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.476
  SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =    3.83
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       4.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.34
  FLOW VELOCITY(FEET/SEC.) =  3.20   DEPTH*VELOCITY(FT*FT/SEC.) =   1.23
  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2202.00 =     215.11 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   2202.00 TO NODE   2203.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   197.38  DOWNSTREAM(FEET) =   196.66
  FLOW LENGTH(FEET) =    71.50   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.) =   5.77
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.97
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    4.26
  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2203.00 =     286.61 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2204.00 TO NODE   2203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =  66
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4998
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    6.33
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =     11.30
  TC(MIN.) =    4.26

****************************************************************************
  FLOW PROCESS FROM NODE   2203.00 TO NODE   2014.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.66  DOWNSTREAM(FEET) =   193.00
  FLOW LENGTH(FEET) =   344.96   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.18
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.30
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =    5.06
  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2014.00 =     631.57 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.6  TC(MIN.) =      5.06
  PEAK FLOW RATE(CFS)   =      11.30
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                        2003,1985,1981 HYDROLOGY MANUAL
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                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* PROPOSED CONDITIONS                                                      *
* SYSTEM 2400                                                              *
 ****************************************************************************

  FILE NAME: 2400P100.DAT
  TIME/DATE OF STUDY: 12:16 11/28/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 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   2400.00 TO NODE   2401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    207.00
  DOWNSTREAM ELEVATION(FEET) =    206.44
  ELEVATION DIFFERENCE(FEET) =      0.56
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.245
```



```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    58.67
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   2401.00 TO NODE   2402.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  206.44  DOWNSTREAM ELEVATION(FEET) =  201.95
  STREET LENGTH(FEET) =   407.87   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
  STREET FLOW TRAVEL TIME(MIN.) =   2.79   Tc(MIN.) =    6.03
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.705
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5300
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.535
  SUBAREA AREA(ACRES) =    1.47      SUBAREA RUNOFF(CFS) =    6.00
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       6.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.91
  FLOW VELOCITY(FEET/SEC.) =  2.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
  LONGEST FLOWPATH FROM NODE   2400.00 TO NODE   2402.00 =     467.87 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2402.00 TO NODE   2403.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   194.06  DOWNSTREAM(FEET) =   193.65
  FLOW LENGTH(FEET) =    40.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.14
```

```
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE   2400.00 TO NODE   2403.00 =     508.37 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2403.00 TO NODE   2403.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.615
  USER-SPECIFIED RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6073
  SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    4.11
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =      10.17
  TC(MIN.) =    6.14

****************************************************************************
  FLOW PROCESS FROM NODE   2403.00 TO NODE   2014.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   193.65  DOWNSTREAM(FEET) =   193.00
  FLOW LENGTH(FEET) =    32.06   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.92
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.17
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.20
  LONGEST FLOWPATH FROM NODE   2400.00 TO NODE   2014.00 =     540.43 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.2  TC(MIN.) =      6.20
  PEAK FLOW RATE(CFS)   =      10.17
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                *
* PROPOSED CONDITIONS                                                    *
* SYSTEM 3000                                                            *
 ************************************************************************

  FILE NAME: 3000P100.DAT
  TIME/DATE OF STUDY: 17:01 12/06/2018
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 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   3000.00 TO NODE   3005.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    356.11
  DOWNSTREAM ELEVATION(FEET) =    354.77
  ELEVATION DIFFERENCE(FEET) =      1.34
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.413
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.34

**************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3010.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  354.77  DOWNSTREAM ELEVATION(FEET) =  338.22
  STREET LENGTH(FEET) =   477.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =    7.67
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =    5.54
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.139
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.780
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    4.70
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       5.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.54
  FLOW VELOCITY(FEET/SEC.) =  4.23   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3010.00 =     537.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3015.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   333.22  DOWNSTREAM(FEET) =   325.70
  FLOW LENGTH(FEET) =   303.91   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.05
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.02
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    6.17
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3015.00 =     840.91 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3015.00 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.) =    6.17
  RAINFALL INTENSITY(INCH/HR) =   7.59
  TOTAL STREAM AREA(ACRES) =     0.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.02

************************************************************************
  FLOW PROCESS FROM NODE   3020.00 TO NODE   3025.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    356.46
  DOWNSTREAM ELEVATION(FEET) =    355.75
  ELEVATION DIFFERENCE(FEET) =      0.71
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.032
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

************************************************************************
  FLOW PROCESS FROM NODE   3025.00 TO NODE   3030.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  355.75  DOWNSTREAM ELEVATION(FEET) =  329.81
  STREET LENGTH(FEET) =   689.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       4.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =    9.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.46
  STREET FLOW TRAVEL TIME(MIN.) =   2.69   Tc(MIN.) =    5.72
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.974
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5600
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.563
  SUBAREA AREA(ACRES) =    1.95      SUBAREA RUNOFF(CFS) =    8.71
  TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =       8.85
```



```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.43
  FLOW VELOCITY(FEET/SEC.) =  4.90   DEPTH*VELOCITY(FT*FT/SEC.) =   1.97
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3030.00 =     749.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE   3030.00 TO NODE   3015.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.20  DOWNSTREAM(FEET) =   325.70
  FLOW LENGTH(FEET) =    26.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.85
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.77
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3015.00 =     775.25 FEET.

************************************************************************
  FLOW PROCESS FROM NODE   3030.00 TO NODE   3015.00 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.) =    5.77
  RAINFALL INTENSITY(INCH/HR) =   7.93
  TOTAL STREAM AREA(ACRES) =     1.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.85

************************************************************************
  FLOW PROCESS FROM NODE   3035.00 TO NODE   3040.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    339.33
  DOWNSTREAM ELEVATION(FEET) =    338.02
  ELEVATION DIFFERENCE(FEET) =      1.31
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.472
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

************************************************************************
  FLOW PROCESS FROM NODE   3040.00 TO NODE   3045.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  338.02  DOWNSTREAM ELEVATION(FEET) =  329.81
  STREET LENGTH(FEET) =   242.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       2.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
  STREET FLOW TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =    3.59
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.576
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    4.81
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       4.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.54
  FLOW VELOCITY(FEET/SEC.) =  4.18   DEPTH*VELOCITY(FT*FT/SEC.) =   1.47
  LONGEST FLOWPATH FROM NODE   3035.00 TO NODE   3045.00 =     302.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3045.00 TO NODE   3015.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.20  DOWNSTREAM(FEET) =   325.70
  FLOW LENGTH(FEET) =     4.26   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.96
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    3.59
  LONGEST FLOWPATH FROM NODE   3035.00 TO NODE   3015.00 =     306.26 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3045.00 TO NODE   3015.00 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.) =    3.59
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     0.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.96

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.02     6.17        7.593          0.79
      2        8.85     5.77        7.927          1.97
```



```
      3        4.96     3.59        8.695          0.99

  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       13.39     3.59       8.695
      2       18.06     5.77       7.927
      3       17.82     6.17       7.593

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      18.06   Tc(MIN.) =    5.77
  TOTAL AREA(ACRES) =        3.8
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3015.00 =     840.91 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3015.00 TO NODE   3050.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   325.70  DOWNSTREAM(FEET) =   321.10
  FLOW LENGTH(FEET) =   165.82   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.58
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.06
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3050.00 =    1006.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3015.00 TO NODE   3050.00 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.) =    6.01
  RAINFALL INTENSITY(INCH/HR) =   7.72
  TOTAL STREAM AREA(ACRES) =     3.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.06

****************************************************************************
  FLOW PROCESS FROM NODE   3055.00 TO NODE   3060.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    330.13
  DOWNSTREAM ELEVATION(FEET) =    328.43
  ELEVATION DIFFERENCE(FEET) =      1.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.799
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.131
  SUBAREA RUNOFF(CFS) =      0.58
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.58

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

```
  FLOW PROCESS FROM NODE   3060.00 TO NODE   3065.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.43  DOWNSTREAM ELEVATION(FEET) =  325.93
  STREET LENGTH(FEET) =   103.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    4.39
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.69
  STREET FLOW TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =    7.40
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.751
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.91
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       1.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   5.89
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE   3055.00 TO NODE   3065.00 =     163.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3065.00 TO NODE   3050.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   321.70  DOWNSTREAM(FEET) =   321.10
  FLOW LENGTH(FEET) =    11.31   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.47
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.43
  LONGEST FLOWPATH FROM NODE   3055.00 TO NODE   3050.00 =     174.31 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3070.00 TO NODE   3050.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.736
  USER-SPECIFIED RUNOFF COEFFICIENT = .4900
  S.C.S. CURVE NUMBER (AMC II) =  85
```



```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4586
  SUBAREA AREA(ACRES) =    0.82   SUBAREA RUNOFF(CFS) =    2.71
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       4.17
  TC(MIN.) =    7.43

****************************************************************************
  FLOW PROCESS FROM NODE   3070.00 TO NODE   3050.00 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.) =    7.43
  RAINFALL INTENSITY(INCH/HR) =   6.74
  TOTAL STREAM AREA(ACRES) =     1.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.17

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       18.06     6.01        7.723          3.75
      2        4.17     7.43        6.736          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       21.43     6.01        7.723
      2       19.92     7.43        6.736

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.43   Tc(MIN.) =    6.01
  TOTAL AREA(ACRES) =        5.1
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3050.00 =    1006.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3050.00 TO NODE   3075.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   321.10  DOWNSTREAM(FEET) =   312.00
  FLOW LENGTH(FEET) =   374.62   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.31
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.43
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    6.56
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3075.00 =    1381.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3050.00 TO NODE   3075.00 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.) =    6.56
```

```
  RAINFALL INTENSITY(INCH/HR) =   7.30
  TOTAL STREAM AREA(ACRES) =     5.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.43

****************************************************************************
  FLOW PROCESS FROM NODE   3080.00 TO NODE   3085.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    325.93
  DOWNSTREAM ELEVATION(FEET) =    324.68
  ELEVATION DIFFERENCE(FEET) =      1.25
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.533
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.675
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE   3085.00 TO NODE   3075.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  324.68  DOWNSTREAM ELEVATION(FEET) =  313.06
  STREET LENGTH(FEET) =   387.40   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.75   Tc(MIN.) =    9.28
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.833
  USER-SPECIFIED RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.582
  SUBAREA AREA(ACRES) =    1.77      SUBAREA RUNOFF(CFS) =    6.19
  TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =       6.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.41
  FLOW VELOCITY(FEET/SEC.) =  4.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.63
  LONGEST FLOWPATH FROM NODE   3080.00 TO NODE   3075.00 =     447.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3090.00 TO NODE   3075.00 IS CODE =  81
----------------------------------------------------------------------------
```



```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.833
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5764
  SUBAREA AREA(ACRES) =    1.58   SUBAREA RUNOFF(CFS) =    5.25
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =      11.90
  TC(MIN.) =    9.28

****************************************************************************
  FLOW PROCESS FROM NODE   3090.00 TO NODE   3075.00 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.) =    9.28
  RAINFALL INTENSITY(INCH/HR) =   5.83
  TOTAL STREAM AREA(ACRES) =     3.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.90

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       21.43     6.56        7.297          5.10
      2       11.90     9.28        5.833          3.54

  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       29.84     6.56       7.297
      2       29.03     9.28       5.833

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      29.84   Tc(MIN.) =    6.56
  TOTAL AREA(ACRES) =        8.6
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3075.00 =    1381.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3075.00 TO NODE   3100.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   312.00  DOWNSTREAM(FEET) =   307.80
  FLOW LENGTH(FEET) =   248.34   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.87
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.84
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    6.94
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3100.00 =    1629.69 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3075.00 TO NODE   3100.00 IS CODE =  10
----------------------------------------------------------------------------
```

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

********************************************************************************
  FLOW PROCESS FROM NODE   3105.00 TO NODE   3110.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    356.46
  DOWNSTREAM ELEVATION(FEET) =    355.72
  ELEVATION DIFFERENCE(FEET) =      0.74
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.990
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

********************************************************************************
  FLOW PROCESS FROM NODE   3110.00 TO NODE   3100.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  355.72  DOWNSTREAM ELEVATION(FEET) =  312.44
  STREET LENGTH(FEET) =   625.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.85
  STREET FLOW TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =    4.84
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.603
  SUBAREA AREA(ACRES) =    2.02      SUBAREA RUNOFF(CFS) =   10.54
  TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =      10.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.73
  FLOW VELOCITY(FEET/SEC.) =  6.52   DEPTH*VELOCITY(FT*FT/SEC.) =   2.54
  LONGEST FLOWPATH FROM NODE   3105.00 TO NODE   3100.00 =     685.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   3110.00 TO NODE   3100.00 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       10.69     4.84       8.695        2.04
  LONGEST FLOWPATH FROM NODE   3105.00 TO NODE   3100.00 =     685.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       29.84     6.94       7.036        8.64
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3100.00 =    1629.69 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      31.51       4.84       8.695
      2      38.49       6.94       7.036

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      38.49   Tc(MIN.) =    6.94
  TOTAL AREA(ACRES) =       10.7

********************************************************************************
  FLOW PROCESS FROM NODE   3110.00 TO NODE   3100.00 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE   3100.00 TO NODE   3115.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.80  DOWNSTREAM(FEET) =   307.20
  FLOW LENGTH(FEET) =     6.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.12
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.49
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    6.95
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3115.00 =    1635.94 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   3100.00 TO NODE   3115.00 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.) =    6.95
  RAINFALL INTENSITY(INCH/HR) =   7.03
  TOTAL STREAM AREA(ACRES) =    10.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     38.49

********************************************************************************
  FLOW PROCESS FROM NODE   3120.00 TO NODE   3125.00 IS CODE =  21
```

```
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    356.46
  DOWNSTREAM ELEVATION(FEET) =    355.82
  ELEVATION DIFFERENCE(FEET) =      0.64
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.139
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

**************************************************************************
  FLOW PROCESS FROM NODE   3125.00 TO NODE   3130.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  355.82  DOWNSTREAM ELEVATION(FEET) =  314.44
  STREET LENGTH(FEET) =   650.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.55
  STREET FLOW TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =    5.27
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.409
  USER-SPECIFIED RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.464
  SUBAREA AREA(ACRES) =    1.86      SUBAREA RUNOFF(CFS) =    7.19
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =       7.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  10.93
  FLOW VELOCITY(FEET/SEC.) =  5.82   DEPTH*VELOCITY(FT*FT/SEC.) =   2.08
  LONGEST FLOWPATH FROM NODE   3120.00 TO NODE   3130.00 =     710.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3130.00 TO NODE   3115.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.80  DOWNSTREAM(FEET) =   307.20
  FLOW LENGTH(FEET) =    26.25   MANNING'S N =  0.013
```



```
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.65
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.34
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.32
  LONGEST FLOWPATH FROM NODE   3120.00 TO NODE   3115.00 =     736.25 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3130.00 TO NODE   3115.00 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.) =    5.32
  RAINFALL INTENSITY(INCH/HR) =   8.36
  TOTAL STREAM AREA(ACRES) =     1.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.34

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       38.49     6.95        7.033         10.68
      2        7.34     5.32        8.357          1.88

  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       36.80     5.32       8.357
      2       44.67     6.95       7.033

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      44.67   Tc(MIN.) =    6.95
  TOTAL AREA(ACRES) =       12.6
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3115.00 =    1635.94 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3115.00 TO NODE   3135.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.20  DOWNSTREAM(FEET) =   269.70
  FLOW LENGTH(FEET) =   468.17   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.59
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.67
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    7.31
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3135.00 =    2104.11 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3150.00 TO NODE   3135.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.807
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5787
  SUBAREA AREA(ACRES) =    1.60   SUBAREA RUNOFF(CFS) =    7.73
  TOTAL AREA(ACRES) =       14.2   TOTAL RUNOFF(CFS) =      55.77
  TC(MIN.) =    7.31

****************************************************************************
  FLOW PROCESS FROM NODE   3135.00 TO NODE   3155.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   269.70  DOWNSTREAM(FEET) =   262.10
  FLOW LENGTH(FEET) =   140.65   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.58
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      55.77
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    7.43
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3155.00 =    2244.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3135.00 TO NODE   3155.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3135.00 TO NODE   3155.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3160.00 TO NODE   3165.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    312.50
  DOWNSTREAM ELEVATION(FEET) =    310.09
  ELEVATION DIFFERENCE(FEET) =      2.41
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.052
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.687
  SUBAREA RUNOFF(CFS) =      0.82
  TOTAL AREA(ACRES) =      0.26   TOTAL RUNOFF(CFS) =      0.82

****************************************************************************
  FLOW PROCESS FROM NODE   3165.00 TO NODE   3170.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  310.09  DOWNSTREAM ELEVATION(FEET) =  309.34
  STREET LENGTH(FEET) =   104.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```



```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.17
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.26
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
  STREET FLOW TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =    6.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.069
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.541
  SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    4.71
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.54
  FLOW VELOCITY(FEET/SEC.) =  2.33   DEPTH*VELOCITY(FT*FT/SEC.) =   1.02
  LONGEST FLOWPATH FROM NODE   3160.00 TO NODE   3170.00 =     164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3170.00 TO NODE   3175.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   304.00  DOWNSTREAM(FEET) =   303.77
  FLOW LENGTH(FEET) =    23.37   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.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.47
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.96
  LONGEST FLOWPATH FROM NODE   3160.00 TO NODE   3175.00 =     187.37 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3180.00 TO NODE   3175.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.025
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5100
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5278
  SUBAREA AREA(ACRES) =    1.05   SUBAREA RUNOFF(CFS) =    3.76
  TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =       9.20
  TC(MIN.) =    6.96

****************************************************************************
  FLOW PROCESS FROM NODE   3175.00 TO NODE   3185.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   303.77  DOWNSTREAM(FEET) =   302.41
  FLOW LENGTH(FEET) =   135.68   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.20
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    7.30
  LONGEST FLOWPATH FROM NODE   3160.00 TO NODE   3185.00 =     323.05 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3175.00 TO NODE   3185.00 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.) =    7.30
  RAINFALL INTENSITY(INCH/HR) =   6.81
  TOTAL STREAM AREA(ACRES) =     2.48
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.20

****************************************************************************
  FLOW PROCESS FROM NODE   3190.00 TO NODE   3195.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    340.83
  DOWNSTREAM ELEVATION(FEET) =    335.97
  ELEVATION DIFFERENCE(FEET) =      4.86
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.816
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   3195.00 TO NODE   3200.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  335.97  DOWNSTREAM ELEVATION(FEET) =  315.48
  STREET LENGTH(FEET) =   487.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.32
```



```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    4.30
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   2.20   Tc(MIN.) =    4.02
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.563
  SUBAREA AREA(ACRES) =    0.49      SUBAREA RUNOFF(CFS) =    2.34
  TOTAL AREA(ACRES) =       0.5       PEAK FLOW RATE(CFS) =       2.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.02
  FLOW VELOCITY(FEET/SEC.) =  3.94   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
  LONGEST FLOWPATH FROM NODE   3190.00 TO NODE   3200.00 =     557.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3200.00 TO NODE   3185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   304.09  DOWNSTREAM(FEET) =   302.41
  FLOW LENGTH(FEET) =   167.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.49
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =    4.60
  LONGEST FLOWPATH FROM NODE   3190.00 TO NODE   3185.00 =     724.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3200.00 TO NODE   3185.00 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.) =    4.60
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     0.51
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.49

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.20     7.30        6.810          2.48
      2        2.49     4.60        8.695          0.51

  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        8.29     4.60       8.695
      2       11.15     7.30       6.810

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.15   Tc(MIN.) =    7.30
  TOTAL AREA(ACRES) =        3.0
  LONGEST FLOWPATH FROM NODE   3190.00 TO NODE   3185.00 =     724.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3185.00 TO NODE   3205.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   302.41  DOWNSTREAM(FEET) =   288.67
  FLOW LENGTH(FEET) =   637.31   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.15
  PIPE TRAVEL TIME(MIN.) =   1.14    Tc(MIN.) =    8.44
  LONGEST FLOWPATH FROM NODE   3190.00 TO NODE   3205.00 =    1361.81 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3185.00 TO NODE   3205.00 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.) =    8.44
  RAINFALL INTENSITY(INCH/HR) =   6.20
  TOTAL STREAM AREA(ACRES) =     2.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.15

****************************************************************************
  FLOW PROCESS FROM NODE   3210.00 TO NODE   3215.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    312.33
  DOWNSTREAM ELEVATION(FEET) =    310.63
  ELEVATION DIFFERENCE(FEET) =      1.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.266
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   3215.00 TO NODE   3220.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  310.63  DOWNSTREAM ELEVATION(FEET) =  294.19
  STREET LENGTH(FEET) =   558.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```



```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.84
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =    9.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.25
  STREET FLOW TRAVEL TIME(MIN.) =   2.49   Tc(MIN.) =    4.76
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.574
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    7.38
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       7.54

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.20
  FLOW VELOCITY(FEET/SEC.) =  4.31   DEPTH*VELOCITY(FT*FT/SEC.) =   1.72
  LONGEST FLOWPATH FROM NODE   3210.00 TO NODE   3220.00 =     618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3220.00 TO NODE   3205.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   288.73  DOWNSTREAM(FEET) =   288.67
  FLOW LENGTH(FEET) =     6.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.34
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.54
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    4.78
  LONGEST FLOWPATH FROM NODE   3210.00 TO NODE   3205.00 =     624.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3235.00 TO NODE   3205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5714
  SUBAREA AREA(ACRES) =    2.72   SUBAREA RUNOFF(CFS) =   13.48
  TOTAL AREA(ACRES) =        4.2   TOTAL RUNOFF(CFS) =      21.02
  TC(MIN.) =    4.78

****************************************************************************
  FLOW PROCESS FROM NODE   3235.00 TO NODE   3155.00 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.) =    4.78
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     4.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.02

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.15     8.44        6.201          2.99
      2       21.02     4.78        8.695          4.23

  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       28.97     4.78       8.695
      2       26.14     8.44       6.201

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      28.97   Tc(MIN.) =    4.78
  TOTAL AREA(ACRES) =        7.2
  LONGEST FLOWPATH FROM NODE   3190.00 TO NODE   3155.00 =    1361.81 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3205.00 TO NODE   3155.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   288.67  DOWNSTREAM(FEET) =   262.20
  FLOW LENGTH(FEET) =   576.73   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.51
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.97
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    5.40
  LONGEST FLOWPATH FROM NODE   3190.00 TO NODE   3155.00 =    1938.54 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3205.00 TO NODE   3155.00 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       28.97     5.40       8.278        7.22
  LONGEST FLOWPATH FROM NODE   3190.00 TO NODE   3155.00 =    1938.54 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
```



```
      1       55.77     7.43       6.736       14.16
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3155.00 =    2244.76 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
      1       69.48      5.40       8.278
      2       79.35      7.43       6.736

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      79.35   Tc(MIN.) =    7.43
  TOTAL AREA(ACRES) =       21.4

****************************************************************************
  FLOW PROCESS FROM NODE   3205.00 TO NODE   3155.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3155.00 TO NODE   3240.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   262.10  DOWNSTREAM(FEET) =   257.60
  FLOW LENGTH(FEET) =    45.95   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.62
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      79.35
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.46
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3240.00 =    2290.71 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3155.00 TO NODE   3240.00 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.) =    7.46
  RAINFALL INTENSITY(INCH/HR) =   6.72
  TOTAL STREAM AREA(ACRES) =    21.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     79.35

****************************************************************************
  FLOW PROCESS FROM NODE   3245.00 TO NODE   3250.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    312.80
  DOWNSTREAM ELEVATION(FEET) =    304.32
  ELEVATION DIFFERENCE(FEET) =      8.48
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.489
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE   3250.00 TO NODE   3255.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  304.32  DOWNSTREAM ELEVATION(FEET) =  262.77
  STREET LENGTH(FEET) =   587.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.94
  STREET FLOW TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =    2.88
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.572
  SUBAREA AREA(ACRES) =    5.60      SUBAREA RUNOFF(CFS) =   27.75
  TOTAL AREA(ACRES) =        5.6        PEAK FLOW RATE(CFS) =      28.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  7.98   DEPTH*VELOCITY(FT*FT/SEC.) =   3.86
  LONGEST FLOWPATH FROM NODE   3245.00 TO NODE   3255.00 =     647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3255.00 TO NODE   3240.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   258.00  DOWNSTREAM(FEET) =   257.60
  FLOW LENGTH(FEET) =     6.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.06
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    2.89
  LONGEST FLOWPATH FROM NODE   3245.00 TO NODE   3240.00 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3255.00 TO NODE   3240.00 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.) =    2.89
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     5.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     28.06

****************************************************************************
  FLOW PROCESS FROM NODE   3260.00 TO NODE   3265.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    312.80
  DOWNSTREAM ELEVATION(FEET) =    304.32
  ELEVATION DIFFERENCE(FEET) =      8.48
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.489
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE   3265.00 TO NODE   3270.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  304.32  DOWNSTREAM ELEVATION(FEET) =  262.77
  STREET LENGTH(FEET) =   621.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       4.38
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.66
  STREET FLOW TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =    3.44
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.792
  SUBAREA AREA(ACRES) =    1.21      SUBAREA RUNOFF(CFS) =    8.31
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       8.54

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.63
  FLOW VELOCITY(FEET/SEC.) =  6.09   DEPTH*VELOCITY(FT*FT/SEC.) =   2.25
  LONGEST FLOWPATH FROM NODE   3260.00 TO NODE   3270.00 =     681.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3240.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   258.00  DOWNSTREAM(FEET) =   257.60
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.71
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.54
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    3.50
  LONGEST FLOWPATH FROM NODE   3260.00 TO NODE   3240.00 =     707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3240.00 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.) =    3.50
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     1.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.54

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       79.35     7.46        6.719         21.38
      2       28.06     2.89        8.695          5.64
      3        8.54     3.50        8.695          1.24

  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       65.80     2.89       8.695
      2       73.85     3.50       8.695
      3      107.62     7.46       6.719

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     107.62   Tc(MIN.) =    7.46
  TOTAL AREA(ACRES) =       28.3
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3240.00 =    2290.71 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3240.00 TO NODE   3271.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   257.60  DOWNSTREAM(FEET) =   250.10
```



```
  FLOW LENGTH(FEET) =   119.57   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.32
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     107.62
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3271.00 =    2410.28 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3274.00 TO NODE   3271.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.672
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5883
  SUBAREA AREA(ACRES) =    1.73   SUBAREA RUNOFF(CFS) =    8.20
  TOTAL AREA(ACRES) =       30.0   TOTAL RUNOFF(CFS) =     117.72
  TC(MIN.) =    7.54

