Appendix J1
Drainage Report

CITY OF SANTEE

Drainage Report

for

CARLTON OAKS COUNTRY CLUB & RESORT
PA-1 (Residential West), PA-2 (Residential North) & PA-3 (Resort Area)
TM 2019-1/ DR 2019-5

City of Santee, CA
County of San Diego

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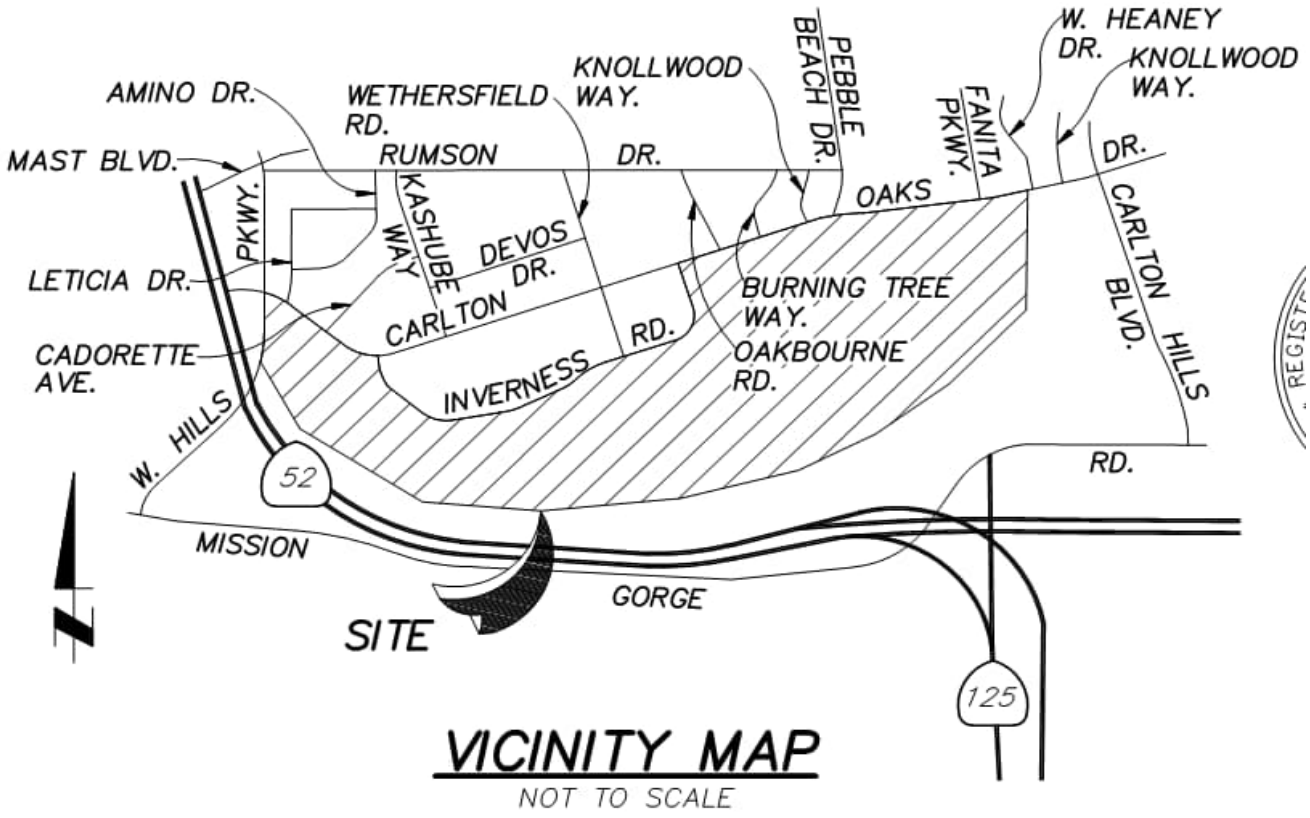


VICINITY MAP

NOT TO SCALE

1.0 Introduction

1.1 Purpose

The purpose of the study is to document existing and proposed drainage conditions, provide peak flow estimates for the drainage facilities in proposed conditions, evaluate potential drainage impacts resulting from the proposed project, and provide recommended design measures to alleviate or reduce impacts.

1.2 Existing Conditions

The existing Carlton Oaks Country Club and Resort is located in the City of Santee and City of San Diego, northwest of the State Route 52 / 125 interchange. The project site is bounded by the San Diego River and Forester Creek to the south and east, West Hills Parkway to the west, and Carlton Oaks Drive to the north. Most of the project limits are located within FEMA regulatory limits of San Diego River (Special Flood Hazard Area Zone AE as shown on FIRM Panel 06073C1634G, dated May 16, 2012, located in Exhibit "C"). The majority of the proposed Residential West (PA-1) is located with the existing floodplain, a small portion of the southwest corner of the proposed Residential North (PA-2) is also located in the existing floodplain, and the proposed Resort Area (PA-3) is located within the existing floodplain and floodway. The project receives runoff from the San Diego River, Sycamore (Santee Lakes) channel, plus several storm drain outfalls from the existing neighborhoods along the Carlton Oaks and Mast Blvd corridors. Runoff from Forester Creek enters at the southeasterly limits of the property. See Exhibit “D” for an Aerial Photo of the property.

South Channel: The property includes a vegetated earth berm along the southern and eastern limits, which directs “low flows” from the San Diego River and Forester Creek along the southerly golf course limits. The berm consists of loosely placed soil that was graded per 1995 grading plan G-378, and it is relatively small (compared to the overall river width). The berm ends near the western limits of the golf course, just upstream of West Hills Parkway Bridge (West Hills Parkway crosses over San Diego River southwest of the proposed Residential West PA-1). See Exhibit “A” for an Aerial Photo of the property showing the existing West Hills Parkway Bridge location. The existing channel is vegetated with sensitive habitat.

North Channel: Runoff from Sycamore channel (adjacent to the western limits of the Santee Lakes) enters the site near the northeast end of the golf course under the Carlton Oaks Drive bridge. Flows are directed southerly and westerly through the northern limits of the golf course through a variety of golf course water features including streams, water hazards and manufactured ponds. The north channel provides drainage relief for overland flows from the majority of the golf course, and the existing neighborhoods north of the property.

Flows from the south and north channels confluence at the west end of the earth berm, approximately 500’ upstream of West Hills Parkway bridge. According to the existing model, during larger storm events, the flood water levels will overtop the berm at one or more locations. Anecdotally, the berm has stood up to large flooding events in the past and has likely been reinforced by natural vegetation growth along the sides. The project does not require or propose any modifications to the existing berm.

See Existing Drainage Exhibit in Map Pocket #1.

1.3 Project Description

Lennar Homes and Carlton Oaks Golf Course, as joint project proponents, are proposing to redevelop the existing Carlton Oaks Country Club into a resort with residential accessory uses (proposed project). An existing clubhouse, restaurant/bar, pro shop, hotel and hotel cottages, and surface parking lot are currently located on the proposed project site and will be demolished as part of the initial project construction.

The proposed project site that will be developed is located on approximately 164.9 acres and would include the redesign of the existing Carlton Oaks Golf Course and the following components: (1)) redesign of the golf course, (2) reconstruction of the clubhouse and pro shop, practice area, and learning center structure; (3) a hotel and associated cottages; (4) residential accessory uses consisting of two residential neighborhoods (Residential West and Residential North) with open space areas; and (5) related on-site infrastructure. Approximately 3.4 acres consist of areas outside of the project site that will be developed with improvements associated with the Project and are located either in the City of San Diego or Santee (Off-site improvement areas). The off-site improvement areas and the proposed project site (developed and undeveloped) make up the CEQA Study area, totaling approximately168.3 acres. See Exhibit “F” for illustrating the onsite project area and offsite improvements.

Golf Course Redesign:

The proposed project would redesign the existing 145-acre, 18-hole golf course to provide an improved experience for the users of the Carlton Oaks Country Club and Resort. The redesigned golf course would cover approximately 104 acres, and would provide 18 holes, similar to the existing course. The length of the golf course would be reduced from approximately 7,300 yards to 6,450 yards to provide a more engaging golfing experience. Under the current existing conditions, the golf course has a total of approximately 132 acres of turf irrigation with a 30-year-old block type irrigation system. The new course design would only have approximately 66 acres of turf irrigation (a 50 percent decrease) and would utilize a new modem irrigation system with individual head controls.

The proposed golf course would reshape the existing man-made ponds on the golf course, and the existing maintenance facility in the eastern portion of the project site will remain in its current location. The existing drainage patterns and facilities would be updated within the golf course to improve the flow of drainage, which would reduce the amount of ponding that occurs on the site during rain events. The remaining out-of-play areas around the golf course would be planted with native grasses and smaller shrubs native to the region, which would be selected to require little or no maintenance. There are a number of riparian areas within the project site, providing an environment for native birds, small animals, and aquatic plant and animal species. These areas are planned to be avoided and retained in their current condition.

In addition to the golf course, the Carlton Oaks Golf Course owner would develop several golf amenities including a pro shop, cart barn, and a cart waiting area on the eastern end of the golf course, northeast of the golf resort, as well as two practice areas. A golf learning center structure would also be developed northeast of the pro shop. A new shared surface parking lot would provide parking spaces for users of the golf course, clubhouse, and hotel.

Carlton Oaks Country Club and Resort Area (PA-3):

The Carlton Oaks Country Club and Resort would consist of approximately 51,926 square feet of golf related resort amenities including 10 cottage-style hotel units, 42-room hotel, a clubhouse with a restaurant, event space, a golf learning center, a cart barn, a pro shop, and a store all located in the eastern portion of the project site. There would also be a golf cart waiting area and a shared, surface parking lot. The hotel and cottage buildings would be constructed as two-story structures. The clubhouse and resort would also provide an outdoor pool and deck area, a patio, and a courtyard.

Residential Development:

The Carlton Oaks Country Club and Resort would include a residential component in the western and northeastern portions of the project site. Residential West (PA-1), in the western portion of the project site, would consist of 86 multi-family detached residential units. Residential North (PA-2) would be located in the northern portion of the project site and would consist of 150 detached multi-family residential units. In addition, six single-family lots would front Carlton Oaks Drive and allow for single-story homes on a minimum of 6,000 square-foot lots. One existing home located at 9225 Inwood Drive has also been included within the project area to allow for minor driveway modifications but no changes to the structure are proposed. The applicant is requesting approval of required easements from the City of San Diego for grading, landscaping, utilities, access, and maintenance.

Access Points:

Access to Residential West would include a private driveway that would require access easements across two parcels owned by the City of San Diego, these parcels cross both City of San Diego and City of Santee jurisdictions. The proposed easements would allow private and emergency access onto the proposed subdivision.

Residential North and the resort would be accessed from Carlton Oaks Drive at the intersection of Burning Tree Way. This access would be approximately 200 feet west of the existing hotel access road (Inwood Drive). Inwood Drive would be closed and replaced with curb and sidewalk. Additionally, six existing driveway aprons along the project frontage would be closed and replaced with curb and landscaping.

Access to the golf course and resort would be provided by a private drive through Residential North from Carlton Oaks Drive southerly via a new bridge across the San Diego River (North Channel).