****************************************************************************
  FLOW PROCESS FROM NODE   3271.00 TO NODE   3275.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   250.10  DOWNSTREAM(FEET) =   242.30
  FLOW LENGTH(FEET) =   148.82   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.65
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     117.72
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.65
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3275.00 =    2559.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3271.00 TO NODE   3275.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3271.00 TO NODE   3275.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3280.00 TO NODE   3285.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    270.84
  DOWNSTREAM ELEVATION(FEET) =    270.13
  ELEVATION DIFFERENCE(FEET) =      0.71
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.032
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
```

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3290.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  270.13  DOWNSTREAM ELEVATION(FEET) =  262.34
  STREET LENGTH(FEET) =   316.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
  STREET FLOW TRAVEL TIME(MIN.) =   1.51   Tc(MIN.) =    4.55
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.606
  SUBAREA AREA(ACRES) =    1.38      SUBAREA RUNOFF(CFS) =    7.20
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       7.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.59
  FLOW VELOCITY(FEET/SEC.) =  4.03   DEPTH*VELOCITY(FT*FT/SEC.) =   1.63
  LONGEST FLOWPATH FROM NODE   3280.00 TO NODE   3290.00 =     376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3290.00 TO NODE   3295.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   259.50  DOWNSTREAM(FEET) =   259.00
  FLOW LENGTH(FEET) =    28.25   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.87
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.43
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    4.60
  LONGEST FLOWPATH FROM NODE   3280.00 TO NODE   3295.00 =     404.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3300.00 TO NODE   3295.00 IS CODE =  81
```



```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5907
  SUBAREA AREA(ACRES) =    1.03   SUBAREA RUNOFF(CFS) =    5.10
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =      12.53
  TC(MIN.) =    4.60

****************************************************************************
  FLOW PROCESS FROM NODE   3295.00 TO NODE   3305.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   259.00  DOWNSTREAM(FEET) =   250.70
  FLOW LENGTH(FEET) =   331.62   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.53
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    5.15
  LONGEST FLOWPATH FROM NODE   3280.00 TO NODE   3305.00 =     735.87 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3295.00 TO NODE   3305.00 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.) =    5.15
  RAINFALL INTENSITY(INCH/HR) =   8.53
  TOTAL STREAM AREA(ACRES) =     2.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.53

****************************************************************************
  FLOW PROCESS FROM NODE   3310.00 TO NODE   3315.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    262.70
  DOWNSTREAM ELEVATION(FEET) =    261.09
  ELEVATION DIFFERENCE(FEET) =      1.61
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.308
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE   3315.00 TO NODE   3320.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
```

```
==========================================================================
  UPSTREAM ELEVATION(FEET) =  261.09  DOWNSTREAM ELEVATION(FEET) =  254.79
  STREET LENGTH(FEET) =   240.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       2.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.96
  STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =    3.55
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.492
  SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    4.09
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       4.32

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.54
  FLOW VELOCITY(FEET/SEC.) =  3.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.28
  LONGEST FLOWPATH FROM NODE   3310.00 TO NODE   3320.00 =     300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3320.00 TO NODE   3305.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   251.20  DOWNSTREAM(FEET) =   250.70
  FLOW LENGTH(FEET) =    33.75   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.32
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    3.64
  LONGEST FLOWPATH FROM NODE   3310.00 TO NODE   3305.00 =     333.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3325.00 TO NODE   3305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4958
```



```
  SUBAREA AREA(ACRES) =    1.01   SUBAREA RUNOFF(CFS) =    4.39
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       8.71
  TC(MIN.) =    3.64

****************************************************************************
  FLOW PROCESS FROM NODE   3325.00 TO NODE   3305.00 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.) =    3.64
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     2.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.71

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       12.53     5.15        8.529          2.44
      2        8.71     3.64        8.695          2.02

  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       17.56     3.64       8.695
      2       21.07     5.15       8.529

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.07   Tc(MIN.) =    5.15
  TOTAL AREA(ACRES) =        4.5
  LONGEST FLOWPATH FROM NODE   3280.00 TO NODE   3305.00 =     735.87 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3305.00 TO NODE   3275.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   250.70  DOWNSTREAM(FEET) =   242.30
  FLOW LENGTH(FEET) =   188.95   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.92
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.07
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    5.38
  LONGEST FLOWPATH FROM NODE   3280.00 TO NODE   3275.00 =     924.82 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3305.00 TO NODE   3275.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
      1       21.07     5.38       8.296        4.46
  LONGEST FLOWPATH FROM NODE   3280.00 TO NODE   3275.00 =     924.82 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      117.72     7.65       6.610       29.99
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3275.00 =    2559.10 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     103.84       5.38       8.296
      2     134.51       7.65       6.610

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     134.51   Tc(MIN.) =    7.65
  TOTAL AREA(ACRES) =       34.5

****************************************************************************
  FLOW PROCESS FROM NODE   3305.00 TO NODE   3275.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3275.00 TO NODE   3330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   242.30  DOWNSTREAM(FEET) =   240.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.47
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     134.51
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.68
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3330.00 =    2609.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3275.00 TO NODE   3330.00 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.) =    7.68
  RAINFALL INTENSITY(INCH/HR) =   6.59
  TOTAL STREAM AREA(ACRES) =    34.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    134.51

****************************************************************************
  FLOW PROCESS FROM NODE   3335.00 TO NODE   3340.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    263.16
```



```
  DOWNSTREAM ELEVATION(FEET) =    256.80
  ELEVATION DIFFERENCE(FEET) =      6.36
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.624
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE   3340.00 TO NODE   3345.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  256.80  DOWNSTREAM ELEVATION(FEET) =  246.10
  STREET LENGTH(FEET) =   252.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       3.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    8.59
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =    4.60
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5300
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.531
  SUBAREA AREA(ACRES) =    1.36      SUBAREA RUNOFF(CFS) =    6.27
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       6.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.63
  FLOW VELOCITY(FEET/SEC.) =  4.84   DEPTH*VELOCITY(FT*FT/SEC.) =   1.79
  LONGEST FLOWPATH FROM NODE   3335.00 TO NODE   3345.00 =     312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3345.00 TO NODE   3330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   240.50  DOWNSTREAM(FEET) =   240.00
  FLOW LENGTH(FEET) =     5.75   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.78
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       6.78
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    4.61
  LONGEST FLOWPATH FROM NODE   3335.00 TO NODE   3330.00 =     317.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3345.00 TO NODE   3330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    4.61
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     1.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.78

****************************************************************************
  FLOW PROCESS FROM NODE   3350.00 TO NODE   3355.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    263.16
  DOWNSTREAM ELEVATION(FEET) =    256.80
  ELEVATION DIFFERENCE(FEET) =      6.36
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.489
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE   3355.00 TO NODE   3360.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  256.80  DOWNSTREAM ELEVATION(FEET) =  246.10
  STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       0.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.54
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.90
  STREET FLOW TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =    2.39
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
```



```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.51
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       1.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   5.42
  FLOW VELOCITY(FEET/SEC.) =  3.81   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
  LONGEST FLOWPATH FROM NODE   3350.00 TO NODE   3360.00 =     305.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3360.00 TO NODE   3330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   241.50  DOWNSTREAM(FEET) =   240.00
  FLOW LENGTH(FEET) =    25.75   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.06
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.74
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    2.44
  LONGEST FLOWPATH FROM NODE   3350.00 TO NODE   3330.00 =     330.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3360.00 TO NODE   3330.00 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.) =    2.44
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     0.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.74

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      134.51     7.68        6.590         34.45
      2        6.78     4.61        8.695          1.47
      3        1.74     2.44        8.695          0.23

  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       48.07     2.44        8.695
      2       89.25     4.61        8.695
      3      140.97     7.68        6.590

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     140.97   Tc(MIN.) =    7.68
```

```
  TOTAL AREA(ACRES) =       36.2
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3330.00 =    2609.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3330.00 TO NODE   3365.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   240.00  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =   190.64   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.97
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     140.97
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    7.81
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3365.00 =    2799.74 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3330.00 TO NODE   3365.00 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.) =    7.81
  RAINFALL INTENSITY(INCH/HR) =   6.52
  TOTAL STREAM AREA(ACRES) =    36.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    140.97

****************************************************************************
  FLOW PROCESS FROM NODE   3510.00 TO NODE   3365.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  23.00   RAIN INTENSITY(INCH/HOUR) =  3.25
  TOTAL AREA(ACRES) =     3.80   TOTAL RUNOFF(CFS) =      8.50

****************************************************************************
  FLOW PROCESS FROM NODE   3510.00 TO NODE   3365.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.00
  RAINFALL INTENSITY(INCH/HR) =   3.25
  TOTAL STREAM AREA(ACRES) =     3.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.50

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      140.97     7.81        6.523         36.15
      2        8.50    23.00        3.249          3.80

  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      143.85     7.81        6.523
      2       78.72    23.00        3.249

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     143.85   Tc(MIN.) =    7.81
  TOTAL AREA(ACRES) =       40.0
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3365.00 =    2799.74 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3365.00 TO NODE   3370.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.523
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5663
  SUBAREA AREA(ACRES) =    3.57   SUBAREA RUNOFF(CFS) =    6.29
  TOTAL AREA(ACRES) =       43.5   TOTAL RUNOFF(CFS) =     160.77
  TC(MIN.) =    7.81

****************************************************************************
  FLOW PROCESS FROM NODE   3365.00 TO NODE   3370.00 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.) =    7.81
  RAINFALL INTENSITY(INCH/HR) =   6.52
  TOTAL STREAM AREA(ACRES) =    43.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    160.77

****************************************************************************
  FLOW PROCESS FROM NODE   3626.00 TO NODE   3370.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.38   RAIN INTENSITY(INCH/HOUR) =  8.29
  TOTAL AREA(ACRES) =     7.20   TOTAL RUNOFF(CFS) =     37.14

****************************************************************************
  FLOW PROCESS FROM NODE   3626.00 TO NODE   3370.00 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.) =    5.38
  RAINFALL INTENSITY(INCH/HR) =   8.29
  TOTAL STREAM AREA(ACRES) =     7.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.14

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      160.77     7.81        6.523         43.52
      2       37.14     5.38        8.293          7.20

  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      163.58     5.38       8.293
      2      189.98     7.81       6.523

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     189.98   Tc(MIN.) =    7.81
  TOTAL AREA(ACRES) =       50.7
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3370.00 =    2799.74 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3370.00 TO NODE   3375.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   228.00  DOWNSTREAM(FEET) =   218.00
  FLOW LENGTH(FEET) =    64.69   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.79
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     189.98
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.83
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3375.00 =    2864.43 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       50.7  TC(MIN.) =      7.83
  PEAK FLOW RATE(CFS)   =     189.98
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                *
* PROPOSED CONDITIONS                                                    *
* SYSTEM 3500                                                            *
 ************************************************************************

  FILE NAME: 3500P100.DAT
  TIME/DATE OF STUDY: 16:21 12/06/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 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<<<<<
==========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    55.00
  UPSTREAM ELEVATION(FEET) =    259.84
  DOWNSTREAM ELEVATION(FEET) =    258.60
  ELEVATION DIFFERENCE(FEET) =      1.24
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.342
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

**************************************************************************
  FLOW PROCESS FROM NODE   3505.00 TO NODE   3510.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  258.60  DOWNSTREAM ELEVATION(FEET) =  243.38
  STREET LENGTH(FEET) =   460.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       0.67
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.95
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   1.94   Tc(MIN.) =    4.28
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2069
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.229
  SUBAREA AREA(ACRES) =    0.58      SUBAREA RUNOFF(CFS) =    1.04
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       1.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   4.30
  FLOW VELOCITY(FEET/SEC.) =  3.33   DEPTH*VELOCITY(FT*FT/SEC.) =   0.80
  LONGEST FLOWPATH FROM NODE   3500.00 TO NODE   3510.00 =     515.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3505.00 TO NODE   3510.00 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.) =    4.28
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.19

**************************************************************************
  FLOW PROCESS FROM NODE   3515.00 TO NODE   3520.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    362.50
  DOWNSTREAM ELEVATION(FEET) =    361.90
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.207
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

**************************************************************************
  FLOW PROCESS FROM NODE   3520.00 TO NODE   3525.00 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  361.90  DOWNSTREAM ELEVATION(FEET) =  243.38
  STREET LENGTH(FEET) =  3014.52   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.015
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0300
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.62
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   12.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =  19.60   Tc(MIN.) =   22.81
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.267
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7773
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.778
  SUBAREA AREA(ACRES) =    3.15      SUBAREA RUNOFF(CFS) =    8.00
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       8.05

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.17
  FLOW VELOCITY(FEET/SEC.) =  2.95   DEPTH*VELOCITY(FT*FT/SEC.) =   1.33
  LONGEST FLOWPATH FROM NODE   3515.00 TO NODE   3525.00 =    3074.52 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3525.00 TO NODE   3510.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   233.50  DOWNSTREAM(FEET) =   232.91
  FLOW LENGTH(FEET) =    36.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
```



```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.05
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   22.89
  LONGEST FLOWPATH FROM NODE   3515.00 TO NODE   3510.00 =    3111.02 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3525.00 TO NODE   3510.00 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.) =   22.89
  RAINFALL INTENSITY(INCH/HR) =   3.26
  TOTAL STREAM AREA(ACRES) =     3.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.05

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.19     4.28        8.695          0.60
      2        8.05    22.89        3.259          3.17

  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        2.70     4.28        8.695
      2        8.50    22.89        3.259

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.50   Tc(MIN.) =   22.89
  TOTAL AREA(ACRES) =        3.8
  LONGEST FLOWPATH FROM NODE   3515.00 TO NODE   3510.00 =    3111.02 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3510.00 TO NODE   3365.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   232.91  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =    81.86   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.50
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   23.00
  LONGEST FLOWPATH FROM NODE   3515.00 TO NODE   3365.00 =    3192.88 FEET.
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.8  TC(MIN.) =     23.00
  PEAK FLOW RATE(CFS)   =       8.50
==========================================================================
==========================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                         Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* PROPOSED CONDITIONS                                                      *
* SYSTEM 3600                                                              *
 ****************************************************************************

  FILE NAME: 3600P100.DAT
  TIME/DATE OF STUDY: 16:37 12/06/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   16.0     10.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   3600.00 TO NODE   3605.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    315.84
  DOWNSTREAM ELEVATION(FEET) =    310.98
  ELEVATION DIFFERENCE(FEET) =      4.86
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.816
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE   3605.00 TO NODE   3610.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  310.98  DOWNSTREAM ELEVATION(FEET) =  247.30
  STREET LENGTH(FEET) =   951.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       7.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.00
  STREET FLOW TRAVEL TIME(MIN.) =   2.67   Tc(MIN.) =    4.49
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5600
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.565
  SUBAREA AREA(ACRES) =    3.10      SUBAREA RUNOFF(CFS) =   15.09
  TOTAL AREA(ACRES) =        3.1        PEAK FLOW RATE(CFS) =      15.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.34
  FLOW VELOCITY(FEET/SEC.) =  6.97   DEPTH*VELOCITY(FT*FT/SEC.) =   2.81
  LONGEST FLOWPATH FROM NODE   3600.00 TO NODE   3610.00 =    1021.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3610.00 TO NODE   3615.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   241.00  DOWNSTREAM(FEET) =   240.74
  FLOW LENGTH(FEET) =    26.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.57
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.47
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    4.54
  LONGEST FLOWPATH FROM NODE   3600.00 TO NODE   3615.00 =    1047.25 FEET.

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

```
  FLOW PROCESS FROM NODE   3620.00 TO NODE   3615.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6349
  SUBAREA AREA(ACRES) =    1.52   SUBAREA RUNOFF(CFS) =   10.31
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      25.78
  TC(MIN.) =    4.54

****************************************************************************
  FLOW PROCESS FROM NODE   3625.00 TO NODE   3615.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6389
  SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    1.61
  TOTAL AREA(ACRES) =        4.9   TOTAL RUNOFF(CFS) =      27.39
  TC(MIN.) =    4.54

****************************************************************************
  FLOW PROCESS FROM NODE   3615.00 TO NODE   3626.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   240.74  DOWNSTREAM(FEET) =   229.50
  FLOW LENGTH(FEET) =   363.14   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.41
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.39
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    5.00
  LONGEST FLOWPATH FROM NODE   3600.00 TO NODE   3626.00 =    1410.39 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3615.00 TO NODE   3626.00 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.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     4.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.39

****************************************************************************
  FLOW PROCESS FROM NODE   3630.00 TO NODE   3635.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
```



```
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    243.16
  DOWNSTREAM ELEVATION(FEET) =    241.60
  ELEVATION DIFFERENCE(FEET) =      1.56
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.652
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE   3635.00 TO NODE   3626.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  241.60  DOWNSTREAM ELEVATION(FEET) =  232.26
  STREET LENGTH(FEET) =   292.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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) =       4.14
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.34
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
  STREET FLOW TRAVEL TIME(MIN.) =   1.26   Tc(MIN.) =    3.91
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5600
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.564
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    7.99
  TOTAL AREA(ACRES) =       1.7        PEAK FLOW RATE(CFS) =       8.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  13.77
  FLOW VELOCITY(FEET/SEC.) =  4.48   DEPTH*VELOCITY(FT*FT/SEC.) =   1.68
  LONGEST FLOWPATH FROM NODE   3630.00 TO NODE   3626.00 =     362.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3640.00 TO NODE   3626.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =  98
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4964
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.62
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       9.75
  TC(MIN.) =    3.91

****************************************************************************
  FLOW PROCESS FROM NODE   3640.00 TO NODE   3626.00 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.) =    3.91
  RAINFALL INTENSITY(INCH/HR) =   8.69
  TOTAL STREAM AREA(ACRES) =     2.26
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.75

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       27.39     5.00        8.695          4.93
      2        9.75     3.91        8.695          2.26

  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       31.21     3.91       8.695
      2       37.14     5.00       8.695

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      37.14   Tc(MIN.) =    5.00
  TOTAL AREA(ACRES) =       7.2
  LONGEST FLOWPATH FROM NODE   3600.00 TO NODE   3626.00 =    1410.39 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3626.00 TO NODE   3370.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   229.50  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =   196.46   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.49
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.14
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    5.38
  LONGEST FLOWPATH FROM NODE   3600.00 TO NODE   3370.00 =    1606.85 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.2  TC(MIN.) =      5.38
  PEAK FLOW RATE(CFS)   =      37.14
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 240                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S240P100.DAT
  TIME/DATE OF STUDY: 17:35 12/06/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.02
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    241.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    656.00
  DOWNSTREAM ELEVATION(FEET) =    646.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
```



```
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.933
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    241.00 TO NODE    242.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    646.00  DOWNSTREAM(FEET) =    250.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4200.00   CHANNEL SLOPE =  0.0943
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.614
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      53.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.65
  AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =  12.40
  Tc(MIN.) =   19.50
  SUBAREA AREA(ACRES) =    81.53       SUBAREA RUNOFF(CFS) =  103.13
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       81.7         PEAK FLOW RATE(CFS) =     103.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) =   6.93
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    242.00 =    4300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    242.00 TO NODE    264.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   240.00  DOWNSTREAM(FEET) =   224.00
  FLOW LENGTH(FEET) =   333.13   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  52.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.87
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     103.31
  PIPE TRAVEL TIME(MIN.) =   1.14    Tc(MIN.) =   20.64
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    264.00 =    4633.13 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    242.00 TO NODE    264.00 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.) =   20.64
  RAINFALL INTENSITY(INCH/HR) =   3.48
  TOTAL STREAM AREA(ACRES) =    81.73
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    103.31

****************************************************************************
  FLOW PROCESS FROM NODE    243.00 TO NODE    244.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    640.00
  DOWNSTREAM ELEVATION(FEET) =    600.00
  ELEVATION DIFFERENCE(FEET) =     40.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
  SUBAREA RUNOFF(CFS) =      1.47
  TOTAL AREA(ACRES) =      0.68   TOTAL RUNOFF(CFS) =      1.47

****************************************************************************
  FLOW PROCESS FROM NODE    244.00 TO NODE    245.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    330.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3300.00   CHANNEL SLOPE =  0.0818
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.683
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      87.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.64
  AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) =   6.36
  Tc(MIN.) =   13.05
  SUBAREA AREA(ACRES) =   107.46       SUBAREA RUNOFF(CFS) =  166.08
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.330
  TOTAL AREA(ACRES) =      108.1         PEAK FLOW RATE(CFS) =     167.04

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.25   FLOW VELOCITY(FEET/SEC.) =  10.65
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    245.00 =    3400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    259.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    330.00  DOWNSTREAM(FEET) =    260.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.0959
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.452
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3900
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     186.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.43
  AVERAGE FLOW DEPTH(FEET) =   1.36   TRAVEL TIME(MIN.) =   1.06
  Tc(MIN.) =   14.11
  SUBAREA AREA(ACRES) =    22.83       SUBAREA RUNOFF(CFS) =   39.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.340
  TOTAL AREA(ACRES) =      131.0         PEAK FLOW RATE(CFS) =     198.44
```



```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.40   FLOW VELOCITY(FEET/SEC.) =  11.61
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    259.00 =    4130.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    257.00 TO NODE    259.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.452
  USER-SPECIFIED RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3386
  SUBAREA AREA(ACRES) =   12.03   SUBAREA RUNOFF(CFS) =   17.14
  TOTAL AREA(ACRES) =      143.0   TOTAL RUNOFF(CFS) =     215.58
  TC(MIN.) =   14.11

****************************************************************************
  FLOW PROCESS FROM NODE    258.00 TO NODE    259.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.452
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3113
  S.C.S. CURVE NUMBER (AMC II) =  65
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3379
  SUBAREA AREA(ACRES) =    3.89   SUBAREA RUNOFF(CFS) =    5.39
  TOTAL AREA(ACRES) =      146.9   TOTAL RUNOFF(CFS) =     220.97
  TC(MIN.) =   14.11

****************************************************************************
  FLOW PROCESS FROM NODE    259.00 TO NODE    260.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    266.00  DOWNSTREAM(FEET) =    228.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.0644
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.262
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     226.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.94
  AVERAGE FLOW DEPTH(FEET) =   1.59   TRAVEL TIME(MIN.) =   0.99
  Tc(MIN.) =   15.10
  SUBAREA AREA(ACRES) =     8.07       SUBAREA RUNOFF(CFS) =   12.04
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.339
  TOTAL AREA(ACRES) =      155.0         PEAK FLOW RATE(CFS) =     223.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.58   FLOW VELOCITY(FEET/SEC.) =   9.91
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    260.00 =    4720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    264.00 IS CODE =  36
----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   224.00  DOWNSTREAM(FEET) =   222.00
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  *GIVEN BOX BASEWIDTH(FEET) =  14.00   ESTIMATED BOX HEIGHT(FEET) =    6.17
  BOX-FLOW VELOCITY(FEET/SEC.) =   2.59
  BOX-FLOW(CFS) =     223.56
  BOX-FLOW TRAVEL TIME(MIN.) =   1.25    Tc(MIN.) =   16.35
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    264.00 =    4914.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    264.00 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.) =   16.35
  RAINFALL INTENSITY(INCH/HR) =   4.05
  TOTAL STREAM AREA(ACRES) =   154.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    223.56

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    378.00
  DOWNSTREAM ELEVATION(FEET) =    360.00
  ELEVATION DIFFERENCE(FEET) =     18.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.516
  SUBAREA RUNOFF(CFS) =      0.58
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.58

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE    263.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =    250.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE =  0.4400
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.950
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.15
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.81
  Tc(MIN.) =    7.08
  SUBAREA AREA(ACRES) =     1.81       SUBAREA RUNOFF(CFS) =    4.40
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       4.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   6.40
```



```
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    263.00 =     350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    264.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   240.00  DOWNSTREAM(FEET) =   221.00
  FLOW LENGTH(FEET) =   161.37   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.26
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.94
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =    7.90
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    264.00 =     511.37 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    264.00 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.) =    7.90
  RAINFALL INTENSITY(INCH/HR) =   6.47
  TOTAL STREAM AREA(ACRES) =     2.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.94

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      103.31    20.64        3.484         81.73
      2      223.56    16.35        4.049        154.96
      3        4.94     7.90        6.472          2.03

  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      152.52     7.90        6.472
      2      308.48    16.35        4.049
      3      298.32    20.64        3.484

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     308.48   Tc(MIN.) =   16.35
  TOTAL AREA(ACRES) =      238.7
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    264.00 =    4914.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE   3375.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    250.00  DOWNSTREAM(FEET) =    210.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   615.00   CHANNEL SLOPE =  0.0650
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
```

```
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     308.48
  FLOW VELOCITY(FEET/SEC.) =  10.05   FLOW DEPTH(FEET) =   1.29
  TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =   17.37
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE   3375.00 =    5529.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE   3375.00 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.) =   17.37
  RAINFALL INTENSITY(INCH/HR) =   3.89
  TOTAL STREAM AREA(ACRES) =   238.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    308.48

****************************************************************************
  FLOW PROCESS FROM NODE   3370.00 TO NODE   3375.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   7.83   RAIN INTENSITY(INCH/HOUR) =  6.51
  TOTAL AREA(ACRES) =    50.70   TOTAL RUNOFF(CFS) =    189.98

****************************************************************************
  FLOW PROCESS FROM NODE   3370.00 TO NODE   3375.00 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.) =    7.83
  RAINFALL INTENSITY(INCH/HR) =   6.51
  TOTAL STREAM AREA(ACRES) =    50.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    189.98

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      308.48    17.37        3.894        238.72
      2      189.98     7.83        6.510         50.70

  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      374.49     7.83        6.510
      2      422.11    17.37        3.894

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     422.11   Tc(MIN.) =   17.37
  TOTAL AREA(ACRES) =      289.4
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE   3375.00 =    5529.00 FEET.

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



```
  FLOW PROCESS FROM NODE   3375.00 TO NODE    266.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    210.00  DOWNSTREAM(FEET) =    202.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00   CHANNEL SLOPE =  0.0129
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.669
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2485
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     428.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.16
  AVERAGE FLOW DEPTH(FEET) =   2.36   TRAVEL TIME(MIN.) =   1.68
  Tc(MIN.) =   19.05
  SUBAREA AREA(ACRES) =    14.08       SUBAREA RUNOFF(CFS) =   12.84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.377
  TOTAL AREA(ACRES) =      303.5         PEAK FLOW RATE(CFS) =     422.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.35   FLOW VELOCITY(FEET/SEC.) =   6.13
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    266.00 =    6149.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    267.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   202.00  DOWNSTREAM(FEET) =   200.50
  FLOW LENGTH(FEET) =   217.17   MANNING'S N =  0.014
  Notes:
    1. Reference: "Hydraulic Charts for the Selection of
       Highway Culverts", Hydraulic Engineering Circular No. 5,
       December 1965, Federal Highway Administration.
    2. INLET control for all Culvert Analysis.
    3. Headwater depth is ASSUMED to be 3 FEET above the culvert soffit.
  GIVEN BOX CULVERT HEIGHT(FEET) =  10.00
  ESTIMATED BOX CULVERT BASEWIDTH(FEET) =    3.35
  CULVERT-FLOW VELOCITY(FEET/SEC.) =  12.60
  CULVERT-FLOW(CFS) =     422.11
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   19.34
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    267.00 =    6366.17 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    267.00 TO NODE    267.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.634
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =  91
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3799
  SUBAREA AREA(ACRES) =    2.79   SUBAREA RUNOFF(CFS) =    7.00
  TOTAL AREA(ACRES) =      306.3   TOTAL RUNOFF(CFS) =     422.84
  TC(MIN.) =   19.34

****************************************************************************
  FLOW PROCESS FROM NODE    267.00 TO NODE    268.00 IS CODE =  51
```

```
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    200.50  DOWNSTREAM(FEET) =    197.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   860.00   CHANNEL SLOPE =  0.0035
  CHANNEL BASE(FEET) =  100.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.116
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =  63
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     424.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.75
  AVERAGE FLOW DEPTH(FEET) =   1.48   TRAVEL TIME(MIN.) =   5.20
  Tc(MIN.) =   24.54
  SUBAREA AREA(ACRES) =     4.62       SUBAREA RUNOFF(CFS) =    2.88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.377
  TOTAL AREA(ACRES) =      310.9         PEAK FLOW RATE(CFS) =     422.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.47   FLOW VELOCITY(FEET/SEC.) =   2.76
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    268.00 =    7226.17 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      310.9  TC(MIN.) =     24.54
  PEAK FLOW RATE(CFS)   =     422.84
================================================================================
================================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 270                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S270P100.DAT
  TIME/DATE OF STUDY: 18:06 05/22/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.02
  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   12.0      6.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    271.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    390.00
  DOWNSTREAM ELEVATION(FEET) =    360.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.922
```



```
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    271.00 TO NODE    276.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  360.00  DOWNSTREAM ELEVATION(FEET) =  254.00
  STREET LENGTH(FEET) =  1350.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =       4.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    8.67
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.83
  STREET FLOW TRAVEL TIME(MIN.) =   3.90   Tc(MIN.) =    5.82
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.881
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    9.26
  TOTAL AREA(ACRES) =       1.4        PEAK FLOW RATE(CFS) =       9.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.77
  FLOW VELOCITY(FEET/SEC.) =  6.67   DEPTH*VELOCITY(FT*FT/SEC.) =   2.48
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    276.00 =    1450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    272.00 TO NODE    276.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.881
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.15   SUBAREA RUNOFF(CFS) =    1.03
  TOTAL AREA(ACRES) =       1.5   TOTAL RUNOFF(CFS) =     10.56
  TC(MIN.) =    5.82

****************************************************************************
  FLOW PROCESS FROM NODE    273.00 TO NODE    276.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.881
  USER-SPECIFIED RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6804
  SUBAREA AREA(ACRES) =    2.08   SUBAREA RUNOFF(CFS) =    8.85
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =      19.41
  TC(MIN.) =    5.82

****************************************************************************
  FLOW PROCESS FROM NODE    274.00 TO NODE    276.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.881
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6922
  SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    1.65
  TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =      21.06
  TC(MIN.) =    5.82

****************************************************************************
  FLOW PROCESS FROM NODE    276.00 TO NODE    277.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.80  DOWNSTREAM(FEET) =   248.00
  FLOW LENGTH(FEET) =    15.55   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.62
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.06
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    5.86
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    277.00 =    1465.55 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    277.00 TO NODE    278.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.852
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =  91
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6920
  SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    1.30
  TOTAL AREA(ACRES) =        4.1   TOTAL RUNOFF(CFS) =      22.28
  TC(MIN.) =    5.86

****************************************************************************
  FLOW PROCESS FROM NODE    278.00 TO NODE    282.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   248.00  DOWNSTREAM(FEET) =   230.00
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.37
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
```



```
  PIPE-FLOW(CFS) =      22.28
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    6.52
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    282.00 =    1640.55 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    278.00 TO NODE    282.00 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.) =    6.52
  RAINFALL INTENSITY(INCH/HR) =   7.32
  TOTAL STREAM AREA(ACRES) =     4.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.28

****************************************************************************
  FLOW PROCESS FROM NODE    279.00 TO NODE    280.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    598.00
  DOWNSTREAM ELEVATION(FEET) =    570.00
  ELEVATION DIFFERENCE(FEET) =     28.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.516
  SUBAREA RUNOFF(CFS) =      1.18
  TOTAL AREA(ACRES) =      0.45   TOTAL RUNOFF(CFS) =      1.18

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    281.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    570.00  DOWNSTREAM(FEET) =    245.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1880.00   CHANNEL SLOPE =  0.1729
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.241
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      33.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.68
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   4.69
  Tc(MIN.) =   10.96
  SUBAREA AREA(ACRES) =    33.71       SUBAREA RUNOFF(CFS) =   63.60
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.360
  TOTAL AREA(ACRES) =       34.2         PEAK FLOW RATE(CFS) =      64.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =   8.27
  LONGEST FLOWPATH FROM NODE    279.00 TO NODE    281.00 =    1980.00 FEET.

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

```
  FLOW PROCESS FROM NODE    281.00 TO NODE    282.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   245.00  DOWNSTREAM(FEET) =   234.00
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.68
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.43
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE    279.00 TO NODE    282.00 =    2160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    281.00 TO NODE    282.00 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.) =   11.60
  RAINFALL INTENSITY(INCH/HR) =   5.05
  TOTAL STREAM AREA(ACRES) =    34.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     64.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       22.28     6.52        7.323         4.10
      2       64.43    11.60        5.052        34.16

  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       58.51     6.52       7.323
      2       79.80    11.60       5.052

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      79.80   Tc(MIN.) =   11.60
  TOTAL AREA(ACRES) =       38.3
  LONGEST FLOWPATH FROM NODE    279.00 TO NODE    282.00 =    2160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    282.00 TO NODE    289.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    234.00  DOWNSTREAM(FEET) =    208.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   711.00   CHANNEL SLOPE =  0.0366
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.591
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      83.21
```



```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.39
  AVERAGE FLOW DEPTH(FEET) =   1.14   TRAVEL TIME(MIN.) =   1.85
  Tc(MIN.) =   13.46
  SUBAREA AREA(ACRES) =     4.95       SUBAREA RUNOFF(CFS) =    6.82
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.385
  TOTAL AREA(ACRES) =       43.2         PEAK FLOW RATE(CFS) =      79.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.11   FLOW VELOCITY(FEET/SEC.) =   6.34
  LONGEST FLOWPATH FROM NODE    279.00 TO NODE    289.00 =    2871.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    282.00 TO NODE    289.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.46
  RAINFALL INTENSITY(INCH/HR) =   4.59
  TOTAL STREAM AREA(ACRES) =    43.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     79.80

****************************************************************************
  FLOW PROCESS FROM NODE    283.00 TO NODE    284.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    520.00
  DOWNSTREAM ELEVATION(FEET) =    506.00
  ELEVATION DIFFERENCE(FEET) =     14.00
  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) =  7.582
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    284.00 TO NODE    285.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    506.00  DOWNSTREAM(FEET) =    318.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.3133
  CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.559
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.42
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.56
  Tc(MIN.) =    7.74
  SUBAREA AREA(ACRES) =     6.43       SUBAREA RUNOFF(CFS) =   15.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.360
```

```
  TOTAL AREA(ACRES) =        6.6         PEAK FLOW RATE(CFS) =      15.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   8.19
  LONGEST FLOWPATH FROM NODE    283.00 TO NODE    285.00 =     700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    285.00 TO NODE    286.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   318.00  DOWNSTREAM(FEET) =   304.00
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.29
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.66
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    8.21
  LONGEST FLOWPATH FROM NODE    283.00 TO NODE    286.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    286.00 TO NODE    289.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    304.00  DOWNSTREAM(FEET) =    208.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   900.00   CHANNEL SLOPE =  0.1067
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.448
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3700
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.10
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   2.11
  Tc(MIN.) =   10.32
  SUBAREA AREA(ACRES) =    11.77       SUBAREA RUNOFF(CFS) =   23.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.366
  TOTAL AREA(ACRES) =       18.4         PEAK FLOW RATE(CFS) =      36.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   7.76
  LONGEST FLOWPATH FROM NODE    283.00 TO NODE    289.00 =    1720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    286.00 TO NODE    289.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.32
  RAINFALL INTENSITY(INCH/HR) =   5.45
  TOTAL STREAM AREA(ACRES) =    18.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     36.73

  ** CONFLUENCE DATA **
```



```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       79.80    13.46        4.591         43.21
      2       36.73    10.32        5.448         18.40

  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      103.98    10.32       5.448
      2      110.75    13.46       4.591

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     110.75   Tc(MIN.) =   13.46
  TOTAL AREA(ACRES) =       61.6
  LONGEST FLOWPATH FROM NODE    279.00 TO NODE    289.00 =    2871.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    289.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.591
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3755
  SUBAREA AREA(ACRES) =   14.25   SUBAREA RUNOFF(CFS) =   23.55
  TOTAL AREA(ACRES) =       75.9   TOTAL RUNOFF(CFS) =     130.80
  TC(MIN.) =   13.46

****************************************************************************
  FLOW PROCESS FROM NODE    288.00 TO NODE    289.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.591
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3700
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3748
  SUBAREA AREA(ACRES) =   11.56   SUBAREA RUNOFF(CFS) =   19.64
  TOTAL AREA(ACRES) =       87.4   TOTAL RUNOFF(CFS) =     150.44
  TC(MIN.) =   13.46

****************************************************************************
  FLOW PROCESS FROM NODE    289.00 TO NODE    291.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    208.00  DOWNSTREAM(FEET) =    195.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4720.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00

        ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
            CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
            ALLOWABLE DEPTH).
```

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            AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
            ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.101
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =  54
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     185.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.48
  AVERAGE FLOW DEPTH(FEET) =   1.83   TRAVEL TIME(MIN.) =  31.75
  Tc(MIN.) =   45.21
  SUBAREA AREA(ACRES) =    85.20       SUBAREA RUNOFF(CFS) =   68.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.377
  TOTAL AREA(ACRES) =      172.6         PEAK FLOW RATE(CFS) =     150.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.63   FLOW VELOCITY(FEET/SEC.) =   2.32
  LONGEST FLOWPATH FROM NODE    279.00 TO NODE    291.00 =    7591.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    291.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.101
  USER-SPECIFIED RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =  45
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3727
  SUBAREA AREA(ACRES) =    7.82   SUBAREA RUNOFF(CFS) =    4.44
  TOTAL AREA(ACRES) =      180.4   TOTAL RUNOFF(CFS) =     150.44
  TC(MIN.) =   45.21
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      180.4  TC(MIN.) =     45.21
  PEAK FLOW RATE(CFS)   =     150.44
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 700                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S700P100.DAT
  TIME/DATE OF STUDY: 17:15 11/27/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    302.40
  DOWNSTREAM ELEVATION(FEET) =    299.74
  ELEVATION DIFFERENCE(FEET) =      2.66
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.952
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  299.74  DOWNSTREAM ELEVATION(FEET) =  200.24
  STREET LENGTH(FEET) =  2790.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.015
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.94
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   17.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.81
  STREET FLOW TRAVEL TIME(MIN.) =   7.91   Tc(MIN.) =    9.86
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.612
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7024
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.703
  SUBAREA AREA(ACRES) =    9.07      SUBAREA RUNOFF(CFS) =   35.75
  TOTAL AREA(ACRES) =        9.1        PEAK FLOW RATE(CFS) =      35.95

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  21.75
  FLOW VELOCITY(FEET/SEC.) =  6.38   DEPTH*VELOCITY(FT*FT/SEC.) =   3.36
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 2790.0 FT WITH ELEVATION-DROP =  99.5 FT, IS   55.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    702.00
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =    2850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   197.20  DOWNSTREAM(FEET) =   191.00
  FLOW LENGTH(FEET) =    44.24   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.65
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.95
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.89
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    703.00 =    2894.24 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.601
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7034
  SUBAREA AREA(ACRES) =    0.33   SUBAREA RUNOFF(CFS) =    1.31
  TOTAL AREA(ACRES) =        9.4   TOTAL RUNOFF(CFS) =      37.19
  TC(MIN.) =    9.89

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    705.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   187.75  DOWNSTREAM(FEET) =   187.05
  FLOW LENGTH(FEET) =    69.76   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.26
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.19
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.01
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    705.00 =    2964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    705.00 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.) =   10.01
  RAINFALL INTENSITY(INCH/HR) =   5.56
  TOTAL STREAM AREA(ACRES) =     9.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.19

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    707.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    412.00
  DOWNSTREAM ELEVATION(FEET) =    390.00
  ELEVATION DIFFERENCE(FEET) =     22.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.315
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.358
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE    708.00 IS CODE =  51
```



```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    272.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1178.00   CHANNEL SLOPE =  0.1002
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.473
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3292
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.98
  AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   4.93
  Tc(MIN.) =   10.25
  SUBAREA AREA(ACRES) =    12.96       SUBAREA RUNOFF(CFS) =   23.35
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.331
  TOTAL AREA(ACRES) =       13.2         PEAK FLOW RATE(CFS) =      23.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   4.70
  LONGEST FLOWPATH FROM NODE    706.00 TO NODE    708.00 =    1263.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    708.00 TO NODE    709.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.473
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3276
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3292
  SUBAREA AREA(ACRES) =   11.87   SUBAREA RUNOFF(CFS) =   21.28
  TOTAL AREA(ACRES) =       25.0   TOTAL RUNOFF(CFS) =      45.13
  TC(MIN.) =   10.25

****************************************************************************
  FLOW PROCESS FROM NODE    709.00 TO NODE    710.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   251.00  DOWNSTREAM(FEET) =   249.58
  FLOW LENGTH(FEET) =   142.48   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.13
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   10.49
  LONGEST FLOWPATH FROM NODE    706.00 TO NODE    710.00 =    1405.48 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    711.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.391
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3305
  SUBAREA AREA(ACRES) =    1.77   SUBAREA RUNOFF(CFS) =    3.34
  TOTAL AREA(ACRES) =       26.8   TOTAL RUNOFF(CFS) =      47.79
  TC(MIN.) =   10.49

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    712.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   249.58  DOWNSTREAM(FEET) =   248.73
  FLOW LENGTH(FEET) =    84.92   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.86
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.79
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   10.63
  LONGEST FLOWPATH FROM NODE    706.00 TO NODE    712.00 =    1490.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    713.00 TO NODE    712.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.344
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3322
  SUBAREA AREA(ACRES) =    2.57   SUBAREA RUNOFF(CFS) =    4.81
  TOTAL AREA(ACRES) =       29.4   TOTAL RUNOFF(CFS) =      52.18
  TC(MIN.) =   10.63

****************************************************************************
  FLOW PROCESS FROM NODE    712.00 TO NODE    714.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   248.73  DOWNSTREAM(FEET) =   194.00
  FLOW LENGTH(FEET) =  1227.16   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.88
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.18
  PIPE TRAVEL TIME(MIN.) =   1.14    Tc(MIN.) =   11.78
  LONGEST FLOWPATH FROM NODE    706.00 TO NODE    714.00 =    2717.56 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    714.00 TO NODE    705.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   194.00  DOWNSTREAM(FEET) =   187.05
  FLOW LENGTH(FEET) =    92.16   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.68
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.18
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   11.85
```



```
  LONGEST FLOWPATH FROM NODE    706.00 TO NODE    705.00 =    2809.72 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    714.00 TO NODE    705.00 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.) =   11.85
  RAINFALL INTENSITY(INCH/HR) =   4.98
  TOTAL STREAM AREA(ACRES) =    29.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     52.18

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       37.19    10.01        5.556          9.44
      2       52.18    11.85        4.984         29.39

  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       81.28    10.01       5.556
      2       85.54    11.85       4.984

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      85.54   Tc(MIN.) =   11.85
  TOTAL AREA(ACRES) =       38.8
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    705.00 =    2964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    715.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   187.05  DOWNSTREAM(FEET) =   183.00
  FLOW LENGTH(FEET) =    26.15   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.49
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      85.54
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    715.00 =    2990.15 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       38.8  TC(MIN.) =     11.86
  PEAK FLOW RATE(CFS)   =      85.54
================================================================================
================================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 950 - PROPOSED 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S950P100.DAT
  TIME/DATE OF STUDY: 22:38 07/29/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    950.00 TO NODE    951.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    186.50
  DOWNSTREAM ELEVATION(FEET) =    185.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.324
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```



```
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

**************************************************************************
  FLOW PROCESS FROM NODE    951.00 TO NODE    952.00 IS CODE =  61
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  185.50  DOWNSTREAM ELEVATION(FEET) =  176.50
  STREET LENGTH(FEET) =   526.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 62.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  54.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.015
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   2.75   Tc(MIN.) =    5.07
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.615
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.791
  SUBAREA AREA(ACRES) =    2.64      SUBAREA RUNOFF(CFS) =   17.97
  TOTAL AREA(ACRES) =       2.7        PEAK FLOW RATE(CFS) =      18.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.20
  FLOW VELOCITY(FEET/SEC.) =  3.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.61
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    952.00 =     576.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    952.00 TO NODE    953.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   172.48  DOWNSTREAM(FEET) =   167.35
  FLOW LENGTH(FEET) =   172.88   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.90
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.19
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    5.31
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    953.00 =     748.88 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    954.00 TO NODE    953.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.360
  USER-SPECIFIED RUNOFF COEFFICIENT = .7600
```

```
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7879
  SUBAREA AREA(ACRES) =    0.29   SUBAREA RUNOFF(CFS) =    1.84
  TOTAL AREA(ACRES) =       3.0   TOTAL RUNOFF(CFS) =      19.50
  TC(MIN.) =    5.31

****************************************************************************
  FLOW PROCESS FROM NODE    954.00 TO NODE    953.00 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.) =    5.31
  RAINFALL INTENSITY(INCH/HR) =   8.36
  TOTAL STREAM AREA(ACRES) =     2.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.50

****************************************************************************
  FLOW PROCESS FROM NODE    955.00 TO NODE    956.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    175.20
  DOWNSTREAM ELEVATION(FEET) =    174.50
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.046
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    956.00 TO NODE    957.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  174.50  DOWNSTREAM ELEVATION(FEET) =  173.20
  STREET LENGTH(FEET) =   220.00   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) =       1.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.51
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.45
  STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    5.47
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.204
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
```



```
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.78
  TOTAL AREA(ACRES) =       0.3        PEAK FLOW RATE(CFS) =       1.93

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.20
  FLOW VELOCITY(FEET/SEC.) =  1.72   DEPTH*VELOCITY(FT*FT/SEC.) =   0.59
  LONGEST FLOWPATH FROM NODE    955.00 TO NODE    957.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    958.00 TO NODE    957.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.204
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4980
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5199
  SUBAREA AREA(ACRES) =    4.31   SUBAREA RUNOFF(CFS) =   17.61
  TOTAL AREA(ACRES) =       4.6   TOTAL RUNOFF(CFS) =      19.54
  TC(MIN.) =    5.47

****************************************************************************
  FLOW PROCESS FROM NODE    957.00 TO NODE    953.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   169.70  DOWNSTREAM(FEET) =   167.35
  FLOW LENGTH(FEET) =   104.95   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.77
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.54
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    5.63
  LONGEST FLOWPATH FROM NODE    955.00 TO NODE    953.00 =     384.95 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    957.00 TO NODE    953.00 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.) =    5.63
  RAINFALL INTENSITY(INCH/HR) =   8.05
  TOTAL STREAM AREA(ACRES) =     4.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.54

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       19.50     5.31        8.360          2.96
      2       19.54     5.63        8.051          4.58

  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       37.92     5.31       8.360
      2       38.31     5.63       8.051

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      38.31   Tc(MIN.) =    5.63
  TOTAL AREA(ACRES) =        7.5
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    953.00 =     748.88 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.5  TC(MIN.) =      5.63
  PEAK FLOW RATE(CFS)   =      38.31
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 300                                                               *
* PROPOSED CONDITIONS                                                      *
 ****************************************************************************

  FILE NAME: S300P100.DAT
  TIME/DATE OF STUDY: 03:03 05/10/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   12.0      6.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    258.39
  DOWNSTREAM ELEVATION(FEET) =    257.76
  ELEVATION DIFFERENCE(FEET) =      0.63
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.155
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```



```
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    305.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  257.76  DOWNSTREAM ELEVATION(FEET) =  248.39
  STREET LENGTH(FEET) =   727.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.23
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    6.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.15
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
  STREET FLOW TRAVEL TIME(MIN.) =   5.65   Tc(MIN.) =    8.80
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.037
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    2.10
  TOTAL AREA(ACRES) =       0.4        PEAK FLOW RATE(CFS) =       2.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.05
  FLOW VELOCITY(FEET/SEC.) =  2.39   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     787.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.037
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.43   SUBAREA RUNOFF(CFS) =    2.26
  TOTAL AREA(ACRES) =       0.9   TOTAL RUNOFF(CFS) =       4.46
  TC(MIN.) =    8.80

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 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) =   244.00  DOWNSTREAM(FEET) =   242.00
  FLOW LENGTH(FEET) =   119.78   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```

```
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.46
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    9.10
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =     906.78 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.910
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =  91
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8317
  SUBAREA AREA(ACRES) =    0.23   SUBAREA RUNOFF(CFS) =    0.94
  TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       5.31
  TC(MIN.) =    9.10

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   242.00  DOWNSTREAM(FEET) =   241.00
  FLOW LENGTH(FEET) =    18.35   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.88
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.31
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.13
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    317.00 =     925.13 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 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.) =    9.13
  RAINFALL INTENSITY(INCH/HR) =   5.90
  TOTAL STREAM AREA(ACRES) =     1.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.31

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    321.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    690.00
  DOWNSTREAM ELEVATION(FEET) =    660.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.933
  SUBAREA RUNOFF(CFS) =      0.42
```



```
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    660.00  DOWNSTREAM(FEET) =    290.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1630.00   CHANNEL SLOPE =  0.2270
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.349
  USER-SPECIFIED RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =  77
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.72
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   3.52
  Tc(MIN.) =   10.62
  SUBAREA AREA(ACRES) =    20.25       SUBAREA RUNOFF(CFS) =   27.08
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.250
  TOTAL AREA(ACRES) =       20.5         PEAK FLOW RATE(CFS) =      27.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   9.57
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    322.00 =    1730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    312.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    290.00  DOWNSTREAM(FEET) =    254.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   324.00   CHANNEL SLOPE =  0.1111
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.129
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.56
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   0.71
  Tc(MIN.) =   11.33
  SUBAREA AREA(ACRES) =     2.49       SUBAREA RUNOFF(CFS) =    3.83
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.255
  TOTAL AREA(ACRES) =       23.0         PEAK FLOW RATE(CFS) =      30.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.66   FLOW VELOCITY(FEET/SEC.) =   7.61
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    312.00 =    2054.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    313.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   244.00  DOWNSTREAM(FEET) =   241.79
  FLOW LENGTH(FEET) =   247.94   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.54
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      30.10
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.82
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    313.00 =    2301.94 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    313.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.992
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2578
  SUBAREA AREA(ACRES) =    1.27   SUBAREA RUNOFF(CFS) =    1.90
  TOTAL AREA(ACRES) =       24.2   TOTAL RUNOFF(CFS) =      31.20
  TC(MIN.) =   11.82

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    317.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   241.79  DOWNSTREAM(FEET) =   241.00
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.01
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.20
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.96
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    317.00 =    2380.94 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    317.00 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.) =   11.96
  RAINFALL INTENSITY(INCH/HR) =   4.95
  TOTAL STREAM AREA(ACRES) =    24.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.31     9.13        5.898          1.08
      2       31.20    11.96        4.953         24.25

  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       29.11     9.13       5.898
      2       35.66    11.96       4.953

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      35.66   Tc(MIN.) =   11.96
  TOTAL AREA(ACRES) =       25.3
```



```
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    317.00 =    2380.94 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    318.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   241.00  DOWNSTREAM(FEET) =   230.00
  FLOW LENGTH(FEET) =   162.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.86
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.66
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.11
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    318.00 =    2543.74 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    318.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    331.00 TO NODE    332.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    630.00
  DOWNSTREAM ELEVATION(FEET) =    624.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.925
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.460
  SUBAREA RUNOFF(CFS) =      0.66
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    333.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    624.00  DOWNSTREAM(FEET) =    246.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2590.00   CHANNEL SLOPE =  0.1459
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.656
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.32
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.24
  AVERAGE FLOW DEPTH(FEET) =   0.57   TRAVEL TIME(MIN.) =   5.24
  Tc(MIN.) =   13.17
  SUBAREA AREA(ACRES) =    45.76       SUBAREA RUNOFF(CFS) =   59.66
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.280
  TOTAL AREA(ACRES) =       46.1         PEAK FLOW RATE(CFS) =      60.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.81   FLOW VELOCITY(FEET/SEC.) =  10.06
```

```
  LONGEST FLOWPATH FROM NODE    331.00 TO NODE    333.00 =    2690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   243.00  DOWNSTREAM(FEET) =   242.62
  FLOW LENGTH(FEET) =    38.84   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.34
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.13
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   13.23
  LONGEST FLOWPATH FROM NODE    331.00 TO NODE    330.00 =    2728.84 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    334.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.642
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2821
  SUBAREA AREA(ACRES) =    4.89   SUBAREA RUNOFF(CFS) =    6.81
  TOTAL AREA(ACRES) =       51.0   TOTAL RUNOFF(CFS) =      66.76
  TC(MIN.) =   13.23

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    337.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   242.61  DOWNSTREAM(FEET) =   241.65
  FLOW LENGTH(FEET) =   121.71   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.79
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      66.76
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   13.44
  LONGEST FLOWPATH FROM NODE    331.00 TO NODE    337.00 =    2850.55 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    337.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.596
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2832
  SUBAREA AREA(ACRES) =    3.40   SUBAREA RUNOFF(CFS) =    4.69
  TOTAL AREA(ACRES) =       54.4   TOTAL RUNOFF(CFS) =      70.78
  TC(MIN.) =   13.44

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    318.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   241.65  DOWNSTREAM(FEET) =   230.00
  FLOW LENGTH(FEET) =   142.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.22
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      70.78
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   13.53
  LONGEST FLOWPATH FROM NODE    331.00 TO NODE    318.00 =    2993.15 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    318.00 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       70.78    13.53       4.574       54.39
  LONGEST FLOWPATH FROM NODE    331.00 TO NODE    318.00 =    2993.15 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       35.66    12.11       4.915       25.33
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    318.00 =    2543.74 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      98.98      12.11        4.915
      2     103.97      13.53        4.574

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     103.97   Tc(MIN.) =   13.53
  TOTAL AREA(ACRES) =       79.7

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    319.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    230.00  DOWNSTREAM(FEET) =    218.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   497.00   CHANNEL SLOPE =  0.0241
  CHANNEL BASE(FEET) =  100.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.128
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     113.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.55
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   2.33
  Tc(MIN.) =   15.87
  SUBAREA AREA(ACRES) =     6.88       SUBAREA RUNOFF(CFS) =   19.60
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.315
  TOTAL AREA(ACRES) =       86.6         PEAK FLOW RATE(CFS) =     112.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE    331.00 TO NODE    319.00 =    3490.15 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    340.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    218.00  DOWNSTREAM(FEET) =    210.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1180.00   CHANNEL SLOPE =  0.0068
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.557
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     127.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.77
  AVERAGE FLOW DEPTH(FEET) =   1.75   TRAVEL TIME(MIN.) =   4.12
  Tc(MIN.) =   19.99
  SUBAREA AREA(ACRES) =    25.38       SUBAREA RUNOFF(CFS) =   29.79
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.319
  TOTAL AREA(ACRES) =      112.0         PEAK FLOW RATE(CFS) =     126.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.74   FLOW VELOCITY(FEET/SEC.) =   4.78
  LONGEST FLOWPATH FROM NODE    331.00 TO NODE    340.00 =    4670.15 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      112.0  TC(MIN.) =     19.99
  PEAK FLOW RATE(CFS)   =     126.89
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                         Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                *
* SYSTEM 400                                                             *
* PROPOSED CONDITIONS 100 YEAR                                           *
 ************************************************************************

  FILE NAME: S400P100.DAT
  TIME/DATE OF STUDY: 11:03 05/16/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   12.0      6.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   30.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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    425.00 TO NODE    426.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    420.00
  DOWNSTREAM ELEVATION(FEET) =    410.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.45

**************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    427.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    275.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2138.00   CHANNEL SLOPE =  0.0631
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.735
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      50.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.80
  AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   6.14
  Tc(MIN.) =   12.83
  SUBAREA AREA(ACRES) =    67.68       SUBAREA RUNOFF(CFS) =   96.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =       67.9         PEAK FLOW RATE(CFS) =      96.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.89   FLOW VELOCITY(FEET/SEC.) =   7.07
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    427.00 =    2238.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    402.00 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) =   250.06
  FLOW LENGTH(FEET) =   489.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.89
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.44
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   13.20
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    402.00 =    2727.80 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.649
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    1.95
  TOTAL AREA(ACRES) =       69.3   TOTAL RUNOFF(CFS) =      96.63
  TC(MIN.) =   13.20

**************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   250.06  DOWNSTREAM(FEET) =   248.19
  FLOW LENGTH(FEET) =   124.51   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.55
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.63
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.35
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    403.00 =    2852.31 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    403.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.614
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
  SUBAREA AREA(ACRES) =    4.22   SUBAREA RUNOFF(CFS) =    5.84
  TOTAL AREA(ACRES) =       73.5   TOTAL RUNOFF(CFS) =     101.75
  TC(MIN.) =   13.35

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    405.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   248.19  DOWNSTREAM(FEET) =   236.75
  FLOW LENGTH(FEET) =   142.94   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.07
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     101.75
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.44
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    405.00 =    2995.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    405.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    407.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    249.90
  DOWNSTREAM ELEVATION(FEET) =    249.50
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.153
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE    407.00 TO NODE    408.00 IS CODE =  62
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  249.50  DOWNSTREAM ELEVATION(FEET) =  243.75
  STREET LENGTH(FEET) =   722.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =       2.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =    9.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.97
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   6.12   Tc(MIN.) =    9.27
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.838
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.786
  SUBAREA AREA(ACRES) =    0.73      SUBAREA RUNOFF(CFS) =    3.32
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       3.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE    406.00 TO NODE    408.00 =     772.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    408.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.838
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6187
  SUBAREA AREA(ACRES) =    0.94   SUBAREA RUNOFF(CFS) =    2.63
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       6.21
  TC(MIN.) =    9.27

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    408.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.838
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5728
  SUBAREA AREA(ACRES) =    0.85   SUBAREA RUNOFF(CFS) =    2.38
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       8.59
  TC(MIN.) =    9.27

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    408.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.838
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5462
  SUBAREA AREA(ACRES) =    1.03   SUBAREA RUNOFF(CFS) =    2.89
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =      11.48
  TC(MIN.) =    9.27

************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    408.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.27
  RAINFALL INTENSITY(INCH/HR) =   5.84
  TOTAL STREAM AREA(ACRES) =     3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.48

************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    417.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    249.90
  DOWNSTREAM ELEVATION(FEET) =    249.50
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.169
  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) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.37

************************************************************************
  FLOW PROCESS FROM NODE    417.00 TO NODE    409.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  249.50  DOWNSTREAM ELEVATION(FEET) =  243.75
  STREET LENGTH(FEET) =   722.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =       2.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.17
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.68
  STREET FLOW TRAVEL TIME(MIN.) =   6.08   Tc(MIN.) =   10.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.472
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.783
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.59
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE    416.00 TO NODE    409.00 =     822.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    418.00 TO NODE    409.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.472
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5416
  SUBAREA AREA(ACRES) =    3.49   SUBAREA RUNOFF(CFS) =    9.17
  TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =      12.98
  TC(MIN.) =   10.25

************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    408.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   240.00  DOWNSTREAM(FEET) =   239.50
  FLOW LENGTH(FEET) =    24.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.98
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   10.29
  LONGEST FLOWPATH FROM NODE    416.00 TO NODE    408.00 =     846.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    408.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.29
  RAINFALL INTENSITY(INCH/HR) =   5.46
  TOTAL STREAM AREA(ACRES) =     4.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.98