Also, a 26-foot-wide private emergency access road for the Residential North and resort parcels would be provided through the existing Vista del Verde condominiums located in the northeastern corner of the project site. This emergency access would comply with the requirements of the City of Santee's Fire Code and would be for the proposed project only and would not be open to the public. A new fence with an emergency access gate will be erected between buildings of the existing adjacent condominium complexes. A private emergency access roadway will also be provided to Residential West "PA-1" via an extension of Private Drive "C" westerly to West Hills Parkway. The

emergency vehicle access will be 26 feet wide with curb and gutter and AC pavement and base, with grades and horizontal alignment that meet the City's Fire Code.

The project will also include a 26-foot private utility maintenance roadway between Residential West "PA-1" and Residential North "PA-2", which will also serve as a pedestrian/golfcart passageway from PA-1 to the resort. The private roadway/pathway will be paved with 26 feet of AC pavement and base with a 2-foot shoulder and will meet the City Fire Code roadway grades and horizontal alignment requirements for firefighting apparatus and vehicles. Gates are located at the west and east limits of the roadway

Project Trail Segments:

A multipurpose, public trail will be provided on the property on the north side of the San Diego River, linking with existing and planned trails to the east and west of the site (Project Trail Segment).

A portion of the Project Trail Segment on the eastern side of the project site will be provided beginning at the entrance of Residential North at Carlton Oaks Drive traversing through the resort and along the southeastern border of the project ending slightly west of the jurisdictional line between the City of Santee and the City of San Diego. This portion of the trail will link to the existing Mast Park West Trail, as well as the future planned trail known as the Carlton Oaks Golf Course Segment.

A portion of the Project Trail Segment on the western side of the project site will be constructed beginning at the Santee jurisdictional line ending at the property line (Station 38+60). This portion of the trail will link to the future planned trail known as the Carlton Oaks Golf Course Segment.
Along the Residential West boundary, a graded bench (located within the Carlton Oaks Golf Course Segment) would also be provided within the easement areas that will be granted to the applicant by the City of San Diego as a part of this project.

In addition to the proposed trail alignment currently proposed through Residential North and the County Club and Resort Area, a supplemental trail offer of dedication is shown on the applicant's map should the City request this supplemental trail alignment. The supplemental trail offer of dedication starts from an area east of the Country Club and Resort parking lot to the property line of the Vista del Verde community. If the City of Santee were to request this supplemental segment, the applicant will agree to dedicate the trail alignment and construct this trail at a later date if the City determines that it desires to build this trail in the future.

Grading:

Fill will be placed to raise the Residential West (PA-1) and Residential North (PA-2) out of the floodplain, and the Resort Area (PA-3) above the 100-year flood levels of the floodway. Grades in a portion of the existing golf course, located approximately south of the proposed Resort Area, will be lowered to offset for the fill that is being placed in the residential and resort areas. Residential West (PA-1) is a residential development located at the west end of the existing golf course property, located north of the record

floodway. Residential West (PA-1) and Residential North area (PA-2) do not encroach into the Floodway but are located in the existing floodplain. (Both PA-1 and PA-2 make up the Residential Area.)

The golf course will be regraded to enhance flows around the proposed Residential and Resort development areas. The Resort Area (PA-3) will encroach into the existing floodway. The Floodway and Floodplain is proposed to be remapped to reflect that Residential West and North are removed from the floodplain and and the Resort Area is fully removed from both the floodplain and floodway. Both residential areas will continue to remain out of the floodway consistent with the current FEMA mapping.

Offsite Improvements:

The following offsite improvements would be required as part of the implementation of the proposed project.

1. Emergency Vehicle Access: The project will include the construction of a 26-foot-wide emergency vehicle access roadway, pursuant to the City of Santee Fire Department's requirements. This work would include modifications to existing parking, as well as construction work at an offsite location within the Vista del Verde community in order to construct the emergency vehicle access pathway. The emergency vehicle access roadway will run south from the condominium project onto the golf course property to the developed portion of the resort area. One parking spot that may be lost by such work will also be relocated on the Vista del Verde property subject to the approval of the City of Santee. The project also includes installation of a motorized gate and replacement of the existing chain link fence with a steel tubular fence, on the boundary of the Golf Course property.

2. West Hills Parkway: West Hills Parkway will be widened within the existing right-of-way from Carlton Oaks Drive approximately 700 feet southerly to the existing bridge, in order to provide a dedicated left-turn lane into the project driveway. The roadway will be widened within the existing right-of-way, and therefore, no additional dedication is required. New striping will include a striped median and increased width for bike lanes. Improvements will also include a new driveway entry for the proposed residential development. Trees are proposed on both sides of West Hills Parkway to provide source control of stormwater, limit stormwater transport and pollutant conveyance to the collection system, restore pre-development hydrology to the extent possible, and provide environmentally enhanced roads. Green Street PDP Exempt SWQMP for Carlton Oaks has been prepared per City of San Diego Storm Water Standards\ BMP Design Manual and following the guidance in Appendix J of the Manual. This work falls within the boundaries of City of San Diego and follows their standards. Access into the project has been analyzed for sight-distance, signal warrants and traffic movements by the project engineering team.

3. Extension of a Padre Dam Municipal Water District (PDMWD) Public Water Main: A Padre Dam Municipal Water District public water main will be extended from the end of Carlton Oaks Drive and down West Hills Parkway and into the proposed subdivision to provide a connection to the private water system for Residential West.

4. Access to Residential North and the Resort Area: Residential North and the Resort Area will take access from Carlton Oaks Drive at the intersection of Burning Tree Way. This access point is approximately 200 feet east of the existing hotel access road (Inwood Drive). Inwood Drive will be closed and replaced with curb and sidewalk. Additionally, six existing driveway aprons along the project frontage, will be closed and replaced with curb and landscaping along with other miscellaneous frontage improvements such as overhead power undergrounding and landscaping. Overhead power undergrounding would extend north of Carlton Oaks Drive. Potable and recycled water will be connected to existing main lines in Carlton Oaks Drive and extended into the project.

5. Drainage Improvements: Existing drainage pipes discharge to the golf course at five locations along the north subdivision boundary. All improvements shall be done in a way that will maintain the existing flow and drainage patterns. Each location is described as follows:

   A. Existing 42-inch storm drain discharges to the site from a headwall located approximately 15 feet offsite, located within a public easement (City of Santee) on an existing residential lot (Lot 17 of Map 4402). The offsite flows will be picked up onsite by proposed storm drain improvements and discharged into the San Diego River (North Channel).

   B. Existing 27-inch storm drain extends onto the project site from an existing residential lot (Lot 14 of Map 5417): This pipe will be extended under the proposed access road to a new headwall and discharge onto the golf course.

   C. Existing 18-inch storm drain discharges to the site from a headwall located approximately 15 feet offsite, located within a public easement (City of Santee) on an existing residential lot (Lot 230 of Map 6973): The offsite flows will be picked up onsite by proposed storm drain improvements and discharged onto the golf course.

   D. Existing 47”x71” storm drain discharges to the site from a headwall located approximately 20 feet offsite, located within a public easement (City of Santee) on an existing residential lot (Lot 239 of Map 6973). Project proposes to remove the headwall and extend the pipe into the project.

E. An existing 72-inch diameter storm drainpipe discharges to the site from the headwall located approximately immediately offsite at the north property line of Residential West. The existing headwall includes a large concrete energy dissipator and concrete channel. These storm drain facilities are located offsite on existing residential lots (Lots 679 & 680 of Map 7295) and within an existing public easement (City of Santee). The offsite flows will be picked up onsite by proposed storm drain improvements and discharged onto the golf course. The project drainage study includes a hydraulic analysis of the extension of this pipe to ensure that no negative upstream impacts will occur as a result of this project.

6. Sewer Maintenance Hole Improvements: Three existing sewer maintenance holes located offsite within a public easement (Padre Dam Municipal Water District) in the northeast corner of the project within the Vista del Verde condominiums: Engineered sewer manhole liners may be needed in the three manholes between the 8-inch tie-in from the north and the 24-inch tie-in. The need for these liners will be determined in the project design phase. All work will be limited to within the public easement area.

2.0 Flood Risk

2.1 FEMA Flood Mapping

The residential areas and Resort Area are proposed to be located in the City of Santee. In addition, a portion of the golf course, the southwest corner of the Resort Area (PA-3), and the primary access to Residential West are proposed to be located in the City of San Diego. The proposed Residential areas are partially located within the existing FEMA floodplain; and the proposed Resort Area (PA-3) is located within the existing FEMA floodplain and floodway of the San Diego River (Special Flood Hazard Area Zone AE as shown on FIRM Panel 06073C1634G, dated May 16, 2012 located in Exhibit "C").The existing hotel is located outside of the existing floodplain and floodway and can be seen at cross section AY290. The initial FIRM Panel was prepared using the original flood model for San Diego River (Upper) in 1982. The existing development north of Forester Creek and south of Carlton Oaks golf course was mapped as Zone X as shown on FIRM Panels: 06073C1634G, and modeled as an ineffective area in the original effective model.

A separate Flood Study for Carlton Oaks has been prepared by H&A and dated February 2024. The Flood Study provides documentation of the data collection, methodologies, and results related to San Diego River hydraulic analysis in existing and proposed conditions that will be used as the basis for preparing the project CLOMR and for processing through the City and ultimately FEMA. The report documents consistency with City of Santee, City of San Diego and FEMA Flood ordinance and regulations, and utilizes the proposed condition model combined with the City specific 100-year flow rate to determine project BFEs, which buildings shall be appropriately elevated above.

The Carlton Oaks golf course is located within the limits of the San Diego River. The San Diego River watershed is several thousand acres and includes both urban, rural, and natural land uses. The majority of flows are carried by the San Diego River (Upper) and Forester Creek. The property includes a vegetated earth berm along the southern and eastern limits, which directs "low flows" from the San Diego River and Forester Creek along the southerly golf course limits. The berm consists of loosely placed soil that was graded per 1995 grading plan G-378, and it is relatively small (compared to the overall river width). Therefore, HEC-RAS proposed, and existing models assume no berm condition to be conservative. The berm ends near the western limits of the golf course, just upstream of West Hills Parkway Bridge (West Hills Parkway crosses over San Diego River southwest of the proposed Residential West PA-1). As will be discussed in the conclusion, there would be a substantial lag time between the time the peak flows from the proposed development outlet to the San Diego River and time the peak flows along the San Diego River reach the proposed outlet locations since the tributary area to the San Diego River is several thousand acres. Due to this lag time, there is no net increase of flows to the San Diego River from the development of Carlton Oaks Country Club and Resort when compared to existing conditions. Therefore, no detention facilities are proposed, and no changes or impacts are proposed or needed to the existing berm. The project also receives runoff from Sycamore (Santee Lakes) channel, plus several storm drain outfalls from the existing neighborhoods along the Carlton Oaks and Mast Blvd corridors. Runoff from Forester Creek joins the San Diego River along the southeasterly limits of the property.

The grading for the Residential West and North development areas are primarily within the floodplain limits, which is typically permitted since the resulting impacts are negligible. The grading for the Hotel/Resort and the Golf Course will occur within the regulatory floodway, which is more sensitive to impacts. A comprehensive Flood Study has been prepared along with this drainage study. The Flood Study demonstrates that the project meets the requirements set forth in the City of Santee Flood Ordinance.