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

```
      1       11.48     9.27        5.838          3.60
      2       12.98    10.29        5.458          4.38

  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       23.18     9.27       5.838
      2       23.71    10.29       5.458

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.71   Tc(MIN.) =   10.29
  TOTAL AREA(ACRES) =        8.0
  LONGEST FLOWPATH FROM NODE    416.00 TO NODE    408.00 =     846.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   239.50  DOWNSTREAM(FEET) =   239.00
  FLOW LENGTH(FEET) =    13.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.93
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.71
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   10.31
  LONGEST FLOWPATH FROM NODE    416.00 TO NODE    410.00 =     859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.452
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =  91
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5499
  SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    1.32
  TOTAL AREA(ACRES) =        8.3   TOTAL RUNOFF(CFS) =      24.97
  TC(MIN.) =   10.31

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    405.00 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       24.97    10.31       5.452        8.33
  LONGEST FLOWPATH FROM NODE    416.00 TO NODE    405.00 =     859.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      101.75    13.44       4.594       73.51
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    405.00 =    2995.25 FEET.
```



```
  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      102.99     10.31       5.452
      2      122.80     13.44       4.594

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     122.80   Tc(MIN.) =   13.44
  TOTAL AREA(ACRES) =       81.8

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    411.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   236.75  DOWNSTREAM(FEET) =   230.00
  FLOW LENGTH(FEET) =   198.43   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.99
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     122.80
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    411.00 =    3193.68 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    230.00  DOWNSTREAM(FEET) =    211.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1166.00   CHANNEL SLOPE =  0.0163
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.857
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3510
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     142.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.84
  AVERAGE FLOW DEPTH(FEET) =   1.53   TRAVEL TIME(MIN.) =   4.02
  Tc(MIN.) =   17.63
  SUBAREA AREA(ACRES) =    28.38       SUBAREA RUNOFF(CFS) =   38.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.332
  TOTAL AREA(ACRES) =      110.2          PEAK FLOW RATE(CFS) =     141.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.53   FLOW VELOCITY(FEET/SEC.) =   4.82
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    412.00 =    4359.68 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      110.2  TC(MIN.) =     17.63
  PEAK FLOW RATE(CFS)   =     141.16
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 430                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S430P100.DAT
  TIME/DATE OF STUDY: 10:17 05/16/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   12.0      6.0    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    430.00 TO NODE    431.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    420.00
  DOWNSTREAM ELEVATION(FEET) =    384.00
  ELEVATION DIFFERENCE(FEET) =     36.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
```



```
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    432.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    384.00  DOWNSTREAM(FEET) =    316.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00   CHANNEL SLOPE =  0.1789
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.248
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.81
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   1.66
  Tc(MIN.) =    8.35
  SUBAREA AREA(ACRES) =     0.79       SUBAREA RUNOFF(CFS) =    1.48
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       1.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   4.45
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    432.00 =     480.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    432.00 TO NODE    433.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    316.00  DOWNSTREAM(FEET) =    284.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.50   CHANNEL SLOPE =  0.0517
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.640
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.572
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.32
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.37
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   1.62
  Tc(MIN.) =    9.97
  SUBAREA AREA(ACRES) =     0.51       SUBAREA RUNOFF(CFS) =    0.85
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       2.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   6.66
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    433.00 =    1099.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    433.00 TO NODE    434.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   284.00  DOWNSTREAM(FEET) =   280.00
  FLOW LENGTH(FEET) =    27.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.54
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   10.00
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    434.00 =    1127.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    435.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    280.00  DOWNSTREAM(FEET) =    266.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   226.00   CHANNEL SLOPE =  0.0619
  CHANNEL BASE(FEET) =    1.72   "Z" FACTOR =   0.640
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.54
  FLOW VELOCITY(FEET/SEC.) =   7.35   FLOW DEPTH(FEET) =   0.19
  TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    435.00 =    1353.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    435.00 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.) =   10.52
  RAINFALL INTENSITY(INCH/HR) =   5.38
  TOTAL STREAM AREA(ACRES) =     1.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.54

****************************************************************************
  FLOW PROCESS FROM NODE    436.00 TO NODE    437.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    420.00
  DOWNSTREAM ELEVATION(FEET) =    392.00
  ELEVATION DIFFERENCE(FEET) =     28.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    435.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    392.00  DOWNSTREAM(FEET) =    266.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1054.00   CHANNEL SLOPE =  0.1195
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.396
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
```



```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.63
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   3.79
  Tc(MIN.) =   10.47
  SUBAREA AREA(ACRES) =     5.78       SUBAREA RUNOFF(CFS) =    9.36
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        6.0         PEAK FLOW RATE(CFS) =       9.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   5.75
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    435.00 =    1154.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    435.00 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.) =   10.47
  RAINFALL INTENSITY(INCH/HR) =   5.40
  TOTAL STREAM AREA(ACRES) =     5.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.63

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.54    10.52        5.383          1.52
      2        9.63    10.47        5.396          5.95

  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       12.16    10.47        5.396
      2       12.15    10.52        5.383

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.16   Tc(MIN.) =   10.47
  TOTAL AREA(ACRES) =        7.5
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    435.00 =    1353.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    435.00 TO NODE    437.00 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) =   265.00
  FLOW LENGTH(FEET) =    52.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.16
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   10.57
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    437.00 =    1405.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    438.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    265.00  DOWNSTREAM(FEET) =    254.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   214.00   CHANNEL SLOPE =  0.0514
  CHANNEL BASE(FEET) =    1.72   "Z" FACTOR =   0.640
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.267
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.69
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =   10.88
  SUBAREA AREA(ACRES) =     1.27       SUBAREA RUNOFF(CFS) =    2.01
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        8.7         PEAK FLOW RATE(CFS) =      13.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =  11.82
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    438.00 =    1619.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    438.00 TO NODE    439.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.00  DOWNSTREAM(FEET) =   237.00
  FLOW LENGTH(FEET) =   225.61   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.81
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   11.11
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    439.00 =    1844.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    438.00 TO NODE    439.00 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.) =   11.11
  RAINFALL INTENSITY(INCH/HR) =   5.19
  TOTAL STREAM AREA(ACRES) =     8.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.81

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    441.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    386.00
  DOWNSTREAM ELEVATION(FEET) =    366.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.933
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    441.00 TO NODE    442.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    366.00  DOWNSTREAM(FEET) =    270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.00   CHANNEL SLOPE =  0.1178
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.454
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.24
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   3.20
  Tc(MIN.) =   10.30
  SUBAREA AREA(ACRES) =     4.46       SUBAREA RUNOFF(CFS) =    7.30
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.297
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       7.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   5.33
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    442.00 =     915.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    442.00 TO NODE    439.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   265.00  DOWNSTREAM(FEET) =   237.00
  FLOW LENGTH(FEET) =    76.40   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.) =  23.82
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.63
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.36
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    439.00 =     991.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    442.00 TO NODE    439.00 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.) =   10.36
  RAINFALL INTENSITY(INCH/HR) =   5.44
  TOTAL STREAM AREA(ACRES) =     4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.63

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       13.81    11.11        5.194          8.74
      2        7.63    10.36        5.436          4.70
```

```
  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       20.82    10.36       5.436
      2       21.09    11.11       5.194

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.09   Tc(MIN.) =   11.11
  TOTAL AREA(ACRES) =       13.4
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    439.00 =    1844.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    439.00 TO NODE    443.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   237.00  DOWNSTREAM(FEET) =   232.00
  FLOW LENGTH(FEET) =   141.29   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.17
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.09
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   11.29
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    443.00 =    1986.15 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    444.00 TO NODE    443.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.141
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2992
  SUBAREA AREA(ACRES) =    2.25   SUBAREA RUNOFF(CFS) =    3.47
  TOTAL AREA(ACRES) =       15.7   TOTAL RUNOFF(CFS) =      24.14
  TC(MIN.) =   11.29

****************************************************************************
  FLOW PROCESS FROM NODE    443.00 TO NODE    445.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   231.00  DOWNSTREAM(FEET) =   225.50
  FLOW LENGTH(FEET) =   349.64   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.92
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.14
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   11.88
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    445.00 =    2335.79 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    443.00 TO NODE    445.00 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.) =   11.88
  RAINFALL INTENSITY(INCH/HR) =   4.98
  TOTAL STREAM AREA(ACRES) =    15.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.14

****************************************************************************
  FLOW PROCESS FROM NODE    446.00 TO NODE    447.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    84.00
  UPSTREAM ELEVATION(FEET) =    266.00
  DOWNSTREAM ELEVATION(FEET) =    258.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.227
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.547
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    447.00 TO NODE    448.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    256.00  DOWNSTREAM(FEET) =    242.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE =  0.0642
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.823
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.44
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   1.05
  Tc(MIN.) =    7.28
  SUBAREA AREA(ACRES) =     1.26       SUBAREA RUNOFF(CFS) =    2.58
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   4.08
  LONGEST FLOWPATH FROM NODE    446.00 TO NODE    448.00 =     302.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    448.00 TO NODE    449.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   242.00  DOWNSTREAM(FEET) =   234.00
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.76
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    7.68
  LONGEST FLOWPATH FROM NODE    446.00 TO NODE    449.00 =     496.00 FEET.
```

```
**************************************************************************
  FLOW PROCESS FROM NODE    449.00 TO NODE    450.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.594
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
  SUBAREA AREA(ACRES) =    2.53   SUBAREA RUNOFF(CFS) =    5.00
  TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =       7.68
  TC(MIN.) =    7.68

**************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    445.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   226.00  DOWNSTREAM(FEET) =   225.50
  FLOW LENGTH(FEET) =    35.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.26
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.68
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.76
  LONGEST FLOWPATH FROM NODE    446.00 TO NODE    445.00 =     531.70 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    445.00 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.) =    7.76
  RAINFALL INTENSITY(INCH/HR) =   6.55
  TOTAL STREAM AREA(ACRES) =     3.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.68

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       24.14    11.88        4.975         15.69
      2        7.68     7.76        6.549          3.88

  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       26.01     7.76       6.549
      2       29.97    11.88       4.975

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      29.97   Tc(MIN.) =   11.88
  TOTAL AREA(ACRES) =       19.6
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    445.00 =    2335.79 FEET.

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



```
  FLOW PROCESS FROM NODE    445.00 TO NODE    446.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   225.49  DOWNSTREAM(FEET) =   221.00
  FLOW LENGTH(FEET) =   262.84   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.92
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.97
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   12.28
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    446.00 =    2598.63 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    445.00 TO NODE    446.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.28
  RAINFALL INTENSITY(INCH/HR) =   4.87
  TOTAL STREAM AREA(ACRES) =    19.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.97

**************************************************************************
  FLOW PROCESS FROM NODE    468.00 TO NODE    446.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.60   RAIN INTENSITY(INCH/HOUR) =  5.36
  TOTAL AREA(ACRES) =     9.30   TOTAL RUNOFF(CFS) =     25.65

**************************************************************************
  FLOW PROCESS FROM NODE    468.00 TO NODE    446.00 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.) =   10.60
  RAINFALL INTENSITY(INCH/HR) =   5.36
  TOTAL STREAM AREA(ACRES) =     9.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.65

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       29.97    12.28        4.870         19.57
      2       25.65    10.60        5.355          9.30

  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       52.90    10.60       5.355
      2       53.29    12.28       4.870
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      53.29   Tc(MIN.) =   12.28
  TOTAL AREA(ACRES) =       28.9
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    446.00 =    2598.63 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    446.00 TO NODE    447.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   221.00  DOWNSTREAM(FEET) =   220.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.89
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.29
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.38
  LONGEST FLOWPATH FROM NODE    430.00 TO NODE    447.00 =    2665.63 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    447.00 TO NODE    447.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.846
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3614
  SUBAREA AREA(ACRES) =    3.51   SUBAREA RUNOFF(CFS) =    5.10
  TOTAL AREA(ACRES) =       32.4   TOTAL RUNOFF(CFS) =      56.71
  TC(MIN.) =   12.38
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       32.4  TC(MIN.) =     12.38
  PEAK FLOW RATE(CFS)   =      56.71
============================================================================
============================================================================
  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. 18.2 Release Date: 05/08/2012  License ID 1509

                           Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYTEM 455                                                                *
* PROPOSED 100 YEAR STORM EVENT                                            *
 ****************************************************************************

  FILE NAME: S455P100.DAT
  TIME/DATE OF STUDY: 10:16 05/16/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   12.0      6.0    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    451.00 TO NODE    452.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    310.00
  DOWNSTREAM ELEVATION(FEET) =    300.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.180
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.498
```



```
  SUBAREA RUNOFF(CFS) =      1.02
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      1.02

****************************************************************************
  FLOW PROCESS FROM NODE    452.00 TO NODE    453.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  300.00  DOWNSTREAM ELEVATION(FEET) =  253.00
  STREET LENGTH(FEET) =   800.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.08
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.32
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
  STREET FLOW TRAVEL TIME(MIN.) =   2.51   Tc(MIN.) =    7.69
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.588
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.480
  SUBAREA AREA(ACRES) =    3.03      SUBAREA RUNOFF(CFS) =    9.58
  TOTAL AREA(ACRES) =       3.3        PEAK FLOW RATE(CFS) =      10.37

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  5.81   DEPTH*VELOCITY(FT*FT/SEC.) =   2.19
  LONGEST FLOWPATH FROM NODE    451.00 TO NODE    453.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    453.00 TO NODE    454.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   249.00  DOWNSTREAM(FEET) =   248.50
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.59
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.37
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.71
  LONGEST FLOWPATH FROM NODE    451.00 TO NODE    454.00 =     916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    455.00 TO NODE    454.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.574
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4800
  SUBAREA AREA(ACRES) =    2.71   SUBAREA RUNOFF(CFS) =    8.55
  TOTAL AREA(ACRES) =        6.0   TOTAL RUNOFF(CFS) =      18.90
  TC(MIN.) =    7.71

****************************************************************************
  FLOW PROCESS FROM NODE    454.00 TO NODE    456.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   249.00  DOWNSTREAM(FEET) =   231.10
  FLOW LENGTH(FEET) =   456.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.04
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.90
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =    8.30
  LONGEST FLOWPATH FROM NODE    451.00 TO NODE    456.00 =    1372.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    454.00 TO NODE    456.00 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.) =    8.30
  RAINFALL INTENSITY(INCH/HR) =   6.27
  TOTAL STREAM AREA(ACRES) =     5.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.90

****************************************************************************
  FLOW PROCESS FROM NODE    457.00 TO NODE    458.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    74.20
  UPSTREAM ELEVATION(FEET) =    253.00
  DOWNSTREAM ELEVATION(FEET) =    248.50
  ELEVATION DIFFERENCE(FEET) =      4.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.272
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.403
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    458.00 TO NODE    458.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  248.50  DOWNSTREAM ELEVATION(FEET) =  235.00
  STREET LENGTH(FEET) =   378.40   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =       0.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.81
  STREET FLOW TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =    6.81
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.124
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  80
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.453
  SUBAREA AREA(ACRES) =    0.47      SUBAREA RUNOFF(CFS) =    1.51
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       1.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   5.66
  FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE    457.00 TO NODE    458.00 =     452.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    459.00 TO NODE    458.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.124
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4736
  SUBAREA AREA(ACRES) =    1.68   SUBAREA RUNOFF(CFS) =    5.74
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       7.42
  TC(MIN.) =    6.81

****************************************************************************
  FLOW PROCESS FROM NODE    458.00 TO NODE    456.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   231.00  DOWNSTREAM(FEET) =   230.50
  FLOW LENGTH(FEET) =    16.25   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.42
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.84
  LONGEST FLOWPATH FROM NODE    457.00 TO NODE    456.00 =     468.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    456.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.105
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4758
```

```
  SUBAREA AREA(ACRES) =    1.14   SUBAREA RUNOFF(CFS) =    3.89
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =      11.29
  TC(MIN.) =    6.84

****************************************************************************
  FLOW PROCESS FROM NODE    456.00 TO NODE    461.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   230.50  DOWNSTREAM(FEET) =   227.10
  FLOW LENGTH(FEET) =   339.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.29
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =    7.64
  LONGEST FLOWPATH FROM NODE    457.00 TO NODE    461.00 =     808.45 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    456.00 TO NODE    461.00 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.) =    7.64
  RAINFALL INTENSITY(INCH/HR) =   6.61
  TOTAL STREAM AREA(ACRES) =     3.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.29

****************************************************************************
  FLOW PROCESS FROM NODE    462.00 TO NODE    463.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    260.00
  DOWNSTREAM ELEVATION(FEET) =    244.00
  ELEVATION DIFFERENCE(FEET) =     16.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.180
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.498
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.49

****************************************************************************
  FLOW PROCESS FROM NODE    463.00 TO NODE    469.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  245.00  DOWNSTREAM ELEVATION(FEET) =  231.00
  STREET LENGTH(FEET) =   720.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   4.63   Tc(MIN.) =    9.81
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.628
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =  90
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    1.13      SUBAREA RUNOFF(CFS) =    4.39
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       4.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.39
  FLOW VELOCITY(FEET/SEC.) =  2.86   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
  LONGEST FLOWPATH FROM NODE    462.00 TO NODE    469.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    464.00 TO NODE    469.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.628
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5615
  SUBAREA AREA(ACRES) =    1.66   SUBAREA RUNOFF(CFS) =    4.48
  TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =       9.20
  TC(MIN.) =    9.81

****************************************************************************
  FLOW PROCESS FROM NODE    469.00 TO NODE    461.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   227.00  DOWNSTREAM(FEET) =   226.50
  FLOW LENGTH(FEET) =    10.75   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.20
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    9.83
  LONGEST FLOWPATH FROM NODE    462.00 TO NODE    461.00 =     830.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    469.00 TO NODE    461.00 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.) =    9.83
  RAINFALL INTENSITY(INCH/HR) =   5.62
  TOTAL STREAM AREA(ACRES) =     2.91
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.29     7.64        6.612          3.34
      2        9.20     9.83        5.622          2.91

  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       18.44     7.64        6.612
      2       18.80     9.83        5.622

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      18.80   Tc(MIN.) =    9.83
  TOTAL AREA(ACRES) =        6.2
  LONGEST FLOWPATH FROM NODE    451.00 TO NODE    461.00 =    1372.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    461.00 TO NODE    470.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   226.50  DOWNSTREAM(FEET) =   226.00
  FLOW LENGTH(FEET) =    10.75   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.80
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    9.84
  LONGEST FLOWPATH FROM NODE    451.00 TO NODE    470.00 =    1382.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    466.00 TO NODE    470.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.617
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5545
  SUBAREA AREA(ACRES) =    0.85   SUBAREA RUNOFF(CFS) =    4.01
  TOTAL AREA(ACRES) =        7.1   TOTAL RUNOFF(CFS) =      22.12
  TC(MIN.) =    9.84

****************************************************************************
  FLOW PROCESS FROM NODE    465.00 TO NODE    470.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.617
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =  81
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5452
  SUBAREA AREA(ACRES) =    1.02   SUBAREA RUNOFF(CFS) =    2.75
  TOTAL AREA(ACRES) =        8.1   TOTAL RUNOFF(CFS) =      24.87
  TC(MIN.) =    9.84
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    470.00 TO NODE    467.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   226.00  DOWNSTREAM(FEET) =   223.00
  FLOW LENGTH(FEET) =    23.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.45
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.87
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    9.86
  LONGEST FLOWPATH FROM NODE    451.00 TO NODE    467.00 =    1405.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    432.00 TO NODE    433.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    316.00  DOWNSTREAM(FEET) =    284.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.50   CHANNEL SLOPE =  0.0517
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.640
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.355
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.91
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   0.74
  Tc(MIN.) =   10.60
  SUBAREA AREA(ACRES) =     0.51       SUBAREA RUNOFF(CFS) =    0.82
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.531
  TOTAL AREA(ACRES) =        8.6         PEAK FLOW RATE(CFS) =      24.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =  13.82
  LONGEST FLOWPATH FROM NODE    451.00 TO NODE    433.00 =    2025.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    467.00 TO NODE    468.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.355
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5134
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.12
  TOTAL AREA(ACRES) =        9.3   TOTAL RUNOFF(CFS) =      25.65
  TC(MIN.) =   10.60
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        9.3  TC(MIN.) =     10.60
  PEAK FLOW RATE(CFS)   =      25.65
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                      2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 18.2 Release Date: 05/08/2012  License ID 1509

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 550 - EXISTING 100 YR                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: S550P100.DAT
  TIME/DATE OF STUDY: 16:47 05/20/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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    550.00 TO NODE    551.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3460
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    728.00
  DOWNSTREAM ELEVATION(FEET) =    700.00
  ELEVATION DIFFERENCE(FEET) =     28.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.300
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.490
  SUBAREA RUNOFF(CFS) =      0.65
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.65

**************************************************************************
  FLOW PROCESS FROM NODE    551.00 TO NODE    560.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    247.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3284.00   CHANNEL SLOPE =  0.1379
  CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.575
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      70.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.57
  AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   7.23
  Tc(MIN.) =   13.53
  SUBAREA AREA(ACRES) =    81.48       SUBAREA RUNOFF(CFS) =  134.21
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.360
  TOTAL AREA(ACRES) =       81.7         PEAK FLOW RATE(CFS) =     134.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.44   FLOW VELOCITY(FEET/SEC.) =   9.08
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    560.00 =    3384.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    559.00 TO NODE    560.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.575
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3910
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3726
  SUBAREA AREA(ACRES) =   56.11   SUBAREA RUNOFF(CFS) =  100.38
  TOTAL AREA(ACRES) =      137.8   TOTAL RUNOFF(CFS) =     234.98
  TC(MIN.) =   13.53

**************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    570.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    247.00  DOWNSTREAM(FEET) =    225.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1175.00   CHANNEL SLOPE =  0.0187
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.671
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3780
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     258.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.56
  AVERAGE FLOW DEPTH(FEET) =   2.62   TRAVEL TIME(MIN.) =   5.50
  Tc(MIN.) =   19.03
  SUBAREA AREA(ACRES) =    34.26       SUBAREA RUNOFF(CFS) =   47.55
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.374
  TOTAL AREA(ACRES) =      172.1         PEAK FLOW RATE(CFS) =     236.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.51   FLOW VELOCITY(FEET/SEC.) =   3.47
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    570.00 =    4559.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      172.1  TC(MIN.) =     19.03
  PEAK FLOW RATE(CFS)   =     236.11
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 18.2 Release Date: 05/08/2012  License ID 1509

                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 600                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S600P100.DAT
  TIME/DATE OF STUDY: 19:01 11/27/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   12.0      6.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    240.37
  DOWNSTREAM ELEVATION(FEET) =    239.76
  ELEVATION DIFFERENCE(FEET) =      0.61
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.285
```



```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    57.43
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    602.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  239.76  DOWNSTREAM ELEVATION(FEET) =  236.46
  STREET LENGTH(FEET) =   468.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =       0.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    6.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.63
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.46
  STREET FLOW TRAVEL TIME(MIN.) =   4.80   Tc(MIN.) =    8.08
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.380
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.27      SUBAREA RUNOFF(CFS) =    1.50
  TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =       1.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.14
  FLOW VELOCITY(FEET/SEC.) =  1.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.58
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    602.00 =     538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    603.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   232.00  DOWNSTREAM(FEET) =   231.50
  FLOW LENGTH(FEET) =     4.00   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.) =  10.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.67
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    8.09
```

```
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    603.00 =     542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    603.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.377
  USER-SPECIFIED RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7174
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    1.49
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       3.16
  TC(MIN.) =    8.09

****************************************************************************
  FLOW PROCESS FROM NODE    603.00 TO NODE    605.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   231.50  DOWNSTREAM(FEET) =   227.00
  FLOW LENGTH(FEET) =   155.21   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.16
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    8.43
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    605.00 =     697.21 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    606.00 TO NODE    605.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.207
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7482
  SUBAREA AREA(ACRES) =    0.67   SUBAREA RUNOFF(CFS) =    3.24
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       6.32
  TC(MIN.) =    8.43

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    607.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.207
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =  91
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7395
  SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    1.03
  TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       7.34
  TC(MIN.) =    8.43

****************************************************************************
  FLOW PROCESS FROM NODE    607.00 TO NODE    608.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   227.00  DOWNSTREAM(FEET) =   226.00
  FLOW LENGTH(FEET) =    35.85   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.) =   9.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.34
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.50
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    608.00 =     733.06 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.6  TC(MIN.) =      8.50
  PEAK FLOW RATE(CFS)   =       7.34
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 613                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S613P100.DAT
  TIME/DATE OF STUDY: 07:32 05/24/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    613.00 TO NODE    614.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    262.00
  DOWNSTREAM ELEVATION(FEET) =    240.00
  ELEVATION DIFFERENCE(FEET) =     22.00
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.765
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.932
  SUBAREA RUNOFF(CFS) =      1.63
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.63

****************************************************************************
  FLOW PROCESS FROM NODE    614.00 TO NODE    615.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    440.00  DOWNSTREAM(FEET) =    228.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1015.00   CHANNEL SLOPE =  0.2089
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.102
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  15.71
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   1.08
  Tc(MIN.) =    6.84
  SUBAREA AREA(ACRES) =    15.30       SUBAREA RUNOFF(CFS) =   43.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.400
  TOTAL AREA(ACRES) =       15.8         PEAK FLOW RATE(CFS) =      44.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.57   FLOW VELOCITY(FEET/SEC.) =  19.15
  LONGEST FLOWPATH FROM NODE    613.00 TO NODE    615.00 =    1115.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    615.00 TO NODE    616.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.102
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3975
  SUBAREA AREA(ACRES) =    2.54   SUBAREA RUNOFF(CFS) =    6.86
  TOTAL AREA(ACRES) =       18.3   TOTAL RUNOFF(CFS) =      51.78
  TC(MIN.) =    6.84
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       18.3  TC(MIN.) =      6.84
  PEAK FLOW RATE(CFS)   =      51.78
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                *
* SYSTEM 635                                                             *
* PROPOSED CONDITIONS 100 YEAR                                           *
 ************************************************************************

  FILE NAME: S635P100.DAT
  TIME/DATE OF STUDY: 18:21 11/27/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    635.00 TO NODE    636.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    530.00
  DOWNSTREAM ELEVATION(FEET) =    490.00
  ELEVATION DIFFERENCE(FEET) =     40.00
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.52

**************************************************************************
  FLOW PROCESS FROM NODE    636.00 TO NODE    637.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    228.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   872.00   CHANNEL SLOPE =  0.3005
  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) =  6.066
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.08
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   2.05
  Tc(MIN.) =    8.74
  SUBAREA AREA(ACRES) =    10.72       SUBAREA RUNOFF(CFS) =   19.51
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =       11.0         PEAK FLOW RATE(CFS) =      19.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   8.99
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    637.00 =     972.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    637.00 TO NODE    638.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   228.00  DOWNSTREAM(FEET) =   225.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.19
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.95
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.87
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    638.00 =    1072.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    638.00 TO NODE    638.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.006
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3053
  SUBAREA AREA(ACRES) =    0.77   SUBAREA RUNOFF(CFS) =    1.76
  TOTAL AREA(ACRES) =       11.7   TOTAL RUNOFF(CFS) =      21.50
  TC(MIN.) =    8.87
==========================================================================
```

```
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       11.7  TC(MIN.) =      8.87
  PEAK FLOW RATE(CFS)   =      21.50
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                *
* SYSTEM 639                                                             *
* PROPOSED CONDITIONS 100 YEAR                                           *
 ************************************************************************

  FILE NAME: S639P100.DAT
  TIME/DATE OF STUDY: 02:34 05/11/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    639.00 TO NODE    640.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    540.00
  DOWNSTREAM ELEVATION(FEET) =    460.00
  ELEVATION DIFFERENCE(FEET) =     80.00
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
  SUBAREA RUNOFF(CFS) =      0.69
  TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      0.69

**************************************************************************
  FLOW PROCESS FROM NODE    640.00 TO NODE    641.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    246.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   456.00   CHANNEL SLOPE =  0.4693
  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) =  6.283
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.78
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.59
  Tc(MIN.) =    8.27
  SUBAREA AREA(ACRES) =     1.87       SUBAREA RUNOFF(CFS) =    3.52
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        2.2         PEAK FLOW RATE(CFS) =       4.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   5.65
  LONGEST FLOWPATH FROM NODE    639.00 TO NODE    641.00 =     556.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    641.00 TO NODE    642.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   246.00  DOWNSTREAM(FEET) =   237.00
  FLOW LENGTH(FEET) =    54.54   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.13
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.33
  LONGEST FLOWPATH FROM NODE    639.00 TO NODE    642.00 =     610.54 FEET.
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.2  TC(MIN.) =      8.33
  PEAK FLOW RATE(CFS)   =       4.13
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 650                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S650P100.DAT
  TIME/DATE OF STUDY: 18:16 11/27/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   12.0      6.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    650.00 TO NODE    651.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    464.00
  DOWNSTREAM ELEVATION(FEET) =    444.00
  ELEVATION DIFFERENCE(FEET) =     20.00
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.08