FEMA will require a Conditional Letter of Map Revision (CLOMR) to be submitted with relevant mapping, calculations, forms and models. To ensure that the proposed project meets all of the design criteria for FEMA and City, all reports and plans will be submitted to all agencies for review. The City reviews all of the reports in-house and through independent consultants, and signs the MT-2 forms. Upon approval by all agencies, FEMA will issue a CLOMR, which allows the City to issue the grading permit so the project can proceed as shown on the preliminary drawings and models.

Upon completion of the project grading, FEMA requires that a certified survey be performed to verify that the limits and elevation of the grading are in conformance with the approved CLOMR. Upon certification of the grading, the last step is to submit a LOMR (Letter of Map Revision) to FEMA. The LOMR will officially revise the current NFIP map to show changes to the floodplain, floodway, and flood elevations. The revised maps and river modeling will be held at FEMA and at the City as an official record.

2.2 City of Santee/BSI Flood Mapping

In 1992, BSI conducted a Citywide Drainage Study was prepared to evaluate the existing storm drain systems and the flood elevations for the San Diego River (B I, 1992). This study forecasted that there would be increases in impervious area due to future development, and construction of related street improvements and drainage facilities will result in greater peak flow rates (approximately 30% larger) resulting in increased flood elevations ranging from 1' to 6' higher when compared to the FEMA elevations. The BSI study was not adopted by FEMA, but the City has required all proposed development to use the larger flood values when determining the minimum finished floors of structures

The projected peak flow rates as published by FEMA and the City of Santee /BSI study are as follows:

Table 1 - Comparison of Peak Flow Rates (cfs)

San Diego River Location	10-Year FEMA	50-Year FEMA	100-Year FEMA	100-Year City / BSI	500-Year FEMA
W Hills Br (Mission Dam)	5,500	19,000	38,000	50,000	112,000
0.7 Mi Downstream of Sycamore Creek	5,000	17,000	37,000	49,000	112,000
Forester Creek Confluence	4,500	16,000	36,000	48,000	112,000

Flood modeling of the San Diego River (BSI July 1992) is shown on the City of Santee Drawing series # 92-165. See Map Pocket #4 of Flood Study for Carlton Oaks. Sheet 2 and 3 of the drawing series shows flood elevations for the "Santee Discharge Rates" shown along the project range from about 321.0 0 at the east end of the project to 310.2 at the west end of the project. This map shows the baseline flood elevations at each cross section being analyzed within this report. These elevations are used as a base flood elevations, which buildings were appropriately elevated above to meet City of Santee Ordinance.

The City Flood Damage Prevention Ordinance (Santee Municipal Code, Chapter 11.36) requires that for new construction, the lowest finished floor is elevated one foot above the base flood elevation provided in the San Diego River Flood Study. The proposed project has been designed so the lowest finished floor elevation is a minimum of 1 ' above the base flood elevation and thus will meet this requirement in compliance with the City's ordinance. Due to the magnitude of the tributary areas and resulting peak flows, development does not affect the FEMA or City/BSI flood values.

Please refer to the separate Flood Study titled "Flood Study (CLOMR) for Carlton Oaks" dated May 2025, for more information regarding Flood Risk. A CLOMR will be submitted as part of the Discretionary process.

3.0. Methodology

Modified Rational Method Hydrologic Analysis

Computer Software Package – AES-2015

Design Storm - 100- year return interval

Land Use – Single-family Residential, Commercial

Soil Type – The project contains soil type A, B, and D, however, hydrologic soil group D was assumed for all areas. Group D soils have very slow infiltration rates when thoroughly wetted. Consisting chiefly of clay soils with a high swelling potential, soils with a high permanent water table, soils with clay pan or clay layer at or near the surface, and shallow soils over nearly impervious materials, Group D soils have a very slow rate of water transmission. To be more conservative, Soil D was assumed for the entire studied area.

Runoff Coefficient - In accordance with the County of San Diego standards, runoff coefficients were based on land use and slope per San Diego County Hydrology Manual. A 0.9 runoff was assigned for impervious areas while a 0.2, 0.25, and 0.35 coefficient was used for pervious areas with soil type A, B, and D respectively. Please see the AES spreadsheet for assumed imperviousness of each area. Soil D was assumed for the entire studied area.

Rainfall Intensity- The rainfall intensity is determined per the San Diego County Hydrology Manual based on 6-hour precipitation amounts and calculated time of concentrations. Six-hour precipitations are taken from the San Diego County Hydrology Manual isopluvials.

Method of Analysis – The Rational Method is the most widely used hydrologic model for estimating peak runoff rates. Applied to small urban and semi-urban areas with drainage areas less than 1.0 square miles, the Rational Method relates storm rainfall intensity, a runoff coefficient, and drainage area to peak runoff rate. This relationship is expressed by the equation:

Q = CIA, where:

Q = The peak runoff rate in cubic feet per second at the point of analysis.

C = A runoff coefficient representing the area - averaged ratio of runoff to rainfall intensity.

I = The time-averaged rainfall intensity in inches per hour corresponding to the time of concentration.

A = The drainage basin area in acres.

To perform a node-link study, the total watershed area is divided into subareas which discharge at designated nodes.

The procedure for the subarea summation model is as follows:

(1) Subdivide the watershed into subareas with the initial subarea being less than 10 acres in size (generally 1 lot will do), and subsequent subareas gradually increasing in size. Assign upstream and downstream nodal numbers to each subarea to correlate calculations to the watershed map.

(2) Estimate an initial T_c by using the appropriate nomograph or overland flow velocity estimation.

(3) Using the initial T_c, determine the corresponding values of I. Then Q = CIA.

(4) Using Q, estimate the travel time between this node and the next by Manning's equation as applied to the particular channel or conduit linking the two nodes. Then, repeat the calculation for Q based on the revised intensity (which is a function of the revised time of concentration)

The nodes are joined together by links, which may be street gutter flows, drainage swales, drainage ditches, pipe flow, or various channel flows. The AES-2003 computer subarea menu is as follows:

SUBAREA HYDROLOGIC PROCESS

1. Confluence analysis at node.
2. Initial subarea analysis (including time of concentration calculation).
3. Pipeflow travel time (computer estimated).
4. Pipeflow travel time (user specified).
5. Trapezoidal channel travel time.
6. Street flow analysis through subarea.
7. User - specified information at node.
8. Addition of subarea runoff to main line.
9. V-gutter flow through area.
10. Copy main stream data to memory bank
11. Confluence main stream data with a memory bank
12. Clear a memory bank

At the confluence point of two or more basins, the following procedure is used to combine peak flow rates to account for differences in the basin's times of concentration. This adjustment is based on the assumption that each basin's hydrographs are triangular in shape.

(1). If the collection streams have the same times of concentration, then the Q values are directly summed,

$Q_p = Q_a + Q_b$; $T_p = T_a = T_b$

(2). If the collection streams have different times of concentration, the smaller of the tributary Q values may be adjusted as follows:

(i). The most frequent case is where the collection stream with the longer time of concentration has the larger Q. The smaller Q value is adjusted by the ratio of rainfall intensities.

$Q_p = Q_a + Q_b \ (I_a/I_b)$; $T_p = T_a$

(ii). In some cases, the collection stream with the shorter time of concentration has the larger Q. Then the smaller Q is adjusted by a ratio of the T values.

$Q_p = Q_b + Q_a \ (T_b/T_a)$; $T_p = T_b$

Underground storm drains are analyzed in a similar way. Flow data obtained from the surface model for inlets and collection points are input into the nodes representing those structures. Design grades and lengths are used to compute the capacity of the storm drains and to model the downstream travel times.

4.0. Hydrology

The proposed project site will include multiple private storm drain systems which discharge to the proprietary biofiltration BMPs and then will connect to the extensions of the existing public bypass storm drain systems or will outfall into the San Diego River. 100-year rainfall intensities have been used in the hydrologic analysis to size the proposed storm drain systems, and check the capacity of the existing storm drain systems.

A rational method analysis (AES 2015) was prepared for the project existing and proposed conditions. The above calculations are provided in Exhibit "A."

The BSI San Diego River Flood Study was prepared using Discharge rates from the Preliminary City of Santee Procedure for Design of Storm Drains Outletting into The San Diego River prepared by City of Santee Public Work Department and dated March 22, 1991 (see Exhibit E of this report). Per this procedure and study, the calculated time for the peak flows along the San Diego River to reach the project outlet locations is 77 minutes, while the calculated time of concentration for the peak flows at the proposed Carlton Oaks Country Club and Resort outlet locations doesn't exceed 27 minutes. There would be a substantial lag time between the time the peak flows from the proposed development outlet to the San Diego River and the time the peak flows along the San Diego River reach the proposed outlet locations since the tributary area to the San Diego River is several thousand acres.
Due to this lag time, there is no net increase of flows to the San Diego River from the development of Carlton Oaks Country Club and Resort when compared to existing conditions. Therefore, no detention facilities have been proposed.

5.0. Inlet Calculations

The project includes a variety of inlet types including San Diego Regional Standard Drawing curb inlets (Type “A” and Type “B”). For final design, peak flow rates (Q100) used for curb inlet sizing will be sized based on the peak flow calculated for each inlet tributary area.

6.0. Existing Storm Drain

This project includes two public storm drain extensions that bypass through the proposed residential development (72” RCP and 47”X71” CMP), and three that will be discharged through the course.

Discharge from an existing 72-inch storm drain, currently discharging onto the golf course north of the Residential West (PA-1) and into a man-made pond, will be conveyed through the site in a bypass storm drain, and discharge directly to the San Diego River at the same location as in existing conditions. A rock riprap energy dissipater is proposed at the storm drain outlet to reduce storm runoff to non-erosive velocity and prevent erosion and siltation. The capacity of the extended storm drain has been checked using the peak flows from the proposed conditions (see Exhibit B for Hydraulic analysis) to confirm that the increased rate or amount of surface runoff, will not exceed the capacity of existing stormwater drainage systems. Additionally, the extension of the existing storm drain will not impede or redirect flood flows. As a result, no substantial alteration is proposed to the existing drainage pattern. This bypass storm drain is referred to as Line 1 in Map Pocket number 2, as shown on Map 2 of 6 of the Proposed Conditions Hydrology Map.

To ensure accuracy in establishing the hydraulic grade line for the proposed extension of the 72-inch storm drain, a hydraulic analysis was conducted which took into account the tailwater condition at the discharge point within the river, specifically between cross sections 250 and 260. The tributary area to the proposed extension is 332.5 acres (please refer to the tributary area to Node 20 in the AES analysis for the proposed conditions in Exhibit A), while the area of the main stem (San Diego River) at the discharge location is 367.5 square miles (please refer to the stream stats report for San Diego River in Exhibit A). This means that the area ratio of the drainage area of the main stem to the area of the tributary is approximately 999 to 1.4.

According to Section 3.3.5 of the San Diego County Hydraulic Manual Table 3.4, for the 100-year design storm occurring over both areas, the flow rate in the main stem will equal that of a 25-year storm when the tributary flow rate reaches its 100-year peak. Conversely, when the flow rate in the main stem reaches its 100-year peak at the outfall of the tributary, the flow rate from the tributary will have fallen to the 25-year flow rate. It should be noted that a conservative approach was taken and the 50-year water surface elevation in the river was used between cross sections 250 and 260 instead of the 25-year water surface elevation, as the 25-year peak flow for the river was not calculated.