****************************************************************************
  FLOW PROCESS FROM NODE    651.00 TO NODE    652.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    444.00  DOWNSTREAM(FEET) =    228.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   485.00   CHANNEL SLOPE =  0.4454
  CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.568
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.77
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =    7.72
  SUBAREA AREA(ACRES) =     5.16       SUBAREA RUNOFF(CFS) =   10.17
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        5.7         PEAK FLOW RATE(CFS) =      11.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   9.91
  LONGEST FLOWPATH FROM NODE    650.00 TO NODE    652.00 =     585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    652.00 TO NODE    653.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   228.00  DOWNSTREAM(FEET) =   222.30
  FLOW LENGTH(FEET) =   141.75   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.) =  11.88
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.15
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.92
  LONGEST FLOWPATH FROM NODE    650.00 TO NODE    653.00 =     726.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    653.00 TO NODE    654.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.461
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
  SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    2.02
  TOTAL AREA(ACRES) =        6.7   TOTAL RUNOFF(CFS) =      12.99
  TC(MIN.) =    7.92
```

```
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        6.7  TC(MIN.) =      7.92
  PEAK FLOW RATE(CFS)   =      12.99
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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            Ver. 18.2 Release Date: 05/08/2012  License ID 1509

                         Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 660                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S660P100.DAT
  TIME/DATE OF STUDY: 18:11 11/27/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   12.0      6.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    660.00 TO NODE    661.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    252.78
  DOWNSTREAM ELEVATION(FEET) =    252.03
  ELEVATION DIFFERENCE(FEET) =      0.75
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.153
```



```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.71
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    661.00 TO NODE    662.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  252.03  DOWNSTREAM ELEVATION(FEET) =  227.04
  STREET LENGTH(FEET) =   625.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =       2.63
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.36
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   2.68   Tc(MIN.) =    5.84
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.868
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.72      SUBAREA RUNOFF(CFS) =    4.93
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       5.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.27
  FLOW VELOCITY(FEET/SEC.) =  4.46   DEPTH*VELOCITY(FT*FT/SEC.) =   1.54
  LONGEST FLOWPATH FROM NODE    660.00 TO NODE    662.00 =     695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    663.00 TO NODE    662.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.868
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8279
  SUBAREA AREA(ACRES) =    0.65   SUBAREA RUNOFF(CFS) =    3.99
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       9.05
  TC(MIN.) =    5.84

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

```
  FLOW PROCESS FROM NODE    662.00 TO NODE    664.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   226.00  DOWNSTREAM(FEET) =   223.00
  FLOW LENGTH(FEET) =    11.63   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.05
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.85
  LONGEST FLOWPATH FROM NODE    660.00 TO NODE    664.00 =     706.63 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =      5.85
  PEAK FLOW RATE(CFS)   =       9.05
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 670                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S670P100.DAT
  TIME/DATE OF STUDY: 18:43 11/27/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   12.0      6.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    670.00 TO NODE    671.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    262.97
  DOWNSTREAM ELEVATION(FEET) =    261.46
  ELEVATION DIFFERENCE(FEET) =      1.51
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.912
```



```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.10
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE    671.00 TO NODE    672.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  261.46  DOWNSTREAM ELEVATION(FEET) =  237.04
  STREET LENGTH(FEET) =  1360.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.36
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   8.55   Tc(MIN.) =   11.46
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.091
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7762
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.784
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    2.57
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       2.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.42
  FLOW VELOCITY(FEET/SEC.) =  2.87   DEPTH*VELOCITY(FT*FT/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE    670.00 TO NODE    672.00 =    1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    673.00 TO NODE    672.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.091
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7755
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7788
  SUBAREA AREA(ACRES) =    1.14   SUBAREA RUNOFF(CFS) =    4.50
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       7.34
  TC(MIN.) =   11.46
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    672.00 TO NODE    674.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   232.00  DOWNSTREAM(FEET) =   231.50
  FLOW LENGTH(FEET) =    65.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.34
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.66
  LONGEST FLOWPATH FROM NODE    670.00 TO NODE    674.00 =    1525.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    674.00 TO NODE    675.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.037
  USER-SPECIFIED RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7717
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.44
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       7.70
  TC(MIN.) =   11.66

****************************************************************************
  FLOW PROCESS FROM NODE    675.00 TO NODE    676.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   231.50  DOWNSTREAM(FEET) =   230.00
  FLOW LENGTH(FEET) =    29.85   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.70
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.70
  LONGEST FLOWPATH FROM NODE    670.00 TO NODE    676.00 =    1555.15 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.0  TC(MIN.) =     11.70
  PEAK FLOW RATE(CFS)   =       7.70
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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           Ver. 18.2 Release Date: 05/08/2012  License ID 1509

                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                *
* SYSTEM 680                                                             *
* PROPOSED CONDITIONS 100 YEAR                                           *
 ************************************************************************

  FILE NAME: S680P100.DAT
  TIME/DATE OF STUDY: 07:27 05/11/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    680.00 TO NODE    681.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    640.00
  DOWNSTREAM ELEVATION(FEET) =    600.00
  ELEVATION DIFFERENCE(FEET) =     40.00
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.52

**************************************************************************
  FLOW PROCESS FROM NODE    681.00 TO NODE    682.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    246.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   848.00   CHANNEL SLOPE =  0.4175
  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) =  5.981
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  SOIL CLASSIFICATION IS "C"
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.29
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   2.25
  Tc(MIN.) =    8.93
  SUBAREA AREA(ACRES) =     6.15       SUBAREA RUNOFF(CFS) =   11.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        6.4         PEAK FLOW RATE(CFS) =      11.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   8.20
  LONGEST FLOWPATH FROM NODE    680.00 TO NODE    682.00 =     948.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    682.00 TO NODE    683.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   246.00  DOWNSTREAM(FEET) =   230.00
  FLOW LENGTH(FEET) =   315.25   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.46
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    9.33
  LONGEST FLOWPATH FROM NODE    680.00 TO NODE    683.00 =    1263.25 FEET.
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        6.4  TC(MIN.) =      9.33
  PEAK FLOW RATE(CFS)   =      11.46
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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           Ver. 18.2 Release Date: 05/08/2012  License ID 1509

                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 4192 OCEAN BREEZE RANCH                                                  *
* SYSTEM 690                                                               *
* PROPOSED CONDITIONS 100 YEAR                                             *
 ****************************************************************************

  FILE NAME: S690P100.DAT
  TIME/DATE OF STUDY: 07:51 05/11/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   18.0     10.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    691.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    800.00
  DOWNSTREAM ELEVATION(FEET) =    780.00
  ELEVATION DIFFERENCE(FEET) =     20.00
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.765
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.932
  SUBAREA RUNOFF(CFS) =      2.50
  TOTAL AREA(ACRES) =      0.77   TOTAL RUNOFF(CFS) =      2.50

****************************************************************************
  FLOW PROCESS FROM NODE    691.00 TO NODE    692.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    780.00  DOWNSTREAM(FEET) =    248.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1380.00   CHANNEL SLOPE =  0.3855
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.003
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      42.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.39
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   3.11
  Tc(MIN.) =    8.88
  SUBAREA AREA(ACRES) =    33.99       SUBAREA RUNOFF(CFS) =   77.54
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.381
  TOTAL AREA(ACRES) =       34.8         PEAK FLOW RATE(CFS) =      79.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   9.30
  LONGEST FLOWPATH FROM NODE    690.00 TO NODE    692.00 =    1480.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    692.00 TO NODE    693.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   248.00  DOWNSTREAM(FEET) =   240.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.37
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      79.43
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.92
  LONGEST FLOWPATH FROM NODE    690.00 TO NODE    693.00 =    1550.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       34.8  TC(MIN.) =      8.92
  PEAK FLOW RATE(CFS)   =      79.43
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 1100 - PROPOSED 100 YR                                         *
*                                                                       *
 ************************************************************************

  FILE NAME: 1100P100.DAT
  TIME/DATE OF STUDY: 18:14 12/05/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   1100.00 TO NODE   1101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    740.00
  DOWNSTREAM ELEVATION(FEET) =    735.00
  ELEVATION DIFFERENCE(FEET) =      5.00
```



```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.593
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.641
  SUBAREA RUNOFF(CFS) =      1.00
  TOTAL AREA(ACRES) =      0.42   TOTAL RUNOFF(CFS) =      1.00

****************************************************************************
  FLOW PROCESS FROM NODE   1101.00 TO NODE   1110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    735.00  DOWNSTREAM(FEET) =    618.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1215.00   CHANNEL SLOPE =  0.0959
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.369
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3590
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.83
  AVERAGE FLOW DEPTH(FEET) =   0.66   TRAVEL TIME(MIN.) =   2.96
  Tc(MIN.) =   10.56
  SUBAREA AREA(ACRES) =    22.07       SUBAREA RUNOFF(CFS) =   42.54
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.359
  TOTAL AREA(ACRES) =       22.5         PEAK FLOW RATE(CFS) =      43.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.92   FLOW VELOCITY(FEET/SEC.) =   8.18
  LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1110.00 =    1315.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1110.00 TO NODE   1115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   613.50  DOWNSTREAM(FEET) =   606.37
  FLOW LENGTH(FEET) =   159.41   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.86
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.35
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.72
  LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1115.00 =    1474.41 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1115.00 TO NODE   1115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.318
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3595
  SUBAREA AREA(ACRES) =    0.02   SUBAREA RUNOFF(CFS) =    0.09
  TOTAL AREA(ACRES) =       22.5   TOTAL RUNOFF(CFS) =      43.35
```

```
  TC(MIN.) =   10.72
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1115.00 TO NODE   1120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.318
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3960
  SUBAREA AREA(ACRES) =    2.14   SUBAREA RUNOFF(CFS) =    8.88
  TOTAL AREA(ACRES) =       24.6   TOTAL RUNOFF(CFS) =      51.91
  TC(MIN.) =   10.72
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       24.6  TC(MIN.) =     10.72
  PEAK FLOW RATE(CFS)   =      51.91
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OCEAN BREEZE RANCH                                                    *
* SYSTEM 1800 - PROPOSED 100 YR                                         *
*                                                                       *
 ************************************************************************

  FILE NAME: 1800P100.DAT
  TIME/DATE OF STUDY: 17:07 11/28/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1800.00 TO NODE   1801.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    688.00
  DOWNSTREAM ELEVATION(FEET) =    687.03
  ELEVATION DIFFERENCE(FEET) =      0.97
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.940
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.038
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE   1801.00 TO NODE   1802.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  687.03  DOWNSTREAM ELEVATION(FEET) =  648.91
  STREET LENGTH(FEET) =   558.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.015
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.72
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    8.96
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.968
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =  93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.751
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    3.72
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.90

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.91
  FLOW VELOCITY(FEET/SEC.) =  5.25   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE   1800.00 TO NODE   1802.00 =     608.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.9  TC(MIN.) =      8.96
  PEAK FLOW RATE(CFS)   =       3.90
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX 4

Exhibits

LEGEND:

- PROPERTY BOUNDARY
- PLANNING AREA LIMITS
- RESIDENTIAL LOTS
- BIO-OPEN SPACE
- PARK / LANDSCAPE
- BASIN
- STREET

N

NOT TO SCALE

NORTHEAST QUADRANT:
SYSTEM 500P
SYSTEM 550P
SYSTEM 613P
SYSTEM 635P
SYSTEM 639P
SYSTEM 650P
SYSTEM 680P
SYSTEM 690P

NORTHEAST QUADRANT:
SYSTEM 300P
SYSTEM 400P
SYSTEM 430P
SYSTEM 600P
SYSTEM 660P
SYSTEM 670P

NORTHWEST QUADRANT:
SYSTEM 240P
SYSTEM 3000P
SYSTEM 3500P
SYSTEM 3600P
SYSTEM 270P

EQUESTRIAN
M.U.P.

NORTHWEST QUADRANT:
SYSTEM 1000P
SYSTEM 1300P
SYSTEM 1500P
SYSTEM 2000P

PLANNING
AREA 2

PLANNING
AREA 1

PLANNING
AREA 3

HILLSIDE
ESTATE
PARCEL

SCHOOL
SALE
PARCEL

LOT DD

LOT CC

SOUTHWEST QUADRANT:
SYSTEM 700P

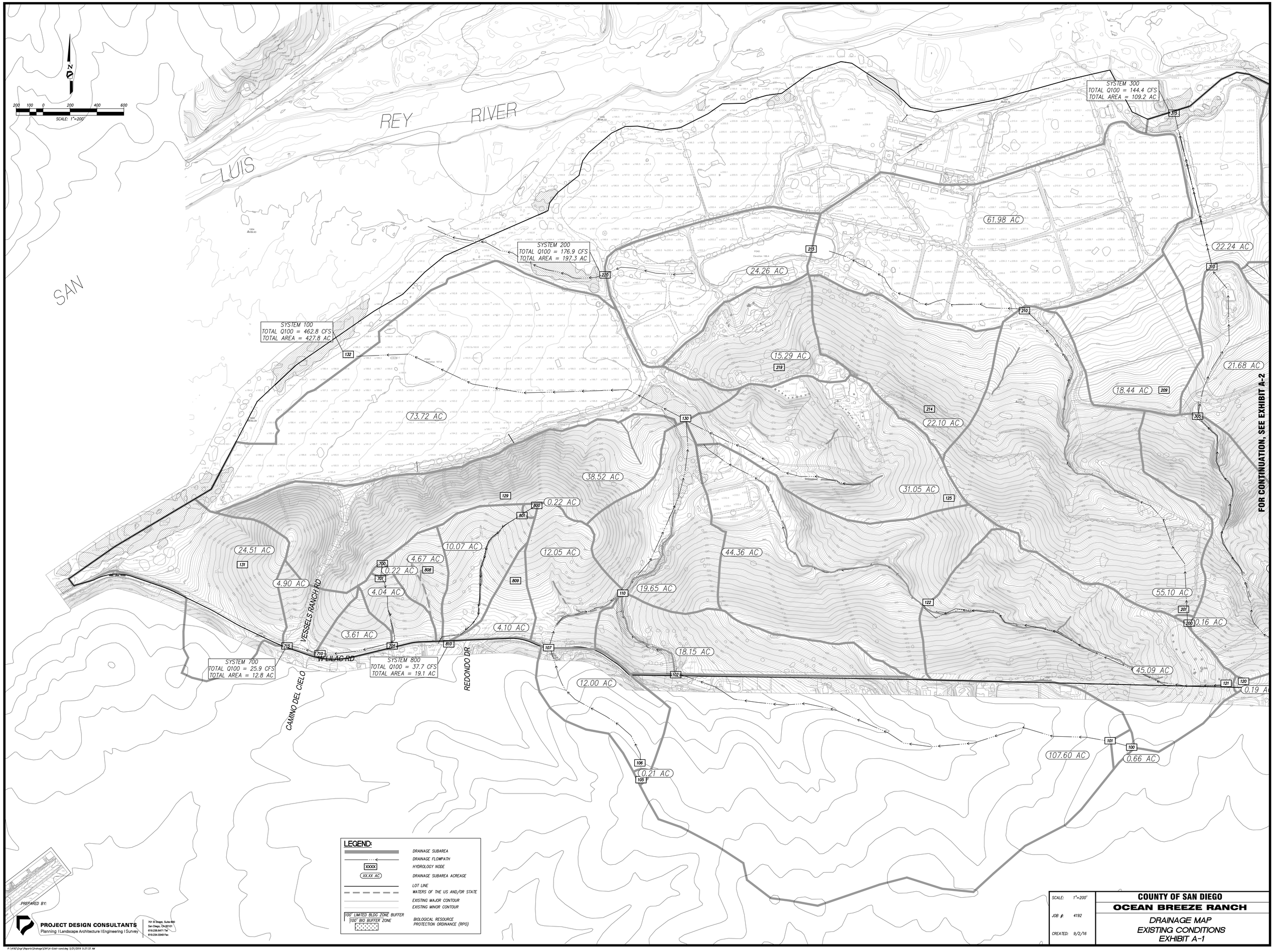
SOUTHEAST QUADRANT:
SYSTEM 1100
SYSTEM 1800

SOUTHWEST QUADRANT:
SYSTEM 950P

PROJECT DESIGN CONSULTANTS
Planning I Landscape Architecture I Engineering I Survey
701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

OCEAN BREEZE RANCH
PROJECT SITE PLAN
EXHIBIT

File Name P:\4192\Engr\Reports\Drainage\EXH\4192 Planning Area and Quadrant Exhibit.dwg, Date Last Plotted: 12/12/2018 7:56:43 PM,



SCALE: 1"=200'
LUIS REY RIVER
SAN
SYSTEM 300
TOTAL Q100 = 144.4 CFS
TOTAL AREA = 109.2 AC
SYSTEM 200
TOTAL Q100 = 176.9 CFS
TOTAL AREA = 197.3 AC
SYSTEM 100
TOTAL Q100 = 462.8 CFS
TOTAL AREA = 427.8 AC
SYSTEM 700
TOTAL Q100 = 25.9 CFS
TOTAL AREA = 12.8 AC
SYSTEM 800
TOTAL Q100 = 37.7 CFS
TOTAL AREA = 19.1 AC
61.98 AC
22.24 AC
24.26 AC
15.29 AC
21.68 AC
18.44 AC
73.72 AC
22.10 AC
38.52 AC
31.05 AC
0.22 AC
24.51 AC
10.07 AC
12.05 AC
44.36 AC
4.67 AC
0.22 AC
4.90 AC
4.04 AC
19.65 AC
55.10 AC
0.16 AC
3.61 AC
4.10 AC
18.15 AC
45.09 AC
12.00 AC
0.19 AC
107.60 AC
0.66 AC
0.21 AC
VESSELS RANCH RD
W LILAC RD
CAMINO DEL CIELO
REDONDO DR
FOR CONTINUATION, SEE EXHIBIT A-2
LEGEND:
DRAINAGE SUBAREA
DRAINAGE FLOWPATH
XXXX HYDROLOGY NODE
XX.XX AC DRAINAGE SUBAREA ACREAGE
LOT LINE
WATERS OF THE US AND/OR STATE
EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
100' LIMITED BLDG ZONE BUFFER
100' BIO BUFFER ZONE
BIOLOGICAL RESOURCE PROTECTION ORDINANCE (RPO)
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
SCALE: 1"=200'
JOB #: 4192
CREATED: 9/2/16
COUNTY OF SAN DIEGO
OCEAN BREEZE RANCH
DRAINAGE MAP
EXISTING CONDITIONS
EXHIBIT A-1

FOR CONTINUATION, SEE EXHIBIT A-3

FOR CONTINUATION, SEE EXHIBIT A-1

N

200 100 0 200 400 600

SCALE: 1"=200'

SYSTEM 400
TOTAL Q100 = 174.3 CFS
TOTAL AREA = 140.2 AC

SYSTEM 550
TOTAL Q100 = 237.2 CFS
TOTAL AREA = 173.2 AC

SYSTEM 500
TOTAL Q100 = 892.2 CFS
TOTAL AREA = 586.4 AC

SYSTEM 1100
TOTAL Q100 = 51.1 CFS
TOTAL AREA = 24.6 AC

SYSTEM 1800
TOTAL Q100 = 3.7 CFS
TOTAL AREA = 0.8 AC

18.61 AC
0.32 AC
56.22 AC
0.47 AC
34.47 AC
64.56 AC
21.35 AC
169.49 AC
39.67 AC
32.42 AC
26.56 AC
13.32 AC
55.66 AC
0.44 AC
54.69 AC
263.38 AC
82.18 AC
0.31 AC
38.36 AC
12.14 AC
0.42 AC
0.35 AC
22.53 AC
0.34 AC
0.19 AC
1.69 AC
0.75 AC
0.07 AC

NORMAN L. SULLIVAN MIDDLE SCHOOL

W LILAC RD

VIA ARARAT DR

LEGEND:

- DRAINAGE SUBAREA
- DRAINAGE FLOWPATH
- XXXX — HYDROLOGY NODE
- XX.XX AC — DRAINAGE SUBAREA ACREAGE
- LOT LINE
- WATERS OF THE US AND/OR STATE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 100' LIMITED BLDG ZONE BUFFER / 100' BIO BUFFER ZONE — BIOLOGICAL RESOURCE PROTECTION ORDINANCE (RPO)

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

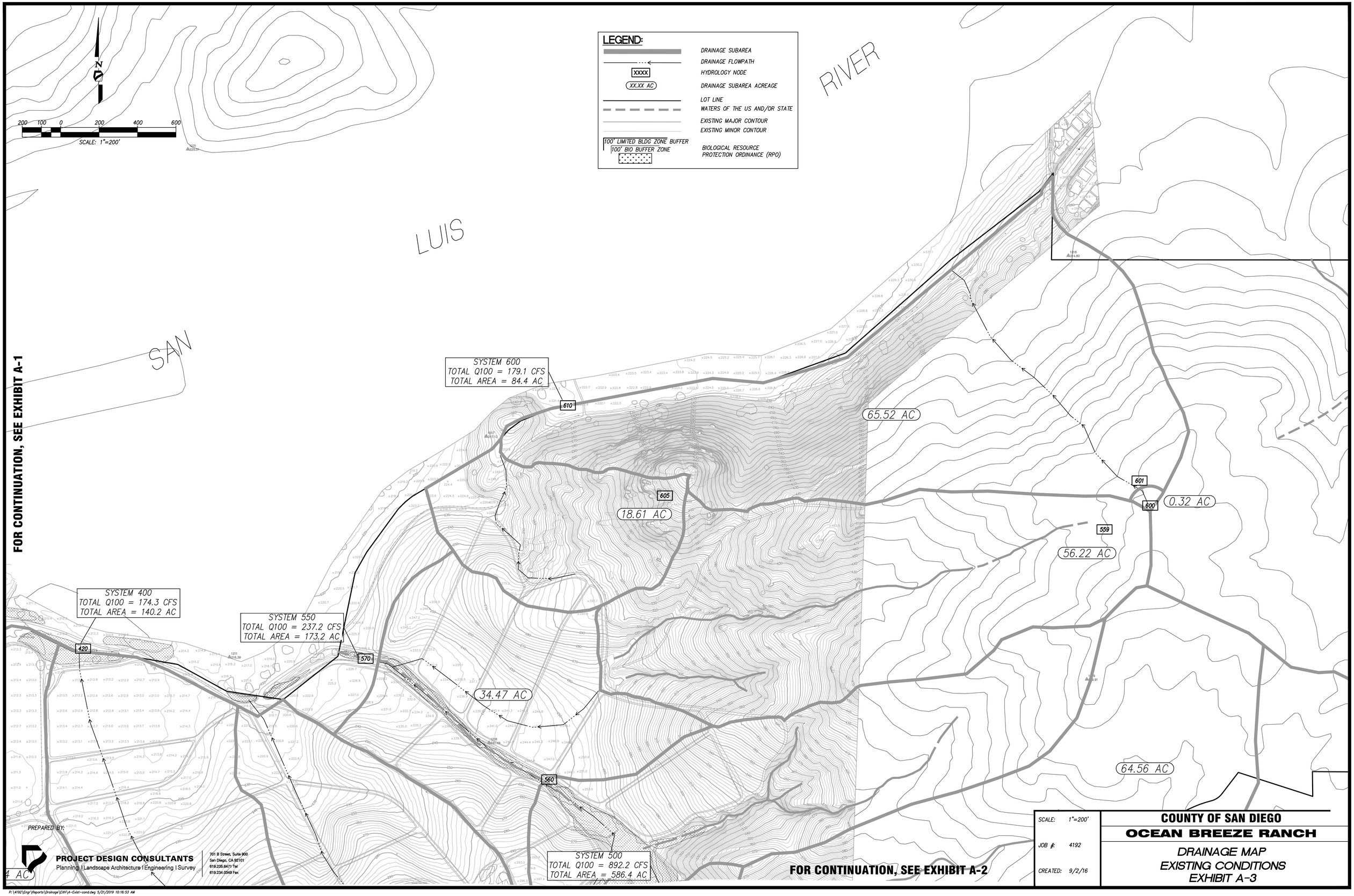
SCALE:	1"=200'
JOB #:	4192
CREATED:	9/2/16

COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

DRAINAGE MAP
EXISTING CONDITIONS
EXHIBIT A-2

P:\4192\Engr\Reports\Drainage\[Ex1\A-Exist-cond.dwg 5/21/2019 10:14:18 AM



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619.235.6471 Tel
619.234.0349 Fax

SCALE:	1"=200'
JOB #:	4192
CREATED:	9/2/16

COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

DRAINAGE MAP
EXISTING CONDITIONS
EXHIBIT A-3

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619.235.6471 Tel
619.234.0349 Fax

N

200 100 0 200 400 600
SCALE: 1"=200'

FOR CONTINUATION, SEE EXHIBIT A-1

24.51 AC
131
4.90 AC
VESSELS RANCH RD
715
710
W LILAC RD
SYSTEM 700
TOTAL Q100 = 25.9 CFS
TOTAL AREA = 12.8 AC
CAMINO DEL CIELO
3.61 AC
4.67 AC
700
0.22 AC
808
701
4.04 AC
705
SYSTEM 800
TOTAL Q100 = 37.7 CFS
TOTAL AREA = 19.1 AC
10.07 AC
809
129
800
0.22 AC
801
38.52 AC
12.05 AC
44.36 AC
110
19.65 AC
4.10 AC
810
REDONDO DR
107
18.15 AC
102
12.00 AC
106
0.21 AC
105

SYSTEM 960
TOTAL Q100 = 19.0 CFS
TOTAL AREA = 4.4 AC
4.37 AC
962
3.07 AC
950
0.03 AC
951
952
961
0.02 AC
960
SYSTEM 950
TOTAL Q100 = 15.7 CFS
TOTAL AREA = 3.1 AC

LEGEND:

- DRAINAGE SUBAREA
- DRAINAGE FLOWPATH
- XXXX — HYDROLOGY NODE
- XX.XX AC — DRAINAGE SUBAREA ACREAGE
- LOT LINE
- WATERS OF THE US AND/OR STATE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 100' LIMITED BLDG ZONE BUFFER / 100' BIO BUFFER ZONE — BIOLOGICAL RESOURCE PROTECTION ORDINANCE (RPO)

SCALE:	1"=200'
JOB #:	4192
CREATED:	9/2/16

COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

DRAINAGE MAP
EXISTING CONDITIONS
EXHIBIT A-4

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N

600 300 0 600 1200 1800

SCALE: 1"=600'

SHEET B-1

SHEET B-2

SHEET B-3

SHEET B-4

SHEET B-5

SHEET B-6

SHEET B-7

SHEET B-8

EQUESTRIAN FACILITY

PLANNING AREA 1

PLANNING AREA 2

PLANNING AREA 3

W LILAC RD

W LILAC RD

W LILAC RD

CAMINO DEL CIELO

CAMINO DEL REY

HWY 395

SCALE:	1"=600'
JOB #:	4192.00
CREATED:	05/18/19

PREPARED BY:

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San Diego, CA 92101
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619.234.0349 Fax

COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

DRAINAGE KEY MAP
PROPOSED CONDITIONS
EXHIBIT B-0

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LEGEND:

- DRAINAGE SUBAREA
- DRAINAGE FLOWPATH
- XXXX — HYDROLOGY NODE
- XX.XX AC — DRAINAGE SUBAREA ACREAGE
- LOT LINE
- WATERS OF THE US AND/OR STATE
- PROP. LINES OF INUNDATION
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED STORM DRAIN
- 100' LIMITED BLDG ZONE BUFFER / 100' BIO BUFFER ZONE — BIOLOGICAL RESOURCE PROTECTION ORDINANCE (RPO)

N

100 50 0 100 200 300

SCALE: 1"=100'

EX. 100YR WSE =192.66
EX. 10YR WSE =188.01

EX. 100YR WSE =190.79
EX. 10YR WSE =186.14

EX. 100YR WSE =187.89
EX. 10YR WSE =183.29

SYSTEM 1300
TOTAL Q100: 68.4 CFS
TOTAL AREA: 18.3 AC

SYSTEM 1000
TOTAL Q100: 187.9 CFS
TOTAL AREA: 86.4 AC

SYSTEM 1500
TOTAL Q100: 20.3 CFS
TOTAL AREA: 6.0 AC

SYSTEM 2000
TOTAL Q100: 67.9 CFS
TOTAL AREA: 17.4 AC

SYSTEM 270
TOTAL Q100: 143.0 CFS
TOTAL AREA: 175.9 AC

SYSTEM 240
TOTAL Q100: 422.8 CFS
TOTAL AREA: 310.9 AC

SYSTEM 700
TOTAL Q100: 85.5 CFS
TOTAL AREA: 38.8 AC

SYSTEM 3000
TOTAL Q100: 190.0 CFS
TOTAL AREA: 50.7 AC

BASIN 2A
BASIN 2B
BASIN 2C
BASIN 2D
BASIN 2E
BASIN 2F
BASIN 2G
BASIN 2H
BASIN 1A

STREET A
STREET B
PARK ROAD 1
PARK ROAD 2
WEST RIDGE ROAD
CAMINO DEL CIELO

FOR CONTINUATION, SEE EXHIBIT B-2

FOR CONTINUATION, SEE EXHIBIT B-4

SCALE:	1"=100'
JOB #:	4192.00
CREATED:	08/14/16

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey
701 B Street, Suite 800
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COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

DRAINAGE MAP
PROPOSED CONDITIONS
EXHIBIT B-1

Last save by LEONORA PIZZARO, File Name P:\4192\Engr\Reports\Drainage\EXH\B-Proposed-cond_EXHIBITS.dwg, Date Last Saved 5/21/2019 5:01:10 AM, Date Plotted Last 5/21/2019 5:21:09 AM



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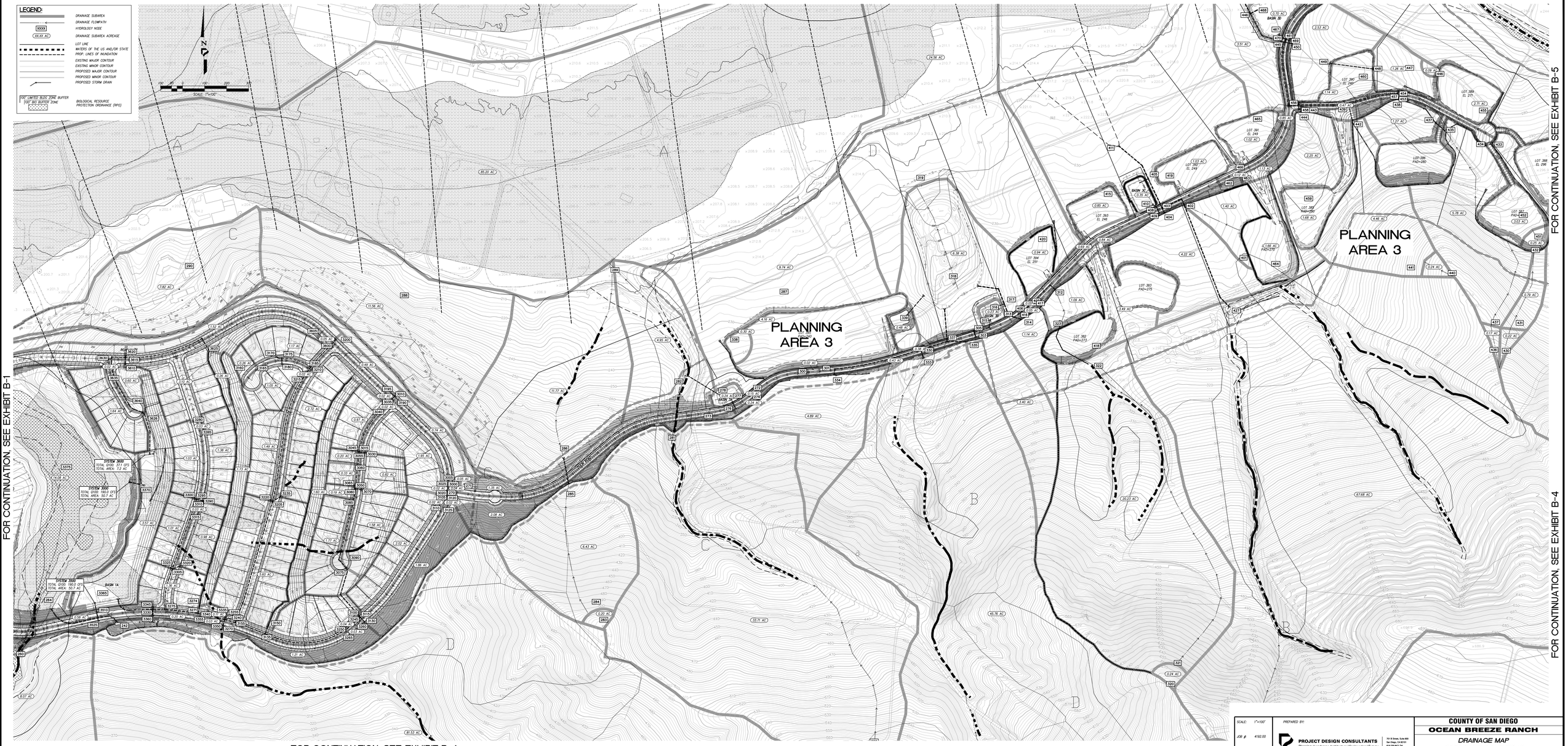

SCALE: 1"=100'

JOB #: 4192.00

CREATED: 08/14/16

PREPARED BY:

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701 B Street, Suite 800
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COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

DRAINAGE MAP
PROPOSED CONDITIONS
EXHIBIT B-3

FOR CONTINUATION, SEE EXHIBIT B-3



FOR CONTINUATION, SEE EXHIBIT B-6

SCALE: 1"=100'	PREPARED BY: PROJECT DESIGN CONSULTANTS Planning | Landscape Architecture | Engineering | Survey	COUNTY OF SAN DIEGO
JOB #: 4192.00	701 B Street, Suite 800 San Diego, CA 92101 619.235.6471 Tel 619.234.0349 Fax	OCEAN BREEZE RANCH
CREATED: 08/14/19		DRAINAGE MAP PROPOSED CONDITIONS EXHIBIT B-4

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SCALE: 1"=100'
JOB #: 4192.00
CREATED: 08/14/19

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San Diego, CA 92101
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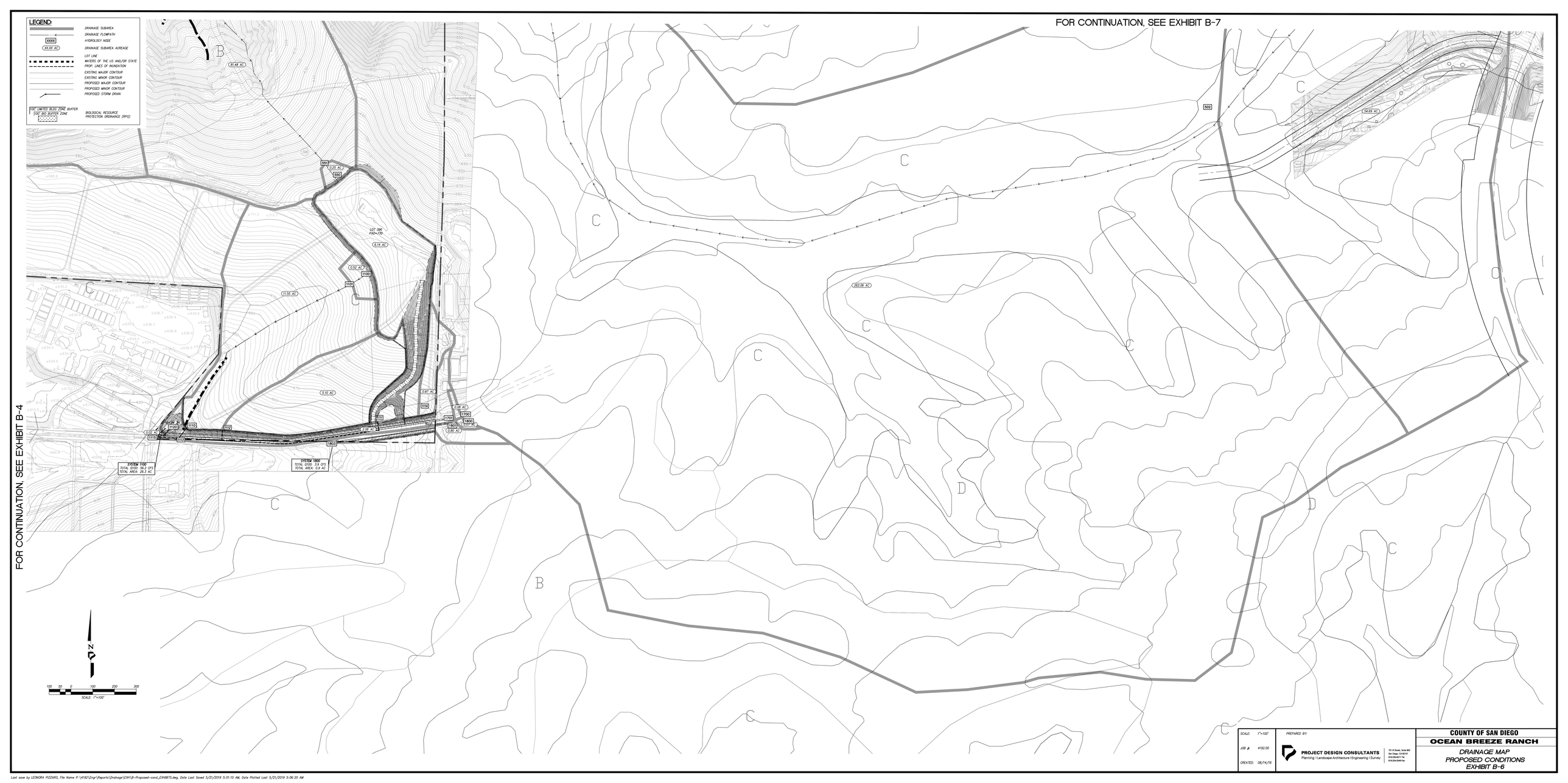
COUNTY OF SAN DIEGO
OCEAN BREEZE RANCH
DRAINAGE MAP
PROPOSED CONDITIONS
EXHIBIT B-5

Last save by: JEFF NOVOA, File Name: P:\4192\Engr\Reports\Drainage\Exh\B-Proposed-cond_EXHIBITS.dwg, Date Last Saved: 5/21/2019 5:22:28 AM, Date Plotted: 5/21/2019 8:42:16 AM



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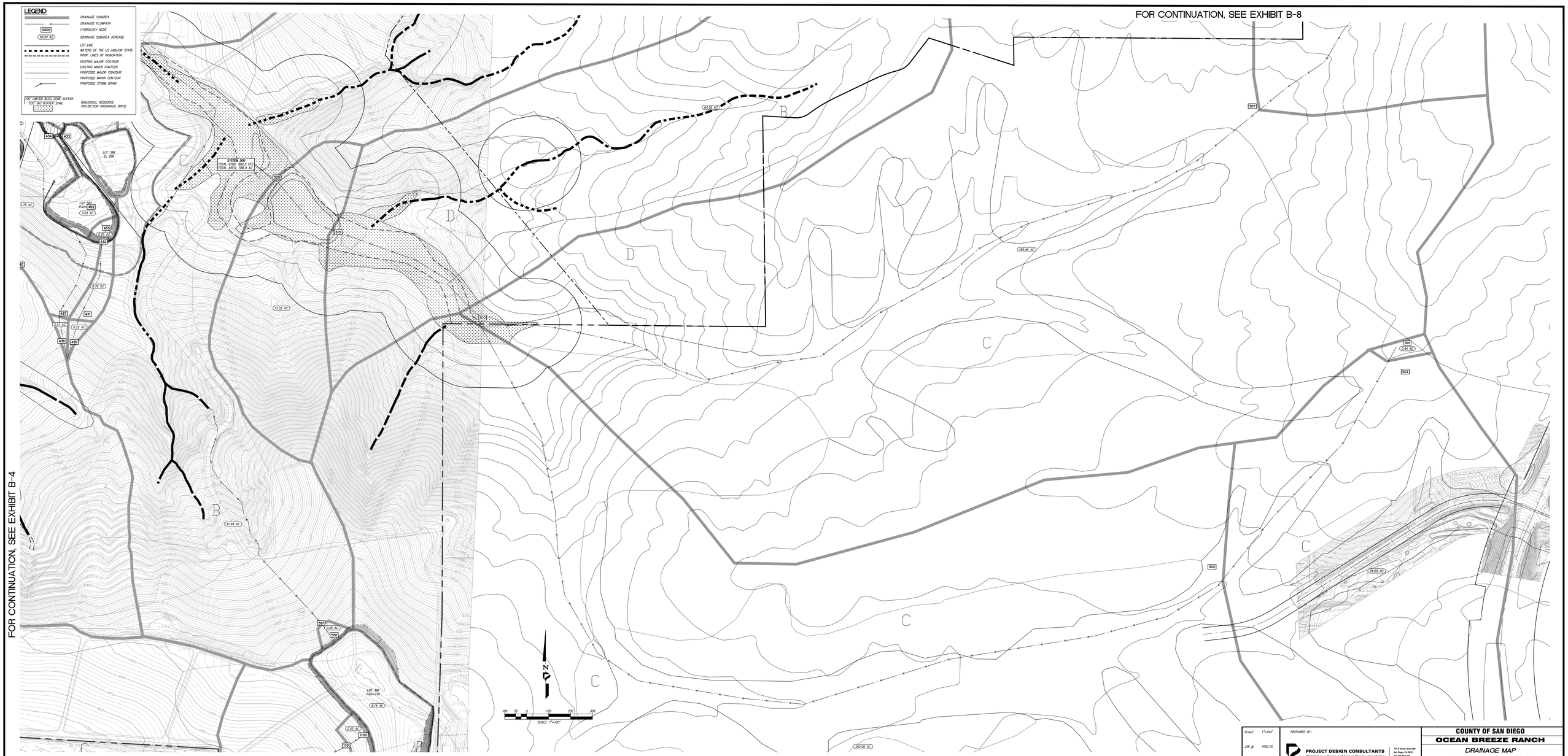
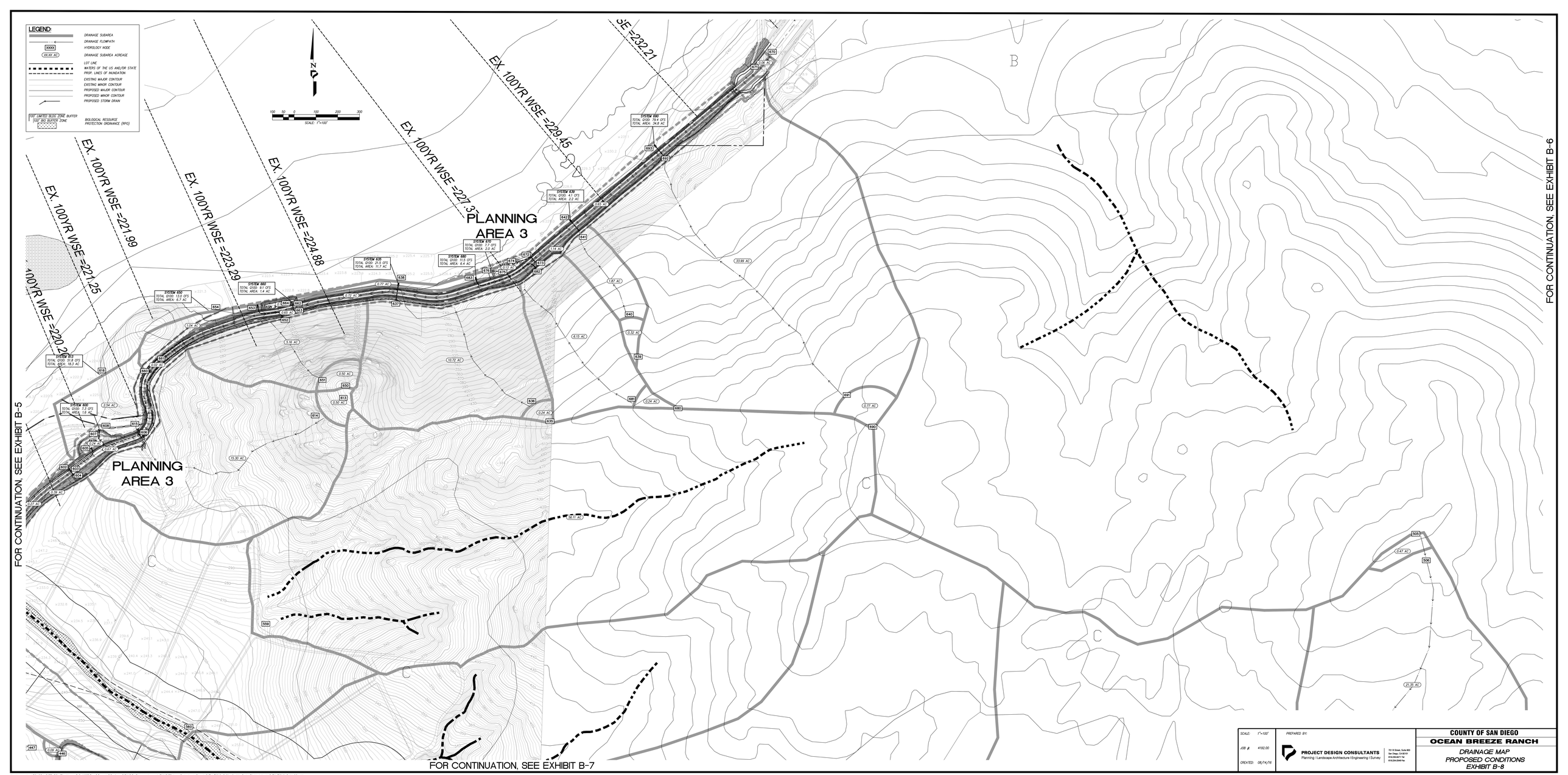


Last save by LEONORA PIZZARO, File Name P:\4192\Engr\Reports\Drainage\Exh\B-Proposed-cond_EXHIBITS.dwg, Date Last Saved 5/21/2019 5:01:10 AM, Date Plotted Last 5/21/2019 5:09:45 AM



SCALE: 1"=100'	PREPARED BY:	COUNTY OF SAN DIEGO
JOB #: 4192.00	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	OCEAN BREEZE RANCH
CREATED: 08/14/19		DRAINAGE MAP PROPOSED CONDITIONS EXHIBIT B-8

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APPENDIX 5

Onsite Floodplain for Onsite Drainage Area Over 25 Acres

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X      X    X        X
          X     X  X        X    X       X   X     X    X        X
          X     X  XXXXXX    XXXX        X    X    X    X   XXXXX


 PROJECT DATA
 Project Title: Prop Cond Floodplain
 Project File : ProCondFloodplain.prj
 Run Date and Time: 5/21/2019 10:46:37 AM

 Project in English units



 PLAN DATA

 Plan Title: Proposed Conditin Channel 1
 Plan File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
1\ProCondFloodplain.p02

           Geometry Title: PropChannel 1
           Geometry File :
p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
1\ProCondFloodplain.g03

           Flow Title    : Prop Channel 1 Flow
           Flow File     :
p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
1\ProCondFloodplain.f03

 Plan Summary Information:
 Number of:  Cross Sections =   12    Multiple Openings  =    0
             Culverts       =    2    Inline Structures  =    0
             Bridges        =    0    Lateral Structures =    0

 Computational Information
     Water surface calculation tolerance  =  0.01
     Critical depth calculation tolerance =  0.01
     Maximum number of iterations         =  20
     Maximum difference tolerance         =  0.3
     Flow tolerance factor                =  0.001

 Computation Options
     Critical depth computed only where necessary
     Conveyance Calculation Method: At breaks in n values only
     Friction Slope Method:         Average Conveyance
     Computational Flow Regime:     Subcritical Flow
```



```
 FLOW DATA

 Flow Title: Prop Channel 1 Flow
 Flow File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
1\ProCondFloodplain.f03

 Flow Data (cfs)

   River           Reach           RS                  PF 1
   Alignment 1     Alignment 1     3896.89              402


 Boundary Conditions


   River           Reach           Profile                      Upstream
        Downstream


   Alignment 1     Alignment 1     PF 1                        Normal S = 0.1
       Known WS = 199



 GEOMETRY DATA

 Geometry Title: PropChannel 1
 Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
1\ProCondFloodplain.g03

 CROSS SECTION


 RIVER: Alignment 1
 REACH: Alignment 1        RS: 3896.89

 INPUT
 Description:
 Station Elevation Data    num=      43
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0  328.6610.79999  327.6311.82999  327.56   13.31  327.45   44.12  325.18
 48.90999  324.8550.45999   324.753.57999  324.5973.42999   323.7   75.47  323.48
     80.7  323.19   92.03   322.7   95.34  322.45  101.51   321.9  107.83  321.66
    112.3  321.23  121.32  320.12  125.39  319.46  133.24  318.21  136.09  317.84
   141.56  317.28  143.62  316.98   144.9  316.87  147.16  316.56  157.34  315.29
   164.33  314.31  166.42   314.1  168.38  312.75  170.91  310.68  173.23  310.52
   174.59   310.4  177.93  310.59  181.33  310.72  184.12  313.04   186.4  314.78
   188.54  315.61  192.34  316.12  197.52  316.86  204.09  317.27  211.09  318.05
    237.5  318.31  244.51  318.57  248.15  318.77

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06  248.15     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
```

```
Expan.
             0  248.15           542.43  542.43  542.43            .1       .3

 CROSS SECTION


 RIVER: Alignment 1
 REACH: Alignment 1        RS: 3354.46

 INPUT
 Description:
 Station Elevation Data    num=      18
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0     2721.220001  271.718.260002  271.39   13.32  271.36    23.5   268.2
    31.66  265.62   39.66  261.96   42.76  260.48   46.18  259.42   53.75  257.34
    56.08  256.68   64.06   258.6   67.55  259.87   72.33  260.78   85.84   268.8
    87.94  270.02   92.69  271.63   96.39  272.89

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06   96.39     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
             0   96.39           656.02  656.02  656.02            .1       .3

 CROSS SECTION


 RIVER: Alignment 1
 REACH: Alignment 1        RS: 2698.44

 INPUT
 Description:
 Station Elevation Data    num=      43
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0  259.96.5100098  259.76   10.47  256.32   15.12 254.794    31.5  249.42
    41.39  246.6757.10001  242.13   57.14  242.1357.20999  242.11   60.55  241.65
     71.5   240.171.73999  240.0888.35001  238.0796.17999  236.94  108.84   235.7
    115.9  235.25  122.63  234.77  139.46  234.28  148.08  234.05  148.81  234.02
   161.92  234.33  167.32  234.79  172.91  233.43  174.72  232.93  181.54  231.76
   183.55  231.37  184.35  231.17  186.86  230.49  193.72  228.49  198.65  227.93
   205.06   228.6  208.93  229.03  221.47  229.89  232.68   232.3  234.43   232.7
   236.46  233.26  252.03  241.51  253.78  242.44  253.97  242.45  262.51  243.01
   267.06  244.35  280.53  249.36  295.69  254.34

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06   15.12     .06  295.69     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
          15.12  295.69           112.16  112.16  112.16            .1       .3

 CROSS SECTION


 RIVER: Alignment 1
 REACH: Alignment 1        RS: 2586.28

 INPUT
```



```
 Description:
 Station Elevation Data    num=      35
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0     260   10.57     255      21     250    31.5     245   47.83     240
    58.36     235   68.26     23071.57001  229.09   79.78  228.45   89.75  228.41
    97.09  228.47  107.81  228.55  118.49  228.67  123.53  228.83  135.77  229.21
   144.67   227.8  148.76  227.09  151.49  226.25  157.61  224.09  158.52  224.67
   158.56  224.69  164.62  228.54   166.5  229.63  171.03  231.84  173.71  233.15
    176.2  233.25  185.76   233.6  196.89   238.1  197.22  238.22  197.41  238.29
   211.42  243.47  219.81  246.69  225.17   248.8  240.74  253.03  244.41     254

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06  244.41     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
             0  244.41           216.27  216.27  216.27            .1       .3

 CULVERT


 RIVER: Alignment 1
 REACH: Alignment 1        RS: 2574.08

 INPUT
 Description:
 Distance from Upstream XS =    12.2
 Deck/Roadway Width        =  186.83
 Weir Coefficient          =     2.6
 Upstream  Deck/Roadway Coordinates
     num=       5
      Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
        0     259           43.72     258           125.46     255
   231.57     250           253.05     249

 Upstream Bridge Cross Section Data
 Station Elevation Data    num=      35
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0     260   10.57     255      21     250    31.5     245   47.83     240
    58.36     235   68.26     23071.57001  229.09   79.78  228.45   89.75  228.41
    97.09  228.47  107.81  228.55  118.49  228.67  123.53  228.83  135.77  229.21
   144.67   227.8  148.76  227.09  151.49  226.25  157.61  224.09  158.52  224.67
   158.56  224.69  164.62  228.54   166.5  229.63  171.03  231.84  173.71  233.15
    176.2  233.25  185.76   233.6  196.89   238.1  197.22  238.22  197.41  238.29
   211.42  243.47  219.81  246.69  225.17   248.8  240.74  253.03  244.41     254

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06  244.41     .06

 Bank Sta: Left   Right    Coeff Contr.   Expan.
             0  244.41            .1       .3

 Downstream  Deck/Roadway Coordinates
     num=       6
      Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
        0   258.5             35     258           101.82     255
   195.1     250           239.92     249              260   248.5

 Downstream Bridge Cross Section Data
```

```
Station Elevation Data    num=      36
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     23510.46001     230   20.81     22526.49001     22330.54001  222.02
36.23001  222.0877.23001   221.7    87.8  221.4593.45001  221.79   105.4  222.24
  110.63  222.14  119.19  222.06  124.45  221.15  124.52  221.14  124.83  221.13
  127.63  221.06  132.02  220.95  132.29  221.01  134.84  221.63  140.78  223.56
  152.37   223.5  158.74  223.67  161.87  223.61  170.08  223.81  171.69  223.78
  175.99   223.9  179.98  223.98  180.81  224.01  190.21  223.59   197.5  223.57
   200.7  223.61  204.66  223.62   217.2  223.82  224.82  224.13  252.14  225.14
  252.32  225.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  252.32     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
            0  252.32             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss
Coef   Exit Loss Coef
              12.2  195.72      .13      .13        0                   .5
          1
Upstream   Elevation =  224
           Centerline Station =  108.76
Downstream Elevation =  222
           Centerline Station =  132.29

CROSS SECTION


RIVER: Alignment 1
REACH: Alignment 1        RS: 2370.01

INPUT
Description:
Station Elevation Data    num=      36
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     23510.46001     230   20.81     22526.49001     22330.54001  222.02
36.23001  222.0877.23001   221.7    87.8  221.4593.45001  221.79   105.4  222.24
  110.63  222.14  119.19  222.06  124.45  221.15  124.52  221.14  124.83  221.13
  127.63  221.06  132.02  220.95  132.29  221.01  134.84  221.63  140.78  223.56
  152.37   223.5  158.74  223.67  161.87  223.61  170.08  223.81  171.69  223.78
  175.99   223.9  179.98  223.98  180.81  224.01  190.21  223.59   197.5  223.57
   200.7  223.61  204.66  223.62   217.2  223.82  224.82  224.13  252.14  225.14
  252.32  225.16
```



```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  252.32     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
            0  252.32           631.28  631.28  631.28             .1       .3

CROSS SECTION


RIVER: Alignment 1
REACH: Alignment 1        RS: 2259.92

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     234      16     23231.57999  229.9936.04001  229.3850.20001   226.6
78.48999   221.1  103.82  219.13  106.55  218.92  121.19  218.16  126.31  218.32
  133.11  218.64  140.75  219.15  149.07   219.5  163.12  219.35   176.1  218.96
  190.99  218.54  208.78  218.16  220.84  218.39   237.1  218.59  250.19  219.04
  261.18  219.75  274.24     221  299.15     228  325.31     240   338.3     246
     350   246.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03     350     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
            0     350           521.19  521.19  521.19             .1       .3

CROSS SECTION


RIVER: Alignment 1
REACH: Alignment 1        RS: 1738.73

INPUT
Description:
Station Elevation Data    num=      47
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     23822.32999     23840.42001     230   57.97  221.6564.39999  219.31
67.32001  218.3575.60999  216.22   86.87  213.6895.60001  211.66  102.64  209.89
  109.22  208.67  121.83  208.22     148  207.42  164.76  208.22  175.96  208.71
  199.08  208.69   213.1  208.69   229.7  208.64  230.57  208.63  238.19  208.67
  269.65  209.73  278.02  210.05  282.57  210.11  285.34  210.12  315.93  210.31
  318.64   211.5   320.5  212.63  324.86  214.55  332.21  218.21  345.42  220.72
  347.63  221.14  349.68  221.51  358.49  223.17  362.31  224.38  372.11  227.28
  376.16  228.54  383.98  230.87  391.79  232.58  405.81  235.75  412.62  237.14
  423.41  237.14  435.09  237.14  439.58  237.14     448  237.14  453.54  237.14
  459.43  237.14     490  237.14

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03     490     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
            0     490           550.04  550.04  550.04             .1       .3
```

```
CROSS SECTION


RIVER: Alignment 1
REACH: Alignment 1        RS: 1188.69

INPUT
Description:
Station Elevation Data    num=      46
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   218.310.26001     218   18.41     21531.43002     21044.74002     205
48.43002     20351.18002  202.9651.21002  202.96   63.88  202.8478.39001  202.87
83.43001  202.8398.79001  202.77  109.67  202.78  121.82  202.77  126.24  202.79
  137.58   202.8  141.99  202.79  156.32   202.9  158.02  202.92  161.69  202.98
  172.75  203.06  176.53   203.1  184.69  203.24  194.49  203.21  196.07  203.21
   208.9  203.21  210.54  203.21  212.15  203.22  223.45  203.04  233.72  202.75
  239.72  202.61  247.56  202.38  251.09  202.24  258.71  201.95  259.71  202.12
  260.98   202.3     262  202.53  268.83  202.51   274.2  202.49  277.71     202
  284.95     205  298.43     210  308.45     215  320.13     220  327.37   223.3
  335.92   223.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .0351.21002     .03  284.95     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
      51.21002  284.95           579.36  579.36  579.36             .1       .3

CULVERT


RIVER: Alignment 1
REACH: Alignment 1        RS: 1100

INPUT
Description:
Distance from Upstream XS =   55.88
Deck/Roadway Width        =     208
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     216     100     400     216     200

Upstream Bridge Cross Section Data
Station Elevation Data    num=      46
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   218.310.26001     218   18.41     21531.43002     21044.74002     205
48.43002     20351.18002  202.9651.21002  202.96   63.88  202.8478.39001  202.87
83.43001  202.8398.79001  202.77  109.67  202.78  121.82  202.77  126.24  202.79
  137.58   202.8  141.99  202.79  156.32   202.9  158.02  202.92  161.69  202.98
  172.75  203.06  176.53   203.1  184.69  203.24  194.49  203.21  196.07  203.21
   208.9  203.21  210.54  203.21  212.15  203.22  223.45  203.04  233.72  202.75
  239.72  202.61  247.56  202.38  251.09  202.24  258.71  201.95  259.71  202.12
  260.98   202.3     262  202.53  268.83  202.51   274.2  202.49  277.71     202
  284.95     205  298.43     210  308.45     215  320.13     220  327.37   223.3
  335.92   223.3

Manning's n Values        num=       3
```



```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .0351.21002     .03  284.95     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
      51.21002  284.95             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     215     100     850     215     200

Downstream Bridge Cross Section Data
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     210    10.1     205    21.1     200   45.69  199.82    53.7  199.88
    61.7  200.02   84.43  200.43   86.51  200.47   87.05  200.47   87.99  200.49
  128.41  200.88  141.48  201.16  165.22  201.65  169.38  201.87  174.28  202.07
  193.19     205   193.2 205.006  201.23     210  205.83     215  222.68     220

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03   193.2     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0   193.2             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       7
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss
Coef   Exit Loss Coef
                50   217.1     .013     .013        0                   .5
          .5
Number of Barrels =  2
Upstream   Elevation =  202
Centerline Stations
    Sta.    Sta.
     179   187.6
Downstream Elevation =  201.5
Centerline Stations
    Sta.    Sta.
    43.1    51.1

CROSS SECTION


RIVER: Alignment 1
REACH: Alignment 1        RS: 912.82
```

```
INPUT
Description:
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     210    10.1     205    21.1     200   45.69  199.82    53.7  199.88
    61.7  200.02   84.43  200.43   86.51  200.47   87.05  200.47   87.99  200.49
  128.41  200.88  141.48  201.16  165.22  201.65  169.38  201.87  174.28  202.07
  193.19     205   193.2 205.006  201.23     210  205.83     215  222.68     220

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03   193.2     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
             0   193.2           151.63  151.63  151.63             .1       .3

CROSS SECTION


RIVER: Alignment 1
REACH: Alignment 1        RS: 761.19

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  201.116.340027  201.1410.61005  201.1639.12006  201.2351.95001  201.26
54.03003  201.2671.91003  201.3193.29004   201.3  104.69  201.26  134.63  201.52
  138.02  201.59153.8701  201.92167.1801  202.18  173.97  202.38   182.2  202.95
  193.94  203.21  200.27  203.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  200.27     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
             0  200.27            171.5   171.5   171.5             .1       .3

CROSS SECTION


RIVER: Alignment 1
REACH: Alignment 1        RS: 539.69

INPUT
Description:
Station Elevation Data    num=      49
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  199.64 2.73999  199.667.429993  199.6737.22998  199.77   48.06  199.89
63.57996  200.04   80.12  200.09   88.69  200.11  106.22   200.2  122.67   200.2
  148.91     203  172.46   202.8  207.65   202.1  212.28  202.05  223.75   202.2
  227.85  202.25  231.61  201.95   240.5  201.34  248.23  201.22  250.89  201.14
  253.45  201.12  259.86   200.9  270.01  200.42     280     200  291.83  199.53
  313.18  199.05  332.46  199.02  347.67   199.2  373.08  199.43  382.16  199.47
  413.71  199.74  416.78  199.77  433.22  199.78  454.34  199.82  458.91   199.8
  494.97  199.79  520.54  200.08   535.4  200.26   551.4  200.19  563.61  200.29
  563.89  200.28  571.45  199.82  574.91  199.84  581.03  199.91  610.37  200.16
  616.83   200.1  623.62  200.04  657.48  199.81  659.48  199.81
```



```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  659.48     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
             0  659.48           139.34  139.34  139.34             .1       .3

CROSS SECTION


RIVER: Alignment 1
REACH: Alignment 1        RS: 400.35

INPUT
Description:
Station Elevation Data    num=      50
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  198.671.939972  198.6916.38998  198.7936.69998  198.9651.93997  198.96
   65.28     19982.37997  199.18   83.06  199.18  101.93  199.35  149.74  199.39
   151.8  199.39  168.13   199.6  171.49  199.57  178.33  199.41  184.01  199.31
  190.91  199.44   193.4  199.54   195.7  199.37  200.92  199.51  210.39  199.22
  211.82  198.95  215.77  198.36  224.33  197.01  226.11  196.69  231.08   196.6
  232.73   196.5  234.45  196.65  239.86  196.91  254.13  198.99     261  199.15
  263.56   199.2  267.21  199.17  284.43     199  285.93  198.76  290.24  198.19
  294.77  197.49  299.87  197.51  309.14  197.32  312.26  197.09  329.18  196.37
  349.55  195.65  350.46   195.6  351.31  195.58  351.91  195.57  379.57  195.38
  401.91   195.2  415.63  195.06  431.73  195.16  433.79   195.2  447.08  194.97

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  447.08     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0  447.08             .1       .3



SUMMARY OF MANNING'S N VALUES

River:Alignment 1

      Reach          River Sta.       n1        n2        n3

 Alignment 1          3896.89            .06       .06       .06
 Alignment 1          3354.46            .06       .06       .06
 Alignment 1          2698.44            .06       .06       .06
 Alignment 1          2586.28            .06       .06       .06
 Alignment 1          2574.08      Culvert
 Alignment 1          2370.01            .06       .06       .06
 Alignment 1          2259.92            .03       .03       .03
 Alignment 1          1738.73            .03       .03       .03
 Alignment 1          1188.69            .03       .03       .03
 Alignment 1          1100         Culvert
 Alignment 1          912.82             .03       .03       .03
 Alignment 1          761.19             .03       .03       .03
 Alignment 1          539.69             .03       .03       .03
 Alignment 1          400.35             .03       .03       .03
```