The second existing public storm drain that currently discharges onto the golf course north-west corner of Residential North (PA-2) will require a bypass system. Discharge from this existing 47 x 71-inch storm drain to the north-west of Residential North will be conveyed through a separate public bypass storm drain that runs parallel to Residential

North and will discharge directly to the San Diego River. A rock riprap energy dissipater is proposed at the storm drain outlet to reduce storm runoff to non-erosive velocity. This bypass storm drain is referred to as Line 2 in Map Pocket number 2, as shown on Map 5 of 6 of the Proposed Conditions Hydrology Map.

To establish the hydraulic grade line for the proposed bypass system, a conservative approach was adopted. This involved using the 100-year water surface elevation in the river as tailwater and considering the 100-year peak flow from the tributary area to the studied pipe.

An existing 42-inch storm drain currently discharges from a headwall located approximately 15 feet offsite, northwest of the Residential East (PA-2). The offsite flows will be picked up onsite by proposed storm drain improvements and conveyed through the site in a bypass storm drain and discharge directly to the San Diego River as in existing conditions. A rock riprap energy dissipater is proposed at the storm drain outlet to reduce storm runoff to non-erosive velocity and prevent erosion and siltation. This bypass storm drain is referred to as Line 5 in Map Pocket number 2, as shown on Maps 3 and 6 of the Proposed Conditions Hydrology Map.

To ensure accuracy in establishing the hydraulic grade line for the proposed bypass storm drain, a hydraulic analysis was conducted which considered the tailwater condition at the discharge point within the river between cross sections 280 and 285. The tributary area to the proposed bypass storm drain is 72.0 acres (please refer to the tributary area to Node 218 in the AES analysis for the proposed conditions in Exhibit A), while the area of the main stem (San Diego River) at the discharge location is 339.4 square miles (please refer to the stream stats report for San Diego River in Exhibit A). This means that the area ratio of the drainage area of the main stem to the area of the tributary is approximately 9,999 to 3.31.

According to Section 3.3.5 of the San Diego County Hydraulic Manual Table 3.4, for the 100-year design storm occurring over both areas, the flow rate in the main stem will equal that of a 10-year storm when the tributary flow rate reaches its 100-year peak. Conversely, when the flow rate in the main stem reaches its 100-year peak at the outfall of the tributary, the flow rate from the tributary will have fallen to the 10-year flow rate.

The existing storm drain that discharges into the golf course includes an existing 18” public storm drain that discharges to the site from a headwall located approximately 15 feet offsite. The offsite flows will be picked up onsite by proposed storm drain improvements and discharged onto the golf course. A rock riprap energy dissipater is proposed at the storm drain outlet to reduce storm runoff to non-erosive velocity. This storm drain is referred to as Line 3 in Map Pocket number 2, as shown on Map 6 of 6 of the Proposed Conditions Hydrology Map.

In addition, an existing 27-inch storm drain discharges to the site from a headwall on site located approximately 33 feet from the northern boundary, within a public easement (City of Santee) on an existing residential lot (Lot 14 of Map 5417). The project proposes to remove the headwall and extend the pipe approximately 10 ft into the project site. The discharge conditions will be similar to existing conditions, about 137 ft north of the river.

A rock riprap energy dissipater is proposed at the storm drain outlet to reduce storm runoff to non-erosive velocity. This storm drain is referred to as Line 4 in Map Pocket number 2, as shown on Map 6 of 6 of the Proposed Conditions Hydrology Map.

To establish the hydraulic grade line for the proposed line 3 and line 4, the conservative approach of using the 100-year water surface elevation in the river as the tailwater and considering the 100-year peak flow from the tributary area to the studied pipe was utilized.

See Map Pocket #1 for the Existing Drainage exhibit, and Map Pocket #2 for the Proposed Drainage exhibit.

The discharge locations may be minimally impacted by backwater effects associated with the San Diego River. We have assumed that these potential effects will occur and have included them in our calculations for the public storm drain systems which are included in Exhibit "B". The discharge locations may be minimally impacted by backwater effects associated with the San Diego River. We have assumed that these potential effects will occur and have included them in our calculations for the public storm drain systems which are included in Exhibit "B". For tailwater calculations, the San Diego River proposed conditions HEC-RAS model was used with BSI- 100 Year peak flow, FEMA 50-Year peak flow and FEMA 10-Year Peak flow. Please refer to Exhibit B for HEC-RAS results.

7.0. Direct Discharge to San Diego River

Drainage systems discharging to rivers and water bodies need to consider the outlet controls imposed by depth and velocity of the receiving water (The project discharges at the Santee portion of San Diego River). The City of Santee, Public Works Department "Procedure for Design of Storm Drains Outletting in the San Diego River" (1991), requires that "side channels" (areas where flows can meander out of the designated floodway due and converge wide other drainage features - such as Sycamore Creek) be designed for the worst case under two different scenarios. The first scenario assumes that side flow channels are to be designed using the 100-year peak storm (County of San Diego 6~hr rational method), while also considering the 10-year peak flow rate and velocity in the San Diego River +2'. For the second scenario, hydrology calculations for the side channel flows are adjusted (reduced) to reflect the San Diego River time of concentration, which is 77 minutes (I100=1.11 in/hr.) in the vicinity of West Hills Drive. The San Diego River hydraulic grade line is based upon the 100-year 6-hour storm event. The overflow structures for the water quality proprietary biofiltration system will be connected to a storm drain pipes that will discharge to the San Diego River within the City of Santee boundary. The 100-year water surface elevation (BSI Study) at these locations is estimated to be approximately 309 at PA~1, 318 at PA-2, and 320 at PA-3. The relevant discharge rates are shown on the Proposed Drainage exhibits.

See Exhibit "C" for summary of adjusted flows.

8.0 Conclusion

The proposed storm drain systems are designed to intercept and convey the 100-year peak flows for the project. Due to the magnitude of the tributary areas and resulting peak flows, the proposed development does not affect the FEMA or City/BSI flood values.

The Carlton Oaks Country Club and Resort project is located within the floodplain and floodway of the San Diego River (06073 C 1634G). Fill will be placed to raise the development areas above the 100-year flood levels. A CLOMR will processed should be prepared as part of the discretionary approval process. Please refer to The Flood Study (CLOMR) for Carlton Oaks Country Club and Resort prepared by Hunsaker and Associates and dated May 2025.

Due to the substantial lag time between the time the peak flows from the proposed development outlet to the San Diego River, and time the peak flows along the San Diego River reach the proposed outlet locations; there is no net increase of flows to the San Diego River from the development of Carlton Oaks Country Club and Resort when compared to existing conditions. Therefore, no detention facilities have been proposed.

The project Flood Study and Drainage Study provides verification for all of the following conditions required per CEQA (as shown in italics) I

a) Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade surface water quality? The project addresses all water quality requirements. Proprietary biofiltration system has been proposed to address water quality requirement, in addition to the proposed site design and source control BMPs. A separate Report “PDP SWQMP for Carlton Oaks” prepared by H&A and dated May 2025, has been prepared to address all water quality requirements.

b) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:

i. result in substantial erosion or siltation on- or off-site;

ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

iii. Create or contribute runoff water, which would exceed the capacity of existing or

planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

iv. Impede or redirect flood flows

The project does not substantially alter the existing drainage patterns of the site or area, including through the alteration of the course of a stream or river in a manner that would result in substantial erosion or siltation. The project will maintain the existing drainage patterns, which directly discharge to the San Diego River; however, it proposes to alter the floodplain and floodway limits as part of the Golf Course and Country Club redevelopment as part of a CLOMR/LOMR application. Discharge locations will be controlled and equipped with energy dissipation devices. In addition, the project will implement measures to prevent potential scour and erosion to the proposed slopes adjacent to the floodway and floodplain by utilizing the latest proprietary technology in slope surface stabilization and reinforcement, such as geotextile turf reinforcement mats that bind to the soil. Therefore, the alterations will not result in substantial erosion or siltation either on- or off-site.

The project will not increase the rate or amount of surface runoff substantially.

The project's runoff water will not exceed the capacity of the existing storm drain system. Calculations were provided to confirm that the public storm drain system has enough capacity to convey the additional flow from the site. Runoff will be treated as previously mentioned prior to discharge into the public storm drain.

The project will not impede or redirect flood flows. The separate flood study prepared for the project addresses all flooding sources.

c) In a flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation? The project is not in tsunami or seiche zones. Developing in the floodplain and floodway has been addressed in the Flood Study for Carlton Oaks prepared by Hunsaker and Associates and dated May 2025.

d) Conflict with or obstruct implementation of a water quality control plan?

The project proposes proprietary biofiltration BMPs, in addition to the source control and site design BMPs to comply the Water Quality Control Plan for the San Diego Basin dated September 8, 1994 with amendment effective September 1, 2021; MS4 permit Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100; City of Santee Standards, and BMP Design Manual dated February 2016; and City of San Diego BMP Design manual dated 2021. The Storm Water Quality Management Plan for Carlton Oaks Country Club & Resort project will address all the storm water quality requirements for San Diego River and ensure that the proposed project does not conflict or obstruct implementation of Water Quality Control Plan for the San Diego Basin dated September 8, 1994 with amendment effective September 1, 2021.

For more water quality discussion and calculations, please refer to the City of Santee PDP Storm Water Quality Management Plan for Carlton Oaks Country Club & Resort dated May 2025, and City of San Diego Green Street Strom Water Quality Management Plan for Carlton Oaks Country Club & Resort dated April 2023 prepared by Hunsaker & Associates San Diego Inc.

Table - 1

Summary of Existing Conditions					
Node	**Area (ac.)**	**Q100 (cfs)**	**T_C (min.)**	**I (in/hr)**	**Runoff Coeff.**
263	2.21	5.71	15.88	3.06	0.63
303	3.49	6.59	11.13	3.85	0.49
317	4.92	8.65	12.43	3.59	0.49
264	11.32	20.06	12.28	3.62	0.49
143	68.78	96.57	23.10	2.41	0.58
132	29.85	72.56	10.17	4.08	0.56
127	4.73	10.86	10.50	4.00	0.58
112	55.87	80.68	21.61	2.51	0.58
103	1.92	2.31	33.11	1.90	0.63
20	334.94	405.36	26.61	2.20	0.55
40	5.08	7.68	9.42	4.29	0.35
Project's Outfall	**523.11**	**612.97**	**27.80**	**2.13**	**0.55**

Table - 2

Summary of Proposed Conditions					
Node	**Area (ac.)**	**Q100 (cfs)**	**T_C (min.)**	**I (in/hr)**	**Runoff Coeff.**
264	10.54	35.34	7.31	5.05	0.73
303	1.69	8.49	11.20	6.13	0.82
313	2.74	13.59	6.01	6.05	0.82
317	2.76	9.16	9.14	4.37	0.76
322	1.28	3.05	7.74	4.87	0.49
218	72.26	103.58	22.60	2.43	0.59
133	29.87	80.19	10.01	4.12	0.73
128	5.11	13.86	10.39	4.02	0.67
112	55.11	80.19	21.61	2.51	0.58
105	2.81	7.21	8.59	4.55	0.58
20	332.54	412.69	26.67	2.20	0.57
40	5.94	16.94	10.781	3.93	0.71
44	0.46	1.54	6.79	5.30	0.65
Project's Outfall	**523.11**	**655.91**	**34.24**	**1.87**	**0.67**

Table - 3

Summary of Proposed Conditions VS. Existing Conditions						
Node (EX/PR)	**Area EX (ac.)**	**Area PR (ac.)**	**Q100-EX (cfs)**	**Q100-PR (cfs)**	**Area Difference**	**Runoff Difference**
263 / 264	2.21	10.54	5.71	35.34	+8.33	+29.63
303 / 303	3.49	1.69	6.59	8.49	-1.80	+1.90
NA / 313	-	2.74	-	13.59	+2.74	+13.59
NA/ 317	-	2.76	-	9.16	+2.81	+9.16
317 / 322	4.92	1.28	8.65	3.05	-3.64	-5.60
264 / NA	11.32	-	20.06	-	-11.32	-20.06
143 / 218	68.78	72.26	96.57	103.58	+3.48	+7.01
132 / 133	29.85	29.87	72.56	80.19	+0.02	+7.63
127 / 128	4.73	5.11	10.86	13.86	+0.38	+3.00
112 / 112	55.87	55.11	80.68	80.19	-0.76	-0.49
103 / 105	1.92	2.81	2.31	7.21	+0.89	+4.90
20 / 20	334.94	332.54	405.36	412.69	-2.40	+7.33
40 / 40	5.08	5.94	7.68	16.94	+0.86	+9.26
NA / 44	-	0.46	-	1.54	+0.46	+1.54
Project's Outfall	**523.11**	**523.11**	**612.97**	**655.91**	**0**	**+42.94***

*Please note that while the project's outfall area is the sum of all areas, the project's outfall runoff is NOT the sum of all runoffs. The runoff at the outfall would be the sum of all nodes IF all basins had the same time of concentration. Please see chapter 4 for methodology on runoff calculations at confluence points.

Exhibit A

Hydrology Calculations (AES)
100-Year

– Runoff Coefficient and Maximum Overland Flow Length Determination

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

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

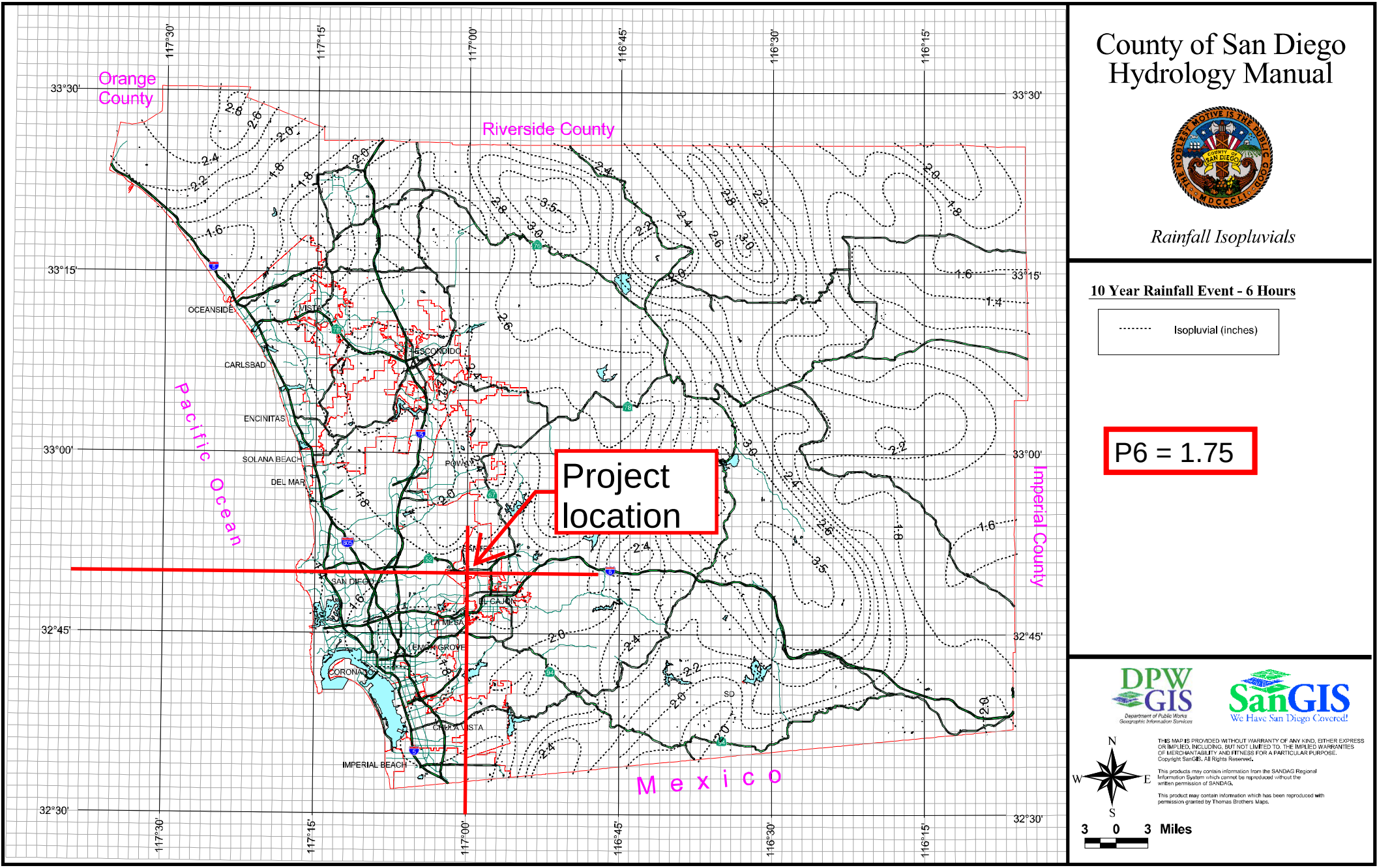
Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description

– County of San Diego Design Criteria



County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 1.75

DPW GIS
Department of Public Works
Geographic Information Services

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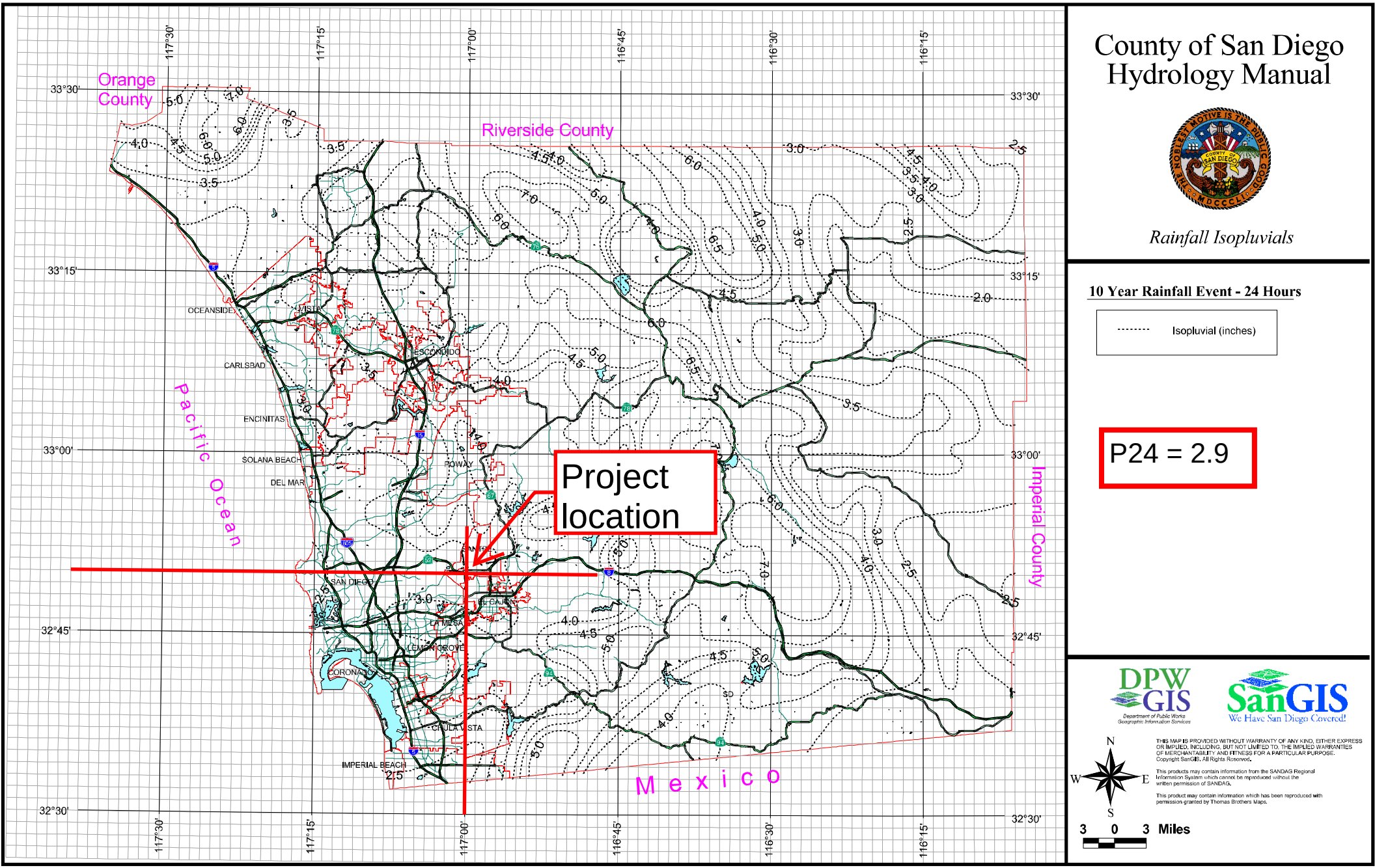
N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24 = 2.9