SUMMARY OF REACH LENGTHS

River: Alignment 1

Reach	River Sta.	Left	Channel	Right
Alignment 1	3896.89	542.43	542.43	542.43
Alignment 1	3354.46	656.02	656.02	656.02
Alignment 1	2698.44	112.16	112.16	112.16
Alignment 1	2586.28	216.27	216.27	216.27
Alignment 1	2574.08	Culvert		
Alignment 1	2370.01	631.28	631.28	631.28
Alignment 1	2259.92	521.19	521.19	521.19
Alignment 1	1738.73	550.04	550.04	550.04
Alignment 1	1188.69	579.36	579.36	579.36
Alignment 1	1100	Culvert		
Alignment 1	912.82	151.63	151.63	151.63
Alignment 1	761.19	171.5	171.5	171.5
Alignment 1	539.69	139.34	139.34	139.34
Alignment 1	400.35			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Alignment 1

Reach	River Sta.	Contr.	Expan.
Alignment 1	3896.89	.1	.3
Alignment 1	3354.46	.1	.3
Alignment 1	2698.44	.1	.3
Alignment 1	2586.28	.1	.3
Alignment 1	2574.08	Culvert	
Alignment 1	2370.01	.1	.3
Alignment 1	2259.92	.1	.3
Alignment 1	1738.73	.1	.3
Alignment 1	1188.69	.1	.3
Alignment 1	1100	Culvert	
Alignment 1	912.82	.1	.3
Alignment 1	761.19	.1	.3
Alignment 1	539.69	.1	.3
Alignment 1	400.35	.1	.3

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


 PROJECT DATA
 Project Title: Channel 2 Prop Floodplain
 Project File : Channel2PropFloodp.prj
 Run Date and Time: 12/18/2018 8:13:44 AM

 Project in English units



 PLAN DATA

 Plan Title: Existing
 Plan File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
2\Channel2PropFloodp.p01

           Geometry Title: Channel 2 Geom
           Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
2\Channel2PropFloodp.g01

           Flow Title    : EX Flow
           Flow File     : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
2\Channel2PropFloodp.f01

 Plan Summary Information:
 Number of:  Cross Sections =    4    Multiple Openings  =    0
             Culverts       =    0    Inline Structures  =    0
             Bridges        =    0    Lateral Structures =    0

 Computational Information
     Water surface calculation tolerance  =  0.01
     Critical depth calculation tolerance =  0.01
     Maximum number of iterations         =  20
     Maximum difference tolerance         =  0.3
     Flow tolerance factor                =  0.001

 Computation Options
     Critical depth computed only where necessary
     Conveyance Calculation Method: At breaks in n values only
     Friction Slope Method:         Average Conveyance
     Computational Flow Regime:     Subcritical Flow



 FLOW DATA

 Flow Title: EX Flow
 Flow File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
2\Channel2PropFloodp.f01

 Flow Data (cfs)

   River           Reach           RS                  PF 1
```



```
   Alignment 2     Alignment 2     2053.73             101.3


 Boundary Conditions

   River           Reach           Profile                     Upstream
Downstream

   Alignment 2     Alignment 2     PF 1                        Normal S = 0.1          Known
WS = 212



 GEOMETRY DATA

 Geometry Title: Channel 2 Geom
 Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
2\Channel2PropFloodp.g01

 CROSS SECTION


 RIVER: Alignment 2
 REACH: Alignment 2        RS: 2053.73

 INPUT
 Description:
 Station Elevation Data    num=      50
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0   420.29.390015  417.9426.43002  414.3526.62003  414.31   39.25  411.92
 50.45001  409.9269.48001  406.8271.30002  406.5876.12003  405.9189.83002  404.07
 94.98001  403.53  104.94  402.36  106.43  402.18  108.61  401.89  116.23  400.92
   123.27  400.14  137.08  398.39  138.64  398.16  139.77  397.91  149.48     396
   155.07  394.82  159.75  394.22  165.52  393.55  171.62  392.71     181  392.12
   182.61  392.04  183.94  392.71  197.88  398.67   202.4  399.51   205.9  399.94
   214.48  399.78  218.51  399.65   219.6  400.21  228.65  403.98  235.21  404.87
   246.34  407.24  261.79  409.89  274.88  412.13  293.87  415.84  299.95  417.09
   305.81  418.36  321.03   421.6  341.49   425.5  348.52  426.94  358.91   429.7
    368.8  432.51  381.37   434.9  382.58  435.08  385.16  435.38  386.23   435.5

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06  386.23     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  386.23           504.91  504.91  504.91             .1       .3

 CROSS SECTION


 RIVER: Alignment 2
 REACH: Alignment 2        RS: 1548.82

 INPUT
 Description:
 Station Elevation Data    num=      43
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0  390.029.630005  386.2324.14001  381.1230.30002  378.8933.64999  377.72
 45.83002  373.6852.08002  371.2658.96002  368.9370.89999  365.11   88.86   359.4
 97.67001  357.09  114.09  354.04  127.85  350.87  133.82  349.52   146.4  346.63
   153.13  345.32  171.13  342.32  174.82  341.67   176.6  341.36  193.72  338.54
    197.8  340.01  206.28  342.59  207.82  343.08  209.43  344.03  212.88  346.04
   221.32  351.05  226.56  350.62  229.91  350.44  240.64  349.81  241.84  349.72
   243.15  350.42  254.05  356.86  258.62  358.78  274.78  363.73  278.18  364.16
    292.4  365.44  297.17  365.54  309.67  367.22  314.38  367.13  317.39  367.13
   319.78  366.97  323.52  366.92  332.32  367.31

 Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  332.32     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0  332.32           444.76  444.76  444.76             .1       .3

CROSS SECTION


RIVER: Alignment 2
REACH: Alignment 2        RS: 1104.06

INPUT
Description:
Station Elevation Data    num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     288.1399841  287.99.8299866  287.922.329987   287.720.25998  285.64
   36.53  283.9845.38998  283.0951.59998  282.2468.04999  279.9873.81999  279.24
75.43999  278.9881.54999  278.2590.80998  277.1892.56999  276.9193.35999  276.79
  101.46  270.52  112.04  261.67  124.94  253.93  128.13  252.24  129.67  251.41
  142.13  244.49  147.62  246.48   150.7  247.55  151.71   247.9  161.62  252.61
  161.83  252.74  163.15  253.47  171.48  257.92  174.72  260.11  182.99  265.54
  195.54  271.12  197.24  271.81  199.75  272.14   224.1  275.25  225.04  275.38
   226.9  275.64  239.64  277.19  243.06  277.04  251.79  277.08  257.78  277.03
  260.63  277.32  271.21  277.34  289.02  277.55  295.66  277.62   323.8  278.01

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06   323.8     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0   323.8           814.73  814.73  814.73             .1       .3

CROSS SECTION


RIVER: Alignment 2
REACH: Alignment 2        RS: 289.33

INPUT
Description:
Station Elevation Data    num=      63
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  217.027.910004  216.449.320007  216.339.779999  216.22   19.59  214.93
44.41998  213.8459.88998  213.2362.82001  213.0976.35001  212.4891.51999  212.27
  102.16  212.17  116.98   211.7  125.31  211.51  133.07  211.24  156.35   210.7
  161.27   210.7  163.79  210.77  171.98  210.96  175.93  213.96  176.83  214.46
  178.26  215.13  178.89  215.38  179.25  215.19  184.35  212.95  186.23  211.51
   188.3  210.22  194.77  209.23  199.42   208.6  210.83  208.34  211.06  208.33
  211.15  208.33  217.43  208.38  223.38  208.72  227.39  208.81  230.82  208.75
  235.52  208.64  237.27   208.6  251.41  208.61  263.55  208.61  267.27  208.63
  274.26  208.65  278.35  208.67  279.09  208.66  286.89  208.66  287.61  208.66
  288.58  208.66  295.46  208.59  301.59  208.61  305.37  208.61   307.2  208.65
  315.16   208.8  322.81  208.77  333.19  207.58  335.12  207.34  345.07  207.01
  348.26  206.87  372.23  206.63  391.53  206.48  396.72  206.48  414.56   206.5
  428.98  206.54  433.19  206.53  434.15  206.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  434.15     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
            0  434.15             .1       .3


SUMMARY OF MANNING'S N VALUES

River:Alignment 2

      Reach          River Sta.       n1        n2        n3
```



```
 Alignment 2          2053.73            .06       .06       .06
 Alignment 2          1548.82            .06       .06       .06
 Alignment 2          1104.06            .06       .06       .06
 Alignment 2          289.33             .06       .06       .06


SUMMARY OF REACH LENGTHS

River: Alignment 2

      Reach          River Sta.      Left     Channel    Right

 Alignment 2          2053.73         504.91    504.91    504.91
 Alignment 2          1548.82         444.76    444.76    444.76
 Alignment 2          1104.06         814.73    814.73    814.73
 Alignment 2          289.33



SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Alignment 2


      Reach          River Sta.     Contr.    Expan.

 Alignment 2          2053.73          .1        .3
 Alignment 2          1548.82          .1        .3
 Alignment 2          1104.06          .1        .3
 Alignment 2          289.33           .1        .3
```

```
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                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


           X     X  XXXXXX    XXXX        XXXX       XX      XXXX
           X     X  X        X    X       X   X     X  X    X
           X     X  X        X            X   X    X    X   X
           XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
           X     X  X        X            X  X     X    X        X
           X     X  X        X    X       X   X    X    X        X
           X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


 PROJECT DATA
 Project Title: Channel 3 Proposed Downstream
 Project File : Channel3Proposed.prj
 Run Date and Time: 12/18/2018 8:12:47 AM

 Project in English units



 PLAN DATA

 Plan Title: Channel3 DS
 Plan File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
3\Channel3Proposed.p07

            Geometry Title: Channel 3 Geom DownstreamOnly
            Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
3\Channel3Proposed.g04

            Flow Title    : Ex Flow
            Flow File     : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
3\Channel3Proposed.f01

 Plan Summary Information:
 Number of:  Cross Sections =    2    Multiple Openings  =    0
             Culverts       =    0    Inline Structures  =    0
             Bridges        =    0    Lateral Structures =    0

 Computational Information
     Water surface calculation tolerance  =  0.01
     Critical depth calculation tolerance =  0.01
     Maximum number of iterations         =  20
     Maximum difference tolerance         =  0.3
     Flow tolerance factor                =  0.001

 Computation Options
     Critical depth computed only where necessary
     Conveyance Calculation Method: At breaks in n values only
     Friction Slope Method:         Average Conveyance
     Computational Flow Regime:     Subcritical Flow




 FLOW DATA

 Flow Title: Ex Flow
 Flow File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
3\Channel3Proposed.f01

 Flow Data (cfs)

   River           Reach           RS                  PF 1
```



```
   Alignment 3     Alignment 3     514.45             114.77


 Boundary Conditions

   River           Reach           Profile                    Upstream
Downstream

   Alignment 3     Alignment 3     PF 1                       Normal S = 0.48         Known
WS = 216.5



 GEOMETRY DATA

 Geometry Title: Channel 3 Geom DownstreamOnly
 Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
3\Channel3Proposed.g04

 CROSS SECTION


 RIVER: Alignment 3
 REACH: Alignment 3        RS: 514.45

 INPUT
 Description:
 Station Elevation Data    num=      28
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0  233.97    3.75   233.7   30.01  233.06   47.41  232.04   58.87  231.04
    76.15  230.63    95.4  230.06  133.24  229.74  143.39  229.71  148.55   229.2
   174.31  229.07  191.38  228.99  202.12     229  203.15  228.74  218.49   228.6
   242.33  228.56  281.43  228.55   288.4  228.51  294.14  228.59  316.82  228.92
   344.38     229  344.58 229.004  345.94  229.03  373.62  229.22  397.75  229.18
   407.32  229.22  430.49  229.25  449.56   229.1

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06  148.55     .06  344.58     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        148.55  344.58           368.42  368.42  368.42             .1       .3

 CROSS SECTION


 RIVER: Alignment 3
 REACH: Alignment 3        RS: 146.03

 INPUT
 Description:
 Station Elevation Data    num=      48
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0  219.12      20  219.1225.77002  219.2932.42999  219.7142.64001  220.01
 48.04999  220.1266.85999  220.3375.32001  220.3792.46002  220.45  104.33  220.44
   108.52  220.49  117.69  220.44  132.99  220.36   159.7  219.73  161.69  219.68
    163.9  219.63  171.34  219.45  206.58  218.55  215.95  218.24  220.65  218.08
   240.17  217.85  250.22  217.74  255.98  217.72  279.53  217.49  302.08  217.75
   308.84  217.78  320.65  217.73  334.34  217.51  351.41  217.55  365.58  217.52
    395.9  217.37  399.79   217.3  403.83  217.32  418.62  217.22   438.3   217.1
   443.28  217.06   455.2  216.93  481.61  216.45  486.46  216.43  492.98  216.39
   532.56   216.3   537.9  216.36  562.09     216  578.64  215.78  601.91  215.35
   624.76  214.95  642.74  214.69   664.5  214.53

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06   664.5     .06
```

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
             0   664.5             .1       .3


SUMMARY OF MANNING'S N VALUES

River:Alignment 3

      Reach          River Sta.       n1        n2        n3

 Alignment 3          514.45             .06       .06       .06
 Alignment 3          146.03             .06       .06       .06



SUMMARY OF REACH LENGTHS

River: Alignment 3

      Reach          River Sta.      Left     Channel    Right

 Alignment 3          514.45          368.42    368.42    368.42
 Alignment 3          146.03


SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Alignment 3


      Reach          River Sta.     Contr.    Expan.

 Alignment 3          514.45           .1        .3
 Alignment 3          146.03           .1        .3
```

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           X     X  XXXXXX    XXXX        XXXX       XX      XXXX
           X     X  X        X    X       X   X     X  X    X
           X     X  X        X            X   X    X    X   X
           XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
           X     X  X        X            X  X     X    X        X
           X     X  X        X    X       X   X    X    X        X
           X     X  XXXXXX    XXXX        X    X   X    X   XXXXX



 PROJECT DATA
 Project Title: Channel 3 Proposed Upstream
 Project File : Channel3PropUS.prj
 Run Date and Time: 12/18/2018 8:14:30 AM

 Project in English units



 PLAN DATA

 Plan Title: Prop US
 Plan File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel 3\Channel3PropUS.p01

           Geometry Title: Channel 3 Upstream
           Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
3\Channel3PropUS.g03

           Flow Title    : Ex Flow
           Flow File     : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
3\Channel3PropUS.f01

 Plan Summary Information:
 Number of:  Cross Sections =    3    Multiple Openings  =    0
             Culverts       =    0    Inline Structures  =    0
             Bridges        =    0    Lateral Structures =    0

 Computational Information
     Water surface calculation tolerance  =  0.01
     Critical depth calculation tolerance =  0.01
     Maximum number of iterations         =  20
     Maximum difference tolerance         =  0.3
     Flow tolerance factor                =  0.001

 Computation Options
     Critical depth computed only where necessary
     Conveyance Calculation Method: At breaks in n values only
     Friction Slope Method:         Average Conveyance
     Computational Flow Regime:     Subcritical Flow



 FLOW DATA

 Flow Title: Ex Flow
 Flow File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel 3\Channel3PropUS.f01

 Flow Data (cfs)

   River          Reach          RS                  PF 1
   Alignment 3    Alignment 3    3377.89             135.5
```



```
 Boundary Conditions

   River          Reach          Profile                      Upstream
Downstream

   Alignment 3    Alignment 3    PF 1                         Normal S = 0.28         Known
WS = 216.5



 GEOMETRY DATA

 Geometry Title: Channel 3 Upstream
 Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
3\Channel3PropUS.g03

 CROSS SECTION


 RIVER: Alignment 3
 REACH: Alignment 3        RS: 3377.89

 INPUT
 Description:
 Station Elevation Data    num=      32
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0  619.131.450012  618.797.130005  618.018.820007   617.827.23001  615.88
    31.02  615.39   35.47  613.85   47.52  612.0559.14001  607.5667.14001  605.31
    69.94  603.93   73.01  603.01   82.95  598.6186.82001  596.89   95.23  602.17
 99.28001  604.83  101.27  605.93  113.66  612.73  117.57  615.72  123.21  619.49
   125.18  618.71  129.46  616.87  134.05  616.76  142.38  617.56  144.49  617.98
   150.39  618.14  150.62  618.18  155.38  620.95  158.82  622.92  159.14  623.16
   167.93  624.85  169.24  624.98

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06  169.24     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  169.24           720.66  720.66  720.66             .1       .3

 CROSS SECTION


 RIVER: Alignment 3
 REACH: Alignment 3        RS: 2706.67

 INPUT
 Description:
 Station Elevation Data    num=      44
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0  461.194.690002  461.0531.57001  461.02   35.22   460.9   43.88  460.63
74.99001  459.6497.79001  458.0698.54001  458.0399.94002   457.9  109.94  457.01
   115.48  455.87  116.03  455.81  116.89  455.38  119.16  454.63  123.56  452.04
   135.34  447.14   136.9  446.21  138.59  446.64  142.44  447.62  145.86  449.35
   151.75  453.43  156.73  456.68  160.57  458.56  169.75  463.04  169.94  463.16
   170.18  463.15   187.2  463.71  191.12  463.43  204.34  462.69  207.94  462.66
   208.86  462.56  211.22  463.06  212.41  463.11  220.29  463.64  221.47  463.75
   222.39  463.73  253.11   463.8  255.29  463.79  257.98  463.81  287.95  464.06
   301.98  464.19  302.82  464.22  310.65  464.48  311.45  464.51

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06  311.45     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  311.45          1083.54 1083.54 1083.54             .1       .3
```

CROSS SECTION

RIVER: Alignment 3
REACH: Alignment 3 RS: 1623.13

INPUT
Description:
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	305.323.519989	304.94	4	304.894.170013		304.884.299988		304.87	
4.51001	304.865.220001	304.8415.42999		304.2915.82999		304.2516.29001		304.2	
17.35001	304.1226.54999	303.5828.23001		303.3530.35999		302.97	38.41	302.58	
46.64999	302.2948.54999	301.9	56.47	300.6156.67999		300.55	57.28	300.39	
63.29001	298.769.60999	297.3974.57001		296.7878.60001		296.61	85.28	296.28	
95.88	296.06	98.25	295.96	101.51	295.73	114.51	295.52	124.1	295.32
125.35	295.31	141.07	295.2	141.94	295.18	156.87	294.88	159.94	294.87
182.03	294.38	185.77	294.36	193.98	294.47	195.2	294.48	202.3	294.51
205.44	294.53	208.81	294.53	210.16	294.48	218.47	294.28	221.24	294.11
233.12	293.53	236.64	293.36	242.64	292.17	244.64	291.77	253.06	291.19
253.09	291.18	266.79	290.76	268.15	290.76	283.15	290.79	285.79	290.84
292.35	292.64	294.57	293.01	301.63	293.28	302.59	293.36	306.85	293.48
311.8	293.94	316.43	294.04	323.53	294.15	343.57	293.84	345.43	293.95
346.84	294.05	347.44	294.12	354.6	294.42	390.45	295.97	417.63	297.3
432.59	298.14	435.75	298.39						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	0	.06	435.75	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	435.75	1108.68	1108.68 1108.68	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Alignment 3

Reach	River Sta.	n1	n2	n3
Alignment 3	3377.89	.06	.06	.06
Alignment 3	2706.67	.06	.06	.06
Alignment 3	1623.13	.06	.06	.06

SUMMARY OF REACH LENGTHS

River: Alignment 3

Reach	River Sta.	Left	Channel	Right
Alignment 3	3377.89	720.66	720.66	720.66
Alignment 3	2706.67	1083.54	1083.54	1083.54
Alignment 3	1623.13	1108.68	1108.68	1108.68

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Alignment 3

Reach	River Sta.	Contr.	Expan.
Alignment 3	3377.89	.1	.3
Alignment 3	2706.67	.1	.3
Alignment 3	1623.13	.1	.3

```
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                     Hydrologic Engineering Center
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                           Davis, California


           X     X  XXXXXX    XXXX        XXXX       XX      XXXX
           X     X  X        X    X       X   X     X  X    X
           X     X  X        X            X   X    X    X   X
           XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
           X     X  X        X            X  X     X    X        X
           X     X  X        X    X       X   X    X    X        X
           X     X  XXXXXX    XXXX        X    X   X    X   XXXXX



 PROJECT DATA
 Project Title: Channel 4 Prop
 Project File : Channel4Prop.prj
 Run Date and Time: 12/18/2018 8:12:05 AM

 Project in English units



 PLAN DATA

 Plan Title: Proposed conditions
 Plan File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel 4\Channel4Prop.p03

           Geometry Title: Channel 4 Propr
           Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
→4\Channel4Prop.g02

           Flow Title    : Channel 4 Ex Flow
           Flow File     : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel
→4\Channel4Prop.f01

 Plan Summary Information:
 Number of:  Cross Sections =   10    Multiple Openings  =    0
             Culverts       =    1    Inline Structures  =    0
             Bridges        =    0    Lateral Structures =    0

 Computational Information
     Water surface calculation tolerance  =  0.01
     Critical depth calculation tolerance =  0.01
     Maximum number of iterations         =  20
     Maximum difference tolerance         =  0.3
     Flow tolerance factor                =  0.001

 Computation Options
     Critical depth computed only where necessary
     Conveyance Calculation Method: At breaks in n values only
     Friction Slope Method:         Average Conveyance
     Computational Flow Regime:     Subcritical Flow



 FLOW DATA

 Flow Title: Channel 4 Ex Flow
 Flow File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel 4\Channel4Prop.f01

 Flow Data (cfs)

   River           Reach           RS                  PF 1
   Alignment 4 EastAlignment 4 East4418.6             893.3
```



```
 Boundary Conditions
                                                                                →
→
   River           Reach           Profile                       Upstream       →
→Downstream
                                                                                →
→
   Alignment 4 EastAlignment 4 EastPF 1                       Normal S = 0.2    Known →
→WS = 223
                                                                                →
→



 GEOMETRY DATA

 Geometry Title: Channel 4 Propr
 Geometry File : p:\4192\Engr\Reports\Drainage\HYDRA\HEC-RAS\Proposed\Channel                →
→4\Channel4Prop.g02

 CROSS SECTION


 RIVER: Alignment 4 East
 REACH: Alignment 4 East   RS: 4418.6

 INPUT
 Description:
 Station Elevation Data    num=      33
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 26.17999  340.5342.01999  336.6845.48999  335.77   46.53  335.61   46.84  335.54
 49.85999  334.66   66.97   329.9   69.63  329.1574.73999  327.95  101.65  322.45
   132.33  318.11  148.09  316.44  154.51   315.8  157.75  315.43  170.03  313.92
   189.69  311.28  198.04  309.62  217.04  306.23  227.96  304.37  238.78  301.47
   242.97  301.33   274.4   301.2  297.58  301.15  300.79  301.12  328.85  300.85
    330.3  301.13  363.16   309.7  374.09  313.07  405.45  323.35  435.27  331.39
   448.16  335.02  456.58   337.3  456.75  337.35

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
 26.17999     .0626.17999     .06  456.75     .06

 Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       26.17999  456.75           850.53  850.53  850.53             .1       .3

 CROSS SECTION


 RIVER: Alignment 4 East
 REACH: Alignment 4 East   RS: 3568.07

 INPUT
 Description:
 Station Elevation Data    num=      56
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0  317.931.349976  317.8920.66998  316.83   27.69  316.3633.20001  315.99
 38.83997  315.7464.45001  312.0774.14999  310.6885.43997  308.17   94.59  305.59
 97.99997  304.89  115.43  300.87  123.95  299.38  142.12  296.91   152.6  295.25
   168.46  293.96  176.81     293  185.28  291.93  193.25  291.76  194.67  291.73
   199.75  290.84  205.97  289.45  209.63  288.86   215.2  287.91   220.3  287.48
   233.07  286.25  235.78  286.25  236.63  286.25  239.63  286.25  336.96  286.25
   360.66  286.25   406.3  286.25  416.96  286.25  417.11  286.25  418.58  286.54
   423.83  287.45  426.54  287.73  435.74   288.4  442.98  289.07   452.8  291.06
   455.46  291.34  467.04   293.5  467.47  293.57   467.7  293.62  468.02  293.63
   475.64  293.87  484.84  296.96  489.82  298.49  491.67  299.18   526.1  311.36
      527  311.67  528.38  312.06  532.26  313.46   558.3  322.43  572.45  327.76
   580.42  330.63

 Manning's n Values        num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
        0     .06       0     .06  580.42     .06
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  580.42           217.44  217.44  217.44             .1       .3

CROSS SECTION


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 3350.63

INPUT
Description:
Station Elevation Data    num=      70
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  298.028.440002  297.3133.71002  293.9234.74005  293.7835.68005  293.63
48.13004   291.556.89001  288.3460.14001  287.0164.67001  286.2575.03003  284.53
78.07004  283.9981.48004  283.47  103.13  285.67  108.32  286.02  118.15  288.17
  123.05  289.84  131.89  294.43  133.79  295.29  150.07  298.02  151.29  298.22
   152.2  298.36  157.26  298.72  172.61  299.04  183.26  298.99  189.93  298.86
  198.43  297.95  209.37  296.81  219.65  295.62  226.43  294.76  235.48  293.44
  243.17  292.03   252.2  290.89  263.56   290.1  279.55  290.11  281.76  290.12
  282.97  290.09  299.86  289.97  305.02  289.96   320.5  289.79  327.87  289.77
  344.32  289.69   348.6  289.74  357.78  289.81  371.19  289.87  373.07  289.84
  391.09  289.77  393.21  289.74   405.2  289.82  417.27  289.77   420.7  289.78
  424.64  289.82  444.47  290.02  450.47  289.98  460.77  290.33  466.64  290.57
  472.55  291.02  476.04  291.09   480.1  291.28   481.3   291.3   488.7  291.68
  496.48  292.18  506.32  294.13  506.43  294.16  506.49   294.2  516.04  300.55
  528.77  306.07   535.1  307.93  547.78  312.58   552.9  314.66  553.84  315.03

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  553.84     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  553.84           122.97  122.97  122.97             .1       .3

CROSS SECTION


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 3227.66

INPUT
Description:
Station Elevation Data    num=      60
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  292.054.920013  291.936.640015  291.8916.33002  291.64   23.19  291.28
28.55002  290.8529.33002  290.8535.58002  289.0939.82001  287.6645.61002  285.54
55.27002  281.8563.39999  278.78   65.19  278.6275.67999  277.7581.26001  277.26
82.27002  277.25   90.37  277.23  108.02  277.15  111.69  276.99   119.9   276.4
  131.11  275.95  155.63  275.45  189.11  276.01  194.49  276.06  194.84  276.27
   199.5  277.83  205.31  274.21  207.45   272.8  210.51  272.12  220.54  270.32
  237.76  268.25   241.1  267.99  243.26  268.01  243.63  268.02  273.57  267.49
  278.09  267.12  279.84  267.12  330.64  267.03  365.73  266.97  366.97  267.19
  380.15   268.3  400.84  272.05   403.1  272.38  404.11  272.56  417.66  275.29
  432.63   280.9  441.71  284.51  445.11  284.82  449.73  285.31  455.38  286.01
  458.01  286.31  466.52  292.45  468.19   293.4  473.62  294.65  474.88  295.31
  484.03   298.4   486.8  299.73  493.97   301.9  497.71  302.86  501.85  303.97

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  501.85     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  501.85           414.19  414.19  414.19             .1       .3

CROSS SECTION


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 2813.47
```



```
INPUT
Description:
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  273.9922.20001  271.1536.17001  268.48   51.69  266.77   79.03  263.12
80.79001  262.9181.42999  262.8382.26999  262.76   84.87  262.52   114.3  260.25
   124.7  259.44     125  259.43   127.1  259.26  138.88  258.44  142.48  258.19
  148.43  257.85  164.53   256.6  166.91   256.4  171.85  255.99  197.73     254
  206.03  254.17  214.06  254.45  249.34  255.48  250.73  255.58  254.03  255.87
  269.62  257.06  280.34  259.32  282.98  259.74  285.19  259.09  287.44  258.27
   290.1  258.15   292.4  258.02   306.5  258.75  310.01  258.99  320.72  260.21
  322.95  260.46  325.21  260.65  368.51  265.06  370.18  265.21  371.84  265.45
  398.16  268.44  422.11  271.89  433.64  273.26  439.28  273.81

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  439.28     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  439.28          1192.52 1192.52 1192.52             .1       .3

CROSS SECTION


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 1620.95

INPUT
Description:
Station Elevation Data    num=      64
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  234.394.889954  233.9319.88995   232.931.69995  232.52   48.38  231.77
69.55997  231.1482.59998  230.96   130.8  230.63  133.51  230.61  134.24  230.61
  162.31  230.96  184.41  231.45   190.8   231.6  198.91  231.68  219.28  231.97
  235.31  232.12  253.72  232.36   260.4  232.44  274.04  232.35  274.23  232.35
  274.31  232.34  278.88  231.79  285.23  230.37   287.7  229.96  293.44  229.59
  300.12   229.2  304.58  229.87   313.7  231.12  313.71  231.12  320.69  232.13
  326.32  232.79  328.84  233.36   335.8  234.75  339.26  234.09   343.7  232.99
   350.5  232.59  351.28  232.53   353.1  232.52  354.14  232.49  356.69  232.48
  365.06  232.45  379.86  232.35  381.52  232.37  390.17  232.25   390.3  232.25
  390.46  232.25  403.34  232.17  403.73  232.17   404.7  232.17  406.63  232.19
  416.54  232.25  421.98  232.27  432.03  232.31  440.21  232.34  446.82  232.37
  458.67  232.52  476.08  232.77  484.75  232.95  487.54  233.03  512.05  234.24
  525.21  234.71  542.55  236.08  565.72  237.65  578.54  238.94

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  578.54     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  578.54           126.16  126.16  126.16             .1       .3

CROSS SECTION


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 1494.79

INPUT
Description:
Station Elevation Data    num=      54
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  232.99    6.02  232.52   28.94 231.196   33.19  230.95   34.31  230.87
   35.47  230.82   88.51  229.88   93.38   229.8  119.18  229.66  143.83  229.76
  147.47  229.76  151.28  229.77  199.15  230.14  201.23  230.18  206.93   230.2
  210.95  230.22  247.17   230.8  252.12  230.75  270.09  230.78  277.18  230.51
  285.27 230.142  285.54  230.13  288.33  229.64   293.7  228.83  300.92  227.51
  304.84   226.7   309.3  226.77  311.81  226.64  317.99  228.06  324.76  229.26
  334.67   231.1  335.28 231.196  337.53  231.55  340.15 231.958  341.51  232.17
   343.4  232.33  350.21  232.88  350.88  232.95  355.13  233.35  356.65  232.82
  362.04  230.99  364.63  231.11  365.42  231.18  372.53  231.68  380.33  232.21
  381.11  232.25  385.11  232.44  413.32  234.47  437.98  237.47  453.59  239.25
```

```
  476.55  241.37  492.95  243.37  514.47   244.8  521.03     245

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   28.94     .06  335.28     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          28.94  335.28             95.75   95.75   95.75             .1      .3

CROSS SECTION


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 1422.96

INPUT
Description:
Station Elevation Data    num=      50
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   231.65.790009  231.1513.52002  230.7153.01001  229.69   72.63  229.37
74.90002  229.36   91.16  229.26  119.95  228.99  122.55  228.99  163.76  228.98
  165.16  228.97   181.6  229.11  206.05  229.36  243.35  229.43  246.73  229.44
  248.28  229.44  253.62  229.45  257.47  229.47  260.53  229.29  271.75  228.67
  273.46  228.44  277.03  227.88  278.88  227.43  281.94  226.56  287.91  225.55
  287.95  225.54     289  225.76  297.17  227.49  298.58  227.73  300.08  228.03
   300.4  228.09  300.94  228.19  312.24  230.29  315.41  231.17  320.95  232.18
  323.04  232.54   324.4  232.17  333.83  229.25   337.1  229.81  343.77  230.83
  354.76  232.17  357.88  232.59  362.53  232.87  378.59  234.27  402.93  236.98
  410.39  237.92  417.62  238.36  437.25   238.7  450.09  238.98  483.98  238.68

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  483.98     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0  483.98             85.72   85.72   85.72             .1      .3

CULVERT


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 1399.08

INPUT
Description:
Distance from Upstream XS =     6.3
Deck/Roadway Width        =      71
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       8
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   233.3           120.75     234          218.83     235
  283.83     236           348.16     237          411.15     238
  471.94     239           533.77     240

Upstream Bridge Cross Section Data
Station Elevation Data    num=      50
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   231.65.790009  231.1513.52002  230.7153.01001  229.69   72.63  229.37
74.90002  229.36   91.16  229.26  119.95  228.99  122.55  228.99  163.76  228.98
  165.16  228.97   181.6  229.11  206.05  229.36  243.35  229.43  246.73  229.44
  248.28  229.44  253.62  229.45  257.47  229.47  260.53  229.29  271.75  228.67
  273.46  228.44  277.03  227.88  278.88  227.43  281.94  226.56  287.91  225.55
  287.95  225.54     289  225.76  297.17  227.49  298.58  227.73  300.08  228.03
   300.4  228.09  300.94  228.19  312.24  230.29  315.41  231.17  320.95  232.18
  323.04  232.54   324.4  232.17  333.83  229.25   337.1  229.81  343.77  230.83
  354.76  232.17  357.88  232.59  362.53  232.87  378.59  234.27  402.93  236.98
  410.39  237.92  417.62  238.36  437.25   238.7  450.09  238.98  483.98  238.68

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  483.98     .06
```



```
Bank Sta: Left   Right    Coeff Contr.   Expan.
            0  483.98            .1       .3

Downstream  Deck/Roadway Coordinates
    num=       8
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   233.3           120.75     234          218.83     235
  283.83     236           348.16     237          411.15     238
  471.94     239           533.77     240

Downstream Bridge Cross Section Data
Station Elevation Data    num=      59
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  231.167.840027  230.9917.35004  230.6636.15002  230.0656.80005   229.2
71.45001  228.9974.90002  228.91  110.45  227.85  121.34  227.81  135.03  227.59
  149.81   227.4  161.57  227.28  199.27   227.4  212.69  227.43   213.5  227.44
  238.42  227.56  254.25   227.7  281.63     228  295.65   228.2  309.64  228.17
  319.58  228.14  326.27  228.15   327.9  227.99  342.88  226.65  346.25   226.2
  352.23  225.61  353.45  225.42  360.86  224.33  365.11  225.75  370.38   227.5
  370.49  227.54  370.55  227.55  381.57  229.37   388.3  230.15     392  230.53
  394.27  229.93  403.29  227.45  404.65  227.71  408.02  228.17  411.88  228.22
  419.55  228.81   420.7  228.81  458.83  228.83  486.54  228.98  499.57  228.97
  537.02  228.77540.3101  228.78  542.53  228.77  554.05  228.67576.6801  228.67
  581.04  228.62   587.5  228.56  621.78  228.74  644.97  228.82   658.9  228.89
  663.56  229.08  676.06  229.77  690.08  230.42  714.65     232

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  714.65     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
            0  714.65            .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       5      12
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss
Coef
              6.3      71     .013     .013        0                    .5                1
Number of Barrels =  3
Upstream   Elevation =  225.8
Centerline Stations
    Sta.    Sta.    Sta.
  287.73  300.97     314
Downstream Elevation =  225.38
Centerline Stations
    Sta.    Sta.    Sta.
  354.73  367.55  380.54

CROSS SECTION


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 1337.24

INPUT
Description:
Station Elevation Data    num=      59
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0  231.167.840027  230.9917.35004  230.6636.15002  230.0656.80005   229.2
71.45001  228.9974.90002  228.91  110.45  227.85  121.34  227.81  135.03  227.59
  149.81   227.4  161.57  227.28  199.27   227.4  212.69  227.43   213.5  227.44
  238.42  227.56  254.25   227.7  281.63     228  295.65   228.2  309.64  228.17
  319.58  228.14  326.27  228.15   327.9  227.99  342.88  226.65  346.25   226.2
  352.23  225.61  353.45  225.42  360.86  224.33  365.11  225.75  370.38   227.5
  370.49  227.54  370.55  227.55  381.57  229.37   388.3  230.15     392  230.53
  394.27  229.93  403.29  227.45  404.65  227.71  408.02  228.17  411.88  228.22
  419.55  228.81   420.7  228.81  458.83  228.83  486.54  228.98  499.57  228.97
  537.02  228.77540.3101  228.78  542.53  228.77  554.05  228.67576.6801  228.67
  581.04  228.62   587.5  228.56  621.78  228.74  644.97  228.82   658.9  228.89
  663.56  229.08  676.06  229.77  690.08  230.42  714.65     232

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  714.65     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0  714.65           140.31  140.31  140.31             .1       .3

CROSS SECTION


RIVER: Alignment 4 East
REACH: Alignment 4 East   RS: 1196.93

INPUT
Description:
Station Elevation Data    num=      90
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  235.97   30.91  234.14    58.9  231.98   74.29  230.95   77.48  230.79
   92.23  229.86  106.82  228.84  117.01  228.01  123.68  227.56  133.69  226.71
   139.2  225.86   142.1  225.65  155.37  224.81  161.06  224.28  172.24  223.99
  198.87  223.33  202.35  223.28  204.45   223.2  208.49  223.14  233.73  222.76
  251.52  222.77  260.88  222.78  267.17  222.88  293.56  223.65  300.35  223.84
  301.86  223.87  304.24  223.88  342.84  224.07  360.45  224.32  380.75  224.58
  393.63  224.58  397.36  224.67  404.47  224.79  419.14  224.99  426.14  225.15
  437.83  225.17  455.23  225.28  465.78  225.34  468.06  225.34  476.75  225.46
  486.65  225.06  492.09  224.92  497.27  225.42  497.81  225.45  507.06  228.72
  507.44  228.83  508.38  228.69  521.91  227.01  526.64  225.94  528.37  225.57
  533.78  224.41  536.59  223.81  540.56  222.85  540.71  222.82  540.92  222.79
  545.65  222.27  549.89  222.66  560.07  224.01  561.48  224.09  567.14  224.32
   568.1  224.37  586.58  225.49  595.64  225.51  595.78  225.52  596.18  225.52
  618.26  225.33   637.6  225.28  673.69   224.9  681.72  224.83  684.65  224.78
  690.94  224.81  714.76  224.78  725.85  224.74  756.27  224.52  769.97   224.4
  774.97  224.53   785.7  224.61  805.07  224.77   814.1  224.71  838.85  224.89
  858.22  225.04  866.52 225.311  872.03  225.49  894.54  225.99  904.06  226.29
  907.49  226.41  908.11  226.36  914.77  226.32  946.47  225.92  950.33  225.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06       0     .06  866.52     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
            0  866.52            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  449.81  950.33               F


SUMMARY OF MANNING'S N VALUES

River:Alignment 4 East

      Reach          River Sta.       n1        n2        n3

 Alignment 4 East     4418.6            .06       .06       .06
 Alignment 4 East     3568.07           .06       .06       .06
 Alignment 4 East     3350.63           .06       .06       .06
 Alignment 4 East     3227.66           .06       .06       .06
 Alignment 4 East     2813.47           .06       .06       .06
```



```
 Alignment 4 East     1620.95           .06       .06       .06
 Alignment 4 East     1494.79           .06       .06       .06
 Alignment 4 East     1422.96           .06       .06       .06
 Alignment 4 East     1399.08      Culvert
 Alignment 4 East     1337.24           .06       .06       .06
 Alignment 4 East     1196.93           .06       .06       .06



SUMMARY OF REACH LENGTHS

River: Alignment 4 East

      Reach          River Sta.      Left     Channel    Right

 Alignment 4 East     4418.6           850.53    850.53    850.53
 Alignment 4 East     3568.07          217.44    217.44    217.44
 Alignment 4 East     3350.63          122.97    122.97    122.97
 Alignment 4 East     3227.66          414.19    414.19    414.19
 Alignment 4 East     2813.47         1192.52   1192.52   1192.52
 Alignment 4 East     1620.95          126.16    126.16    126.16
 Alignment 4 East     1494.79           95.75     95.75     95.75
 Alignment 4 East     1422.96           85.72     85.72     85.72
 Alignment 4 East     1399.08      Culvert
 Alignment 4 East     1337.24          140.31    140.31    140.31
 Alignment 4 East     1196.93



SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Alignment 4 East


      Reach          River Sta.     Contr.    Expan.

 Alignment 4 East     4418.6            .1        .3
 Alignment 4 East     3568.07           .1        .3
 Alignment 4 East     3350.63           .1        .3
 Alignment 4 East     3227.66           .1        .3
 Alignment 4 East     2813.47           .1        .3
 Alignment 4 East     1620.95           .1        .3
 Alignment 4 East     1494.79           .1        .3
 Alignment 4 East     1422.96           .1        .3
 Alignment 4 East     1399.08  Culvert
 Alignment 4 East     1337.24           .1        .3
 Alignment 4 East     1196.93           .1        .3
```



LEGEND

STATION ALONG CENTER OF FLOW ANALYSIS	1+00.00
INUDATION LINES FOR DRAINAGE AREAS OVER 25 ACRES (NON-FEMA)	— — — —

N

SCALE:	1"=150'
JOB #:	4192
CREATED:	8/29/18

PREPARED BY:

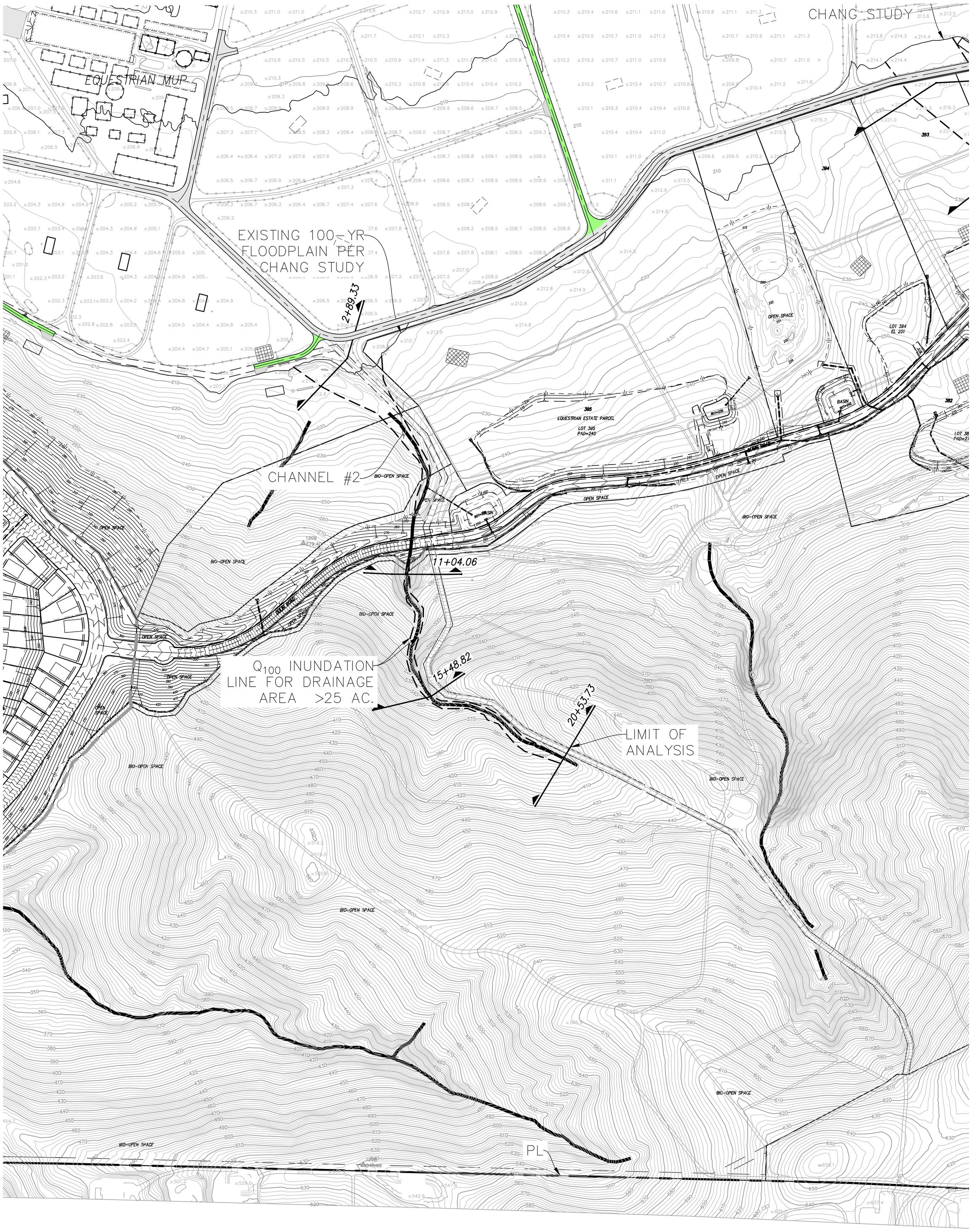
PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey

701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

PROPOSED CONDITIONS
100-YR FLOODPLAIN INUNDATION
HEC- RAS Exhibit (1 of 4)



LEGEND

STATION ALONG CENTER OF FLOW ANALYSIS	1+00.00
INUDATION LINES FOR DRAINAGE AREAS OVER 25 ACRES (NON-FEMA)	— — — —

SCALE: 1"=150'

JOB #: 4192

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COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

PROPOSED CONDITIONS
100-YR FLOODPLAIN INUNDATION
HEC- RAS Exhibit (2 of 4)

P:\4192\Engr\Reports\Drainage\EXH\Floodplain\4192 - Floodplain Exh.dwg 5/21/2019 6:29:29 AM

EXISTING 100-YR FLOODPLAIN PER CHANG STUDY

EXISTING 100-YR FLOODPLAIN PER CHANG STUDY

CHANNEL #4

CHANNEL #3

Q_{100} INUNDATION LINE FOR DRAINAGE AREA >25 AC.

Q_{100} INUNDATION LINE FOR DRAINAGE AREA >25 AC.

Q_{100} INUNDATION LINE FOR DRAINAGE AREA >25 AC.

LIMIT OF ANALYSIS

LIMIT OF ANALYSIS

NORMAN L. SULLIVAN MIDDLE SCHOOL

1+46.03

5+14.45

11+90.

13+37.24

14+94.79

16+20.95

0+00.00

2+26.06

6+71.03

12+72.05

16+23.13

27+06.67

33+77.89

16+01.

BASIN B01=223

BASIN B01=235

BASIN B01=268

BASIN B01=268

LOT 382 PAD=273

LOT 383 PAD=275

LOT 384 PAD=270

LOT 385 PAD=280

LOT 387 PAD=300

LOT 388 EL 296

LOT 389 EL 271

LOT 390 EL 240

LOT 391 EL 249

LOT 392 EL 249

LOT 393 EL 246

LOT 394 EL 251

LOT 385B PAD=280

OPEN SPACE

BIO-OPEN SPACE

REMAINDER PARCEL

Cell Towers

West Lilac Road

PL

LEGEND

STATION ALONG CENTER OF FLOW ANALYSIS	1+00.00
INUDATION LINES FOR DRAINAGE AREAS OVER 25 ACRES (NON-FEMA)	— — — —

SCALE:	1"=150'
JOB #:	4192
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COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

PROPOSED CONDITIONS
100-YR FLOODPLAIN INUNDATION
HEC- RAS Exhibit (3 of 4)

LUIS REY

EXISTING 100-YR FLOODPLAIN PER CHANG STUDY

CHANNEL #4

Q_{100} INUNDATION LINE FOR DRAINAGE AREA >25 AC.

Q_{100} INUNDATION LINE FOR DRAINAGE AREA >25 AC.

LIMIT OF ANALYSIS

PL

DULIN ROAD

OPEN SPACE

BIO-OPEN SPACE

BASIN

POND
Elevation 269.3

LOT 384 PAD=270

LOT 385 PAD=280

LOT 386 PAD=280

LOT 387 PAD=300

LOT 388 EL 296

LOT 389 EL 271

LOT 390 EL 240

LOT 391 EL 249

LOT 392 EL 249

0+00.00

2+26.06

6+71.03

11+96.93

12+72.05

13+37.24

14+94.79

16+20.95

16+23.13

28+13.47

32+27.66

33+50.63

35+68.07

44+18.60

LEGEND

STATION ALONG CENTER OF FLOW ANALYSIS	1+00.00
INUDATION LINES FOR DRAINAGE AREAS OVER 25 ACRES (NON-FEMA)	— — — —

N

SCALE: 1"=150'

JOB #: 4192

CREATED: 8/29/18

PREPARED BY:

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COUNTY OF SAN DIEGO

OCEAN BREEZE RANCH

PROPOSED CONDITIONS
100-YR FLOODPLAIN INUNDATION
HEC- RAS Exhibit (4 of 4)