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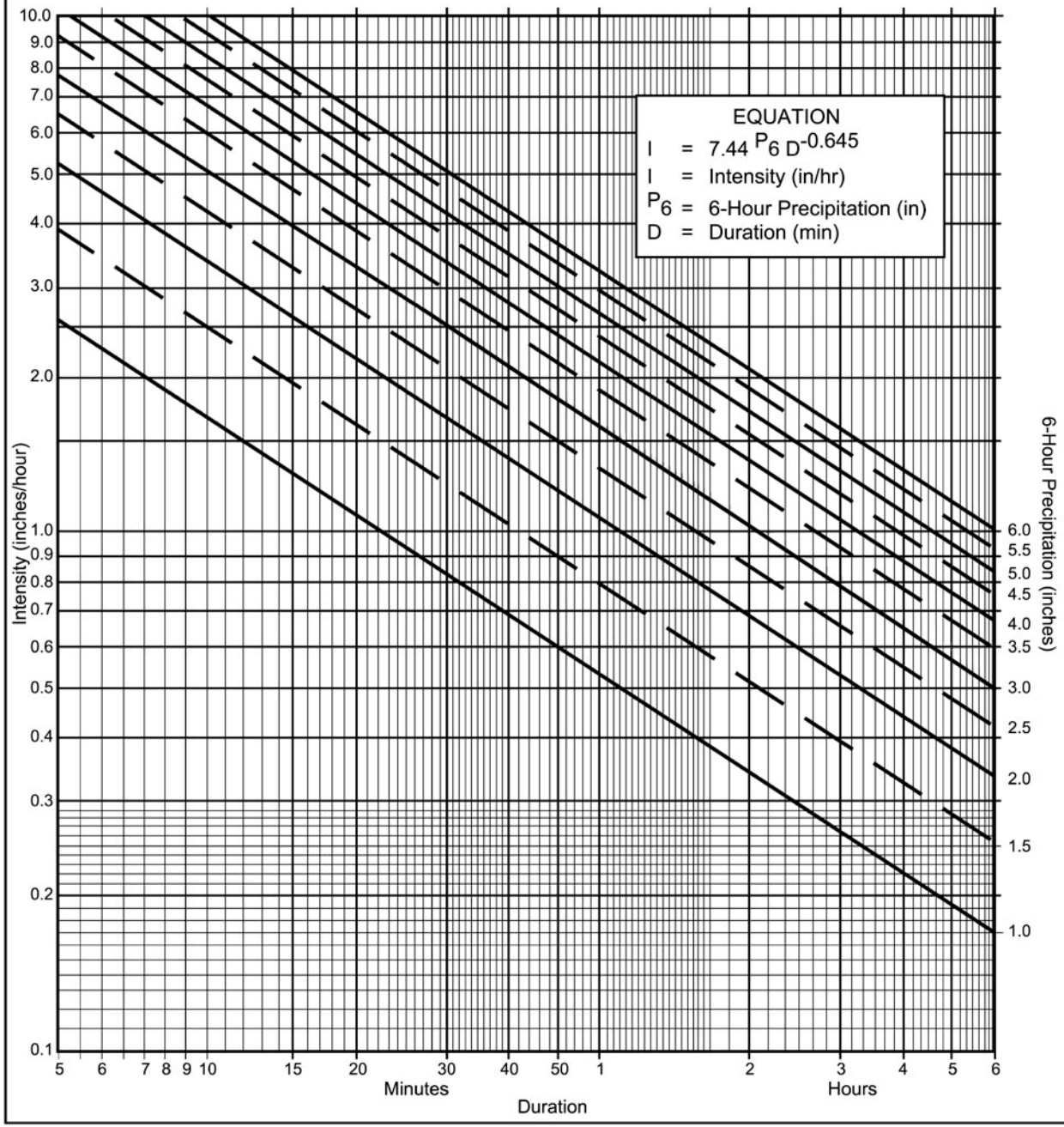
N W E S

3 0 3 Miles



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 _____ year

(b) P_6 = 1.75 in., P_{24} = 2.90, $\frac{P_6}{P_{24}} = \frac{1.75}{2.90}$ %(2) 60

(c) Adjusted P_6(2) = 1.75 in.

(d) t_x = _____ min.

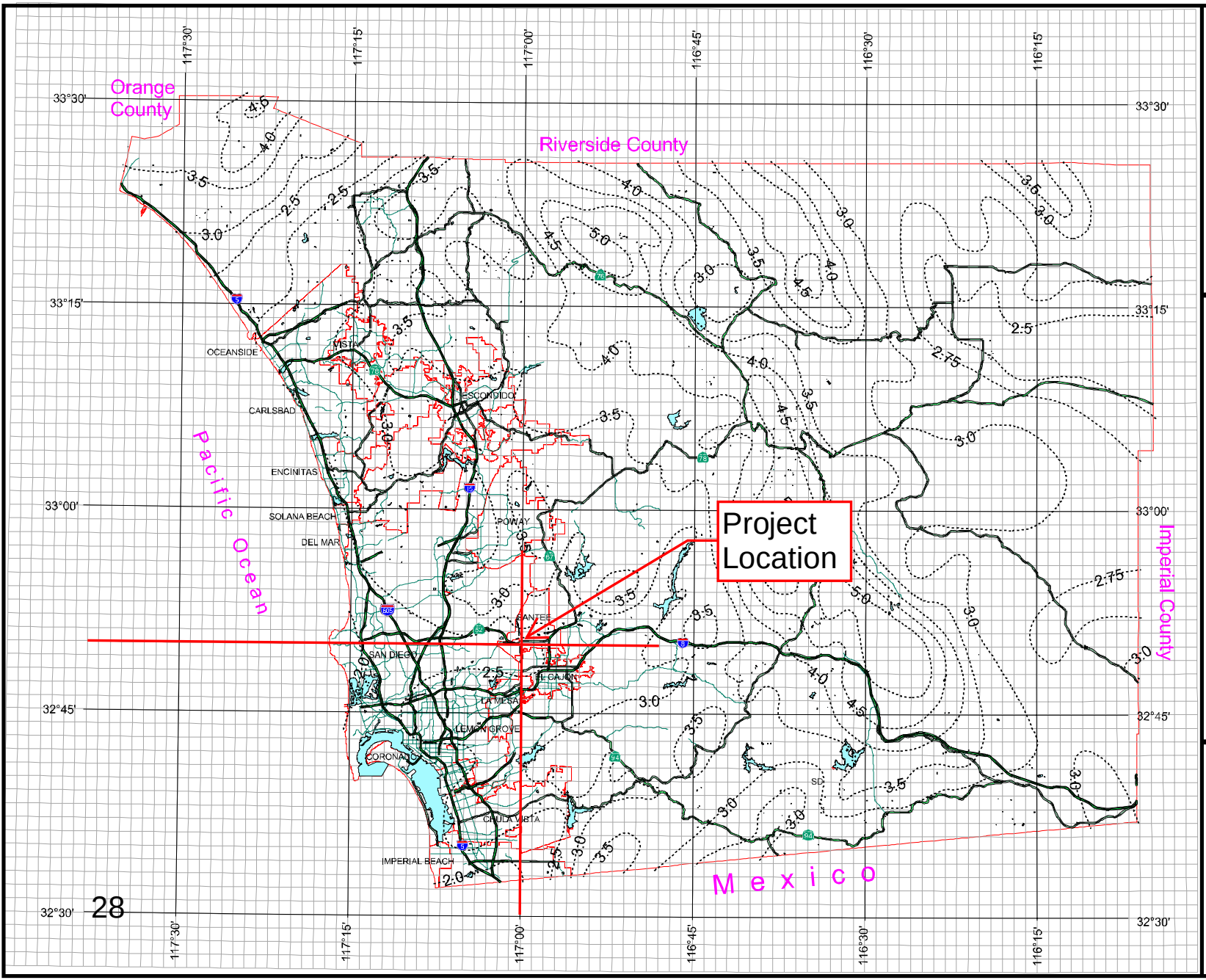
(e) I = _____ in./hr.

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



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6=2.45

DPW GIS
Department of Public Works
Geographic Information Services

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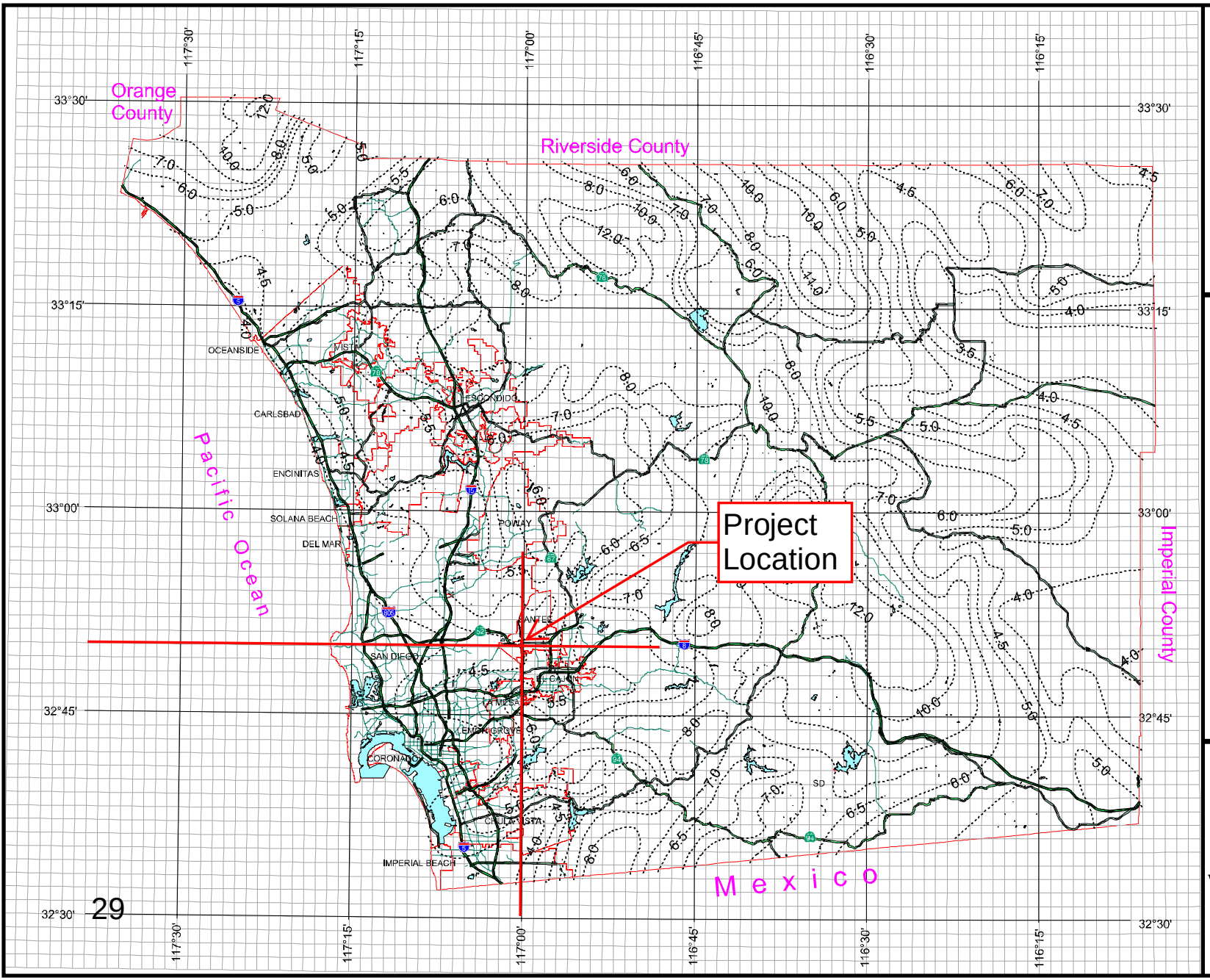
N
W E
S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24=4.55

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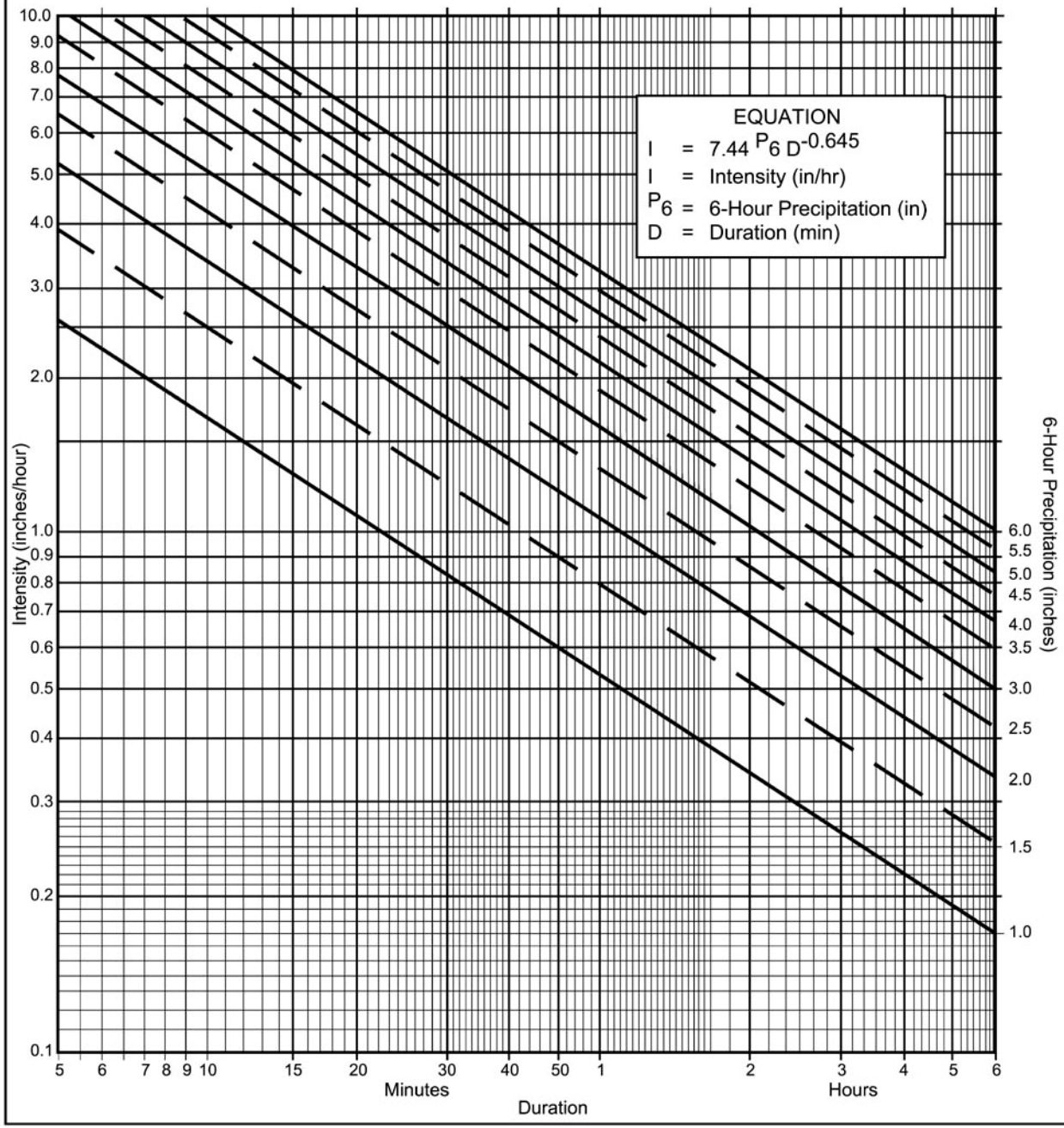
N W E S

3 0 3 Miles



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 _____ year

(b) P_6 = 2.45 in., P_{24} = 4.55, $\frac{P_6}{P_{24}} = \frac{2.45}{4.55}$ = 54%(2)

(c) Adjusted P_6(2) = 2.45 in.

(d) t_x = _____ min.

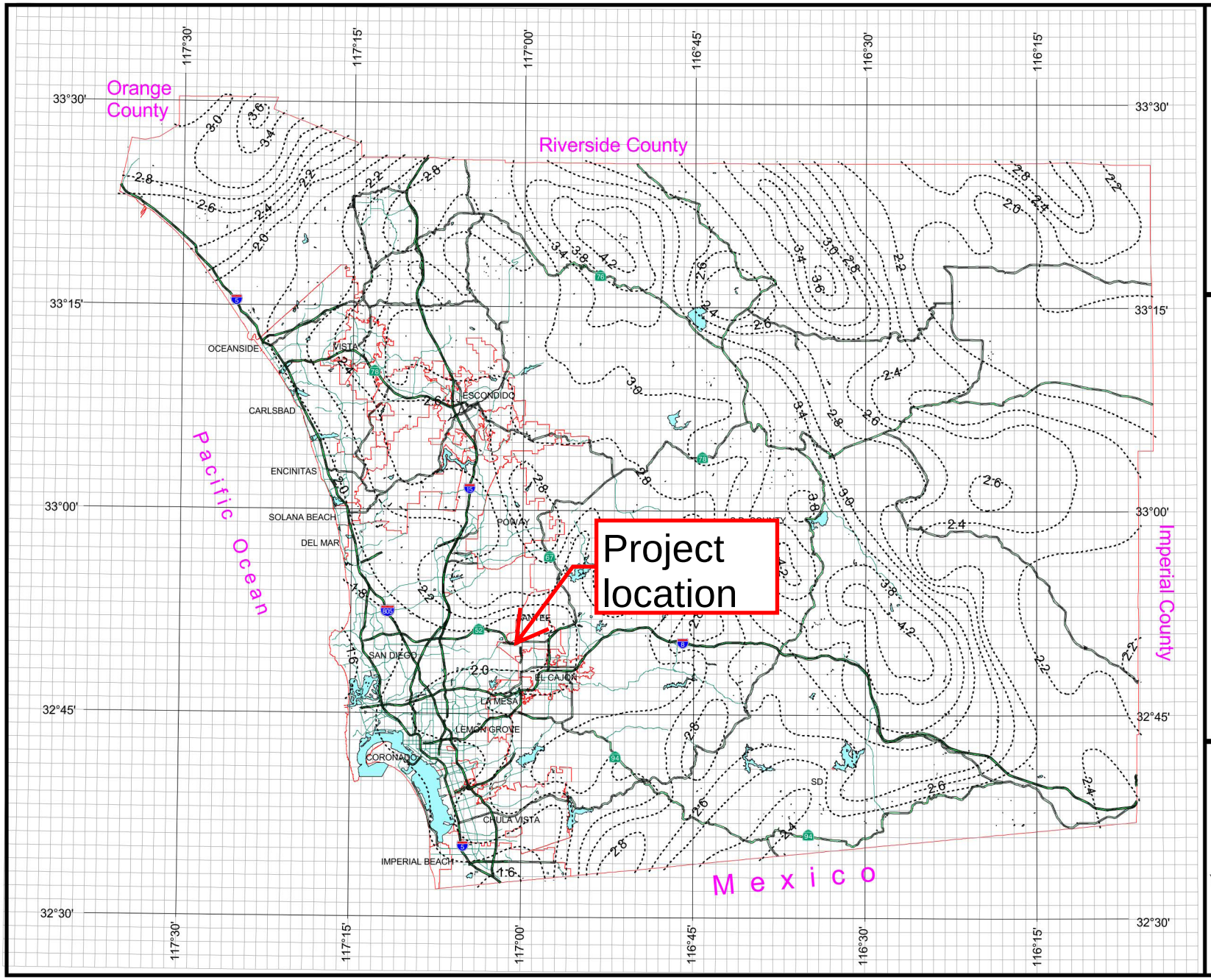
(e) I = _____ in./hr.

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



County of San Diego Hydrology Manual

Rainfall Isopluvials

25 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 1.90

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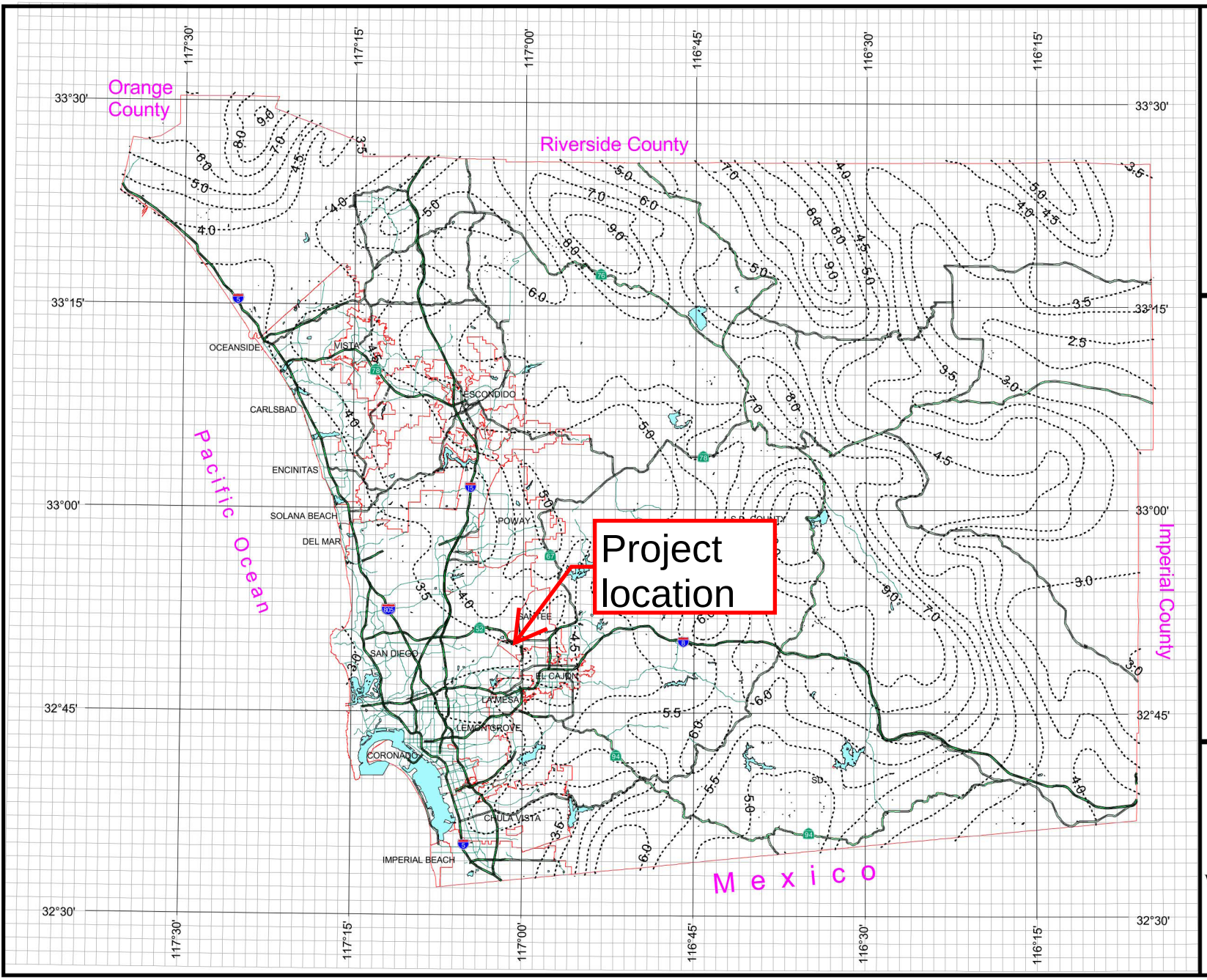
N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

25 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P6 = 3.50

DPW GIS
Department of Public Works Geographic Information Services

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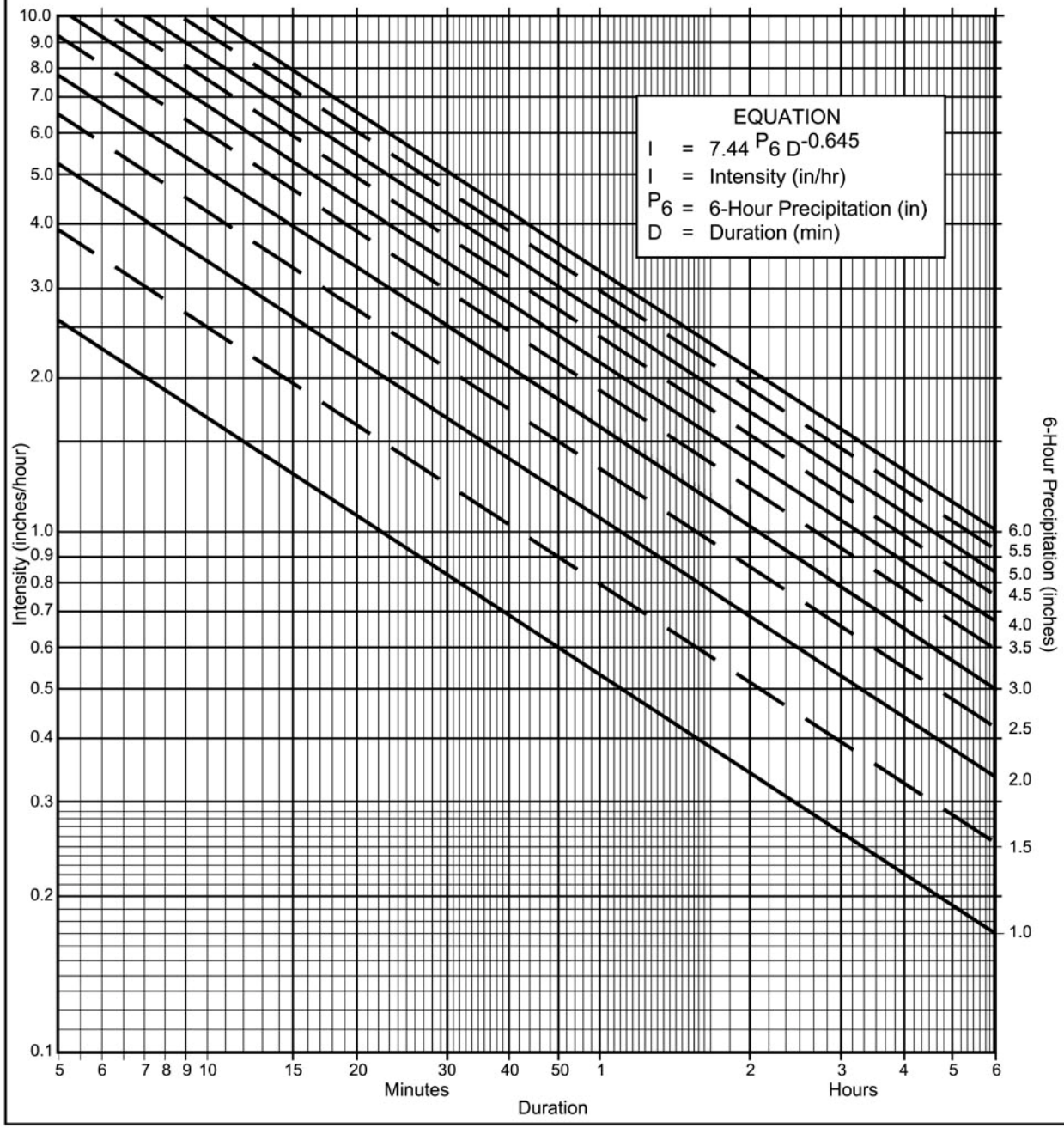
N W E S

3 0 3 Miles



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 _____ year

(b) P_6 = 1.90 in., P_{24} = 3.5, $\frac{P_6}{P_{24}} = \frac{1.90}{3.5}$ = 54 %(2)

(c) Adjusted P_6(2) = 1.90 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

–AES Hydrology Analysis
Existing Conditions

CARLTON OAKS / 10-YR Exisiting conditions for Hydraulic calculation purposes															
AES INPUT DATA															
Node #			Elevation		Length		Area		imperviousness	Soil Type*	C value	If Channel			If memory
From	To	code	Up	Down		slope	total	impervious				Base (ft)	Z:1	maning	Bank #
1	2	2	825.0	615.0	700	30.0%	10.00	1.83	18%	D	0.45				
2	3	5	615.0	490.0	2000	6.3%						0	2	0.040	
2	3	8					71.00	12.99	18%	D	0.45				
3	4	5	490.0	420.0	1500	4.7%						0	2	0.040	
3	4	8					53.00	9.70	18%	D	0.45				
4	5	5	420.0	374.0	1700	2.7%						0	2	0.040	
4	5	8					43.00	7.87	18%	D	0.45				
5	5	1													1-2
6	7	2	883.0	560.0	1000	32.3%	10.00	1.83	18%	D	0.45				
7	8	5	560.0	430.0	1500	8.7%						0	2	0.040	
7	8	8					40.00	7.32	18%	D	0.45				
8	5	5	430.0	374.0	1500	3.7%						0	2	0.040	
8	5	8					38.00	6.95	18%	D	0.45				
5	5	1													2-2
5	10	3	374.0	369.0	250	2.0%								0.013	
5	10	8					21.12	7.60	36%	D	0.55				
10	15	3	369.0	326.0	1900	2.3%								0.013	
10	15	8					41.62	14.98	36%	D	0.55				
					Total Area		327.74	71.08	This corresponds to the flows draining to node 19 on this study						
26	27	2	502.0	415.0	850	10.2%	10.00	1.83	18%	D	0.45				
27	30	5	415.0	365.0	1350	3.7%						0	2	0.040	
27	30	8					31.97	5.85	18%	D	0.45				
30	35	5	365.0	330.0	1250	2.8%						0	2	0.040	
30	35	8					16.10	5.80	36%	D	0.55				
					Total Area		58.07	13.48	This corresponds to the flows draining to node 216 on this study						

Nodes, codes, elevations, areas, and runoff coefficients were obtained directly from the report attached in the reference section. Analysis is being performed to obtain th10-yr and 25-yr peak flow to use as input in the preliminary hydraulic calculations.

10-Year Existing Condition Hydrology Model
For 216 on this report

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                              Analysis prepared by:

                     Hunsaker & Associates San Diego, Inc.
                               9707 Waples Street
                              San Diego,  CA 92121


 ************************* DESCRIPTION OF STUDY *************************
* Carlton Oaks / Hydrology Analysis                                      *
* 10-YEAR RAINFALL EVENT                                                 *
* EXISTING CONDITIONS TO NODES 19 & 216                                  *
 ************************************************************************

  FILE NAME: R:\1759\HYD\DR\CALCS\AES\EX\10EX.DAT
  TIME/DATE OF STUDY: 18:18 04/19/2023
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.750
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   17.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   20.0     12.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  4   16.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  5   26.0     18.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  6   44.0     12.0    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 =  0.50 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      1.00 TO NODE      2.00 IS CODE =  22
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  USER SPECIFIED Tc(MIN.) =   11.930
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.631
  SUBAREA RUNOFF(CFS) =     11.84
  TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     11.84

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2000.00   CHANNEL SLOPE =  0.0625
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.84
  FLOW VELOCITY(FEET/SEC.) =   5.55   FLOW DEPTH(FEET) =   1.03
  TRAVEL TIME(MIN.) =   6.01   Tc(MIN.) =   17.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    2700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.023
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   71.00   SUBAREA RUNOFF(CFS) =   64.63
  TOTAL AREA(ACRES) =       81.0   TOTAL RUNOFF(CFS) =      73.73
  TC(MIN.) =   17.94

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    420.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0467
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      73.73
  FLOW VELOCITY(FEET/SEC.) =   7.87   FLOW DEPTH(FEET) =   2.16
  TRAVEL TIME(MIN.) =   3.18   Tc(MIN.) =   21.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =    4200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.821
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   53.00   SUBAREA RUNOFF(CFS) =   43.43
  TOTAL AREA(ACRES) =      134.0   TOTAL RUNOFF(CFS) =     109.80
  TC(MIN.) =   21.11

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    420.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1700.00   CHANNEL SLOPE =  0.0271
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     109.80
  FLOW VELOCITY(FEET/SEC.) =   7.07   FLOW DEPTH(FEET) =   2.79
  TRAVEL TIME(MIN.) =   4.01   Tc(MIN.) =   25.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    5900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

```
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.628
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   43.00   SUBAREA RUNOFF(CFS) =   31.50
  TOTAL AREA(ACRES) =      177.0   TOTAL RUNOFF(CFS) =     129.65
  TC(MIN.) =   25.12

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 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.) =   25.12
  RAINFALL INTENSITY(INCH/HR) =   1.63
  TOTAL STREAM AREA(ACRES) =   177.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    129.65

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  USER SPECIFIED Tc(MIN.) =   12.460
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.559
  SUBAREA RUNOFF(CFS) =     11.51
  TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     11.51

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    560.00  DOWNSTREAM(FEET) =    430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0867
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.51
  FLOW VELOCITY(FEET/SEC.) =   6.19   FLOW DEPTH(FEET) =   0.96
  TRAVEL TIME(MIN.) =   4.04   Tc(MIN.) =   16.50
  LONGEST FLOWPATH FROM NODE      6.00 TO NODE      8.00 =   71500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.135
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   38.43
  TOTAL AREA(ACRES) =       50.0   TOTAL RUNOFF(CFS) =      48.04
  TC(MIN.) =   16.50

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      5.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0373
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      48.04
```

```
 FLOW VELOCITY(FEET/SEC.) =   6.48   FLOW DEPTH(FEET) =   1.93
 TRAVEL TIME(MIN.) =   3.86   Tc(MIN.) =   20.36
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE      5.00 =   73000.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.864
 *USER SPECIFIED(SUBAREA):
 SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
 SUBAREA AREA(ACRES) =   38.00   SUBAREA RUNOFF(CFS) =   31.88
 TOTAL AREA(ACRES) =       88.0   TOTAL RUNOFF(CFS) =      73.82
 TC(MIN.) =   20.36

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 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.) =   20.36
 RAINFALL INTENSITY(INCH/HR) =   1.86
 TOTAL STREAM AREA(ACRES) =    88.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     73.82

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      129.65    25.12        1.628        177.00
     2       73.82    20.36        1.864         88.00

 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      178.88    20.36       1.864
     2      194.11    25.12       1.628

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     194.11   Tc(MIN.) =   25.12
 TOTAL AREA(ACRES) =      265.0
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE      5.00 =   73000.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE     10.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   369.00
 FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.95
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     194.11
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   25.35
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     10.00 =   73250.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.618
```

```
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4574
  SUBAREA AREA(ACRES) =   21.12   SUBAREA RUNOFF(CFS) =   18.80
  TOTAL AREA(ACRES) =      286.1   TOTAL RUNOFF(CFS) =     211.75
  TC(MIN.) =   25.35

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   369.00  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =  1900.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.16
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     211.75
  PIPE TRAVEL TIME(MIN.) =   1.65    Tc(MIN.) =   27.01
  LONGEST FLOWPATH FROM NODE      6.00 TO NODE     15.00 =   75150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.554
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4691
  SUBAREA AREA(ACRES) =   41.62   SUBAREA RUNOFF(CFS) =   35.56
  TOTAL AREA(ACRES) =      327.7   TOTAL RUNOFF(CFS) =     238.87
  TC(MIN.) =   27.01

+--------------------------------------------------------------------------+
|                                                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  USER SPECIFIED Tc(MIN.) =   13.380
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.444
  SUBAREA RUNOFF(CFS) =     11.00
  TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     11.00

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     30.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    365.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1350.00   CHANNEL SLOPE =  0.0370
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.00
  FLOW VELOCITY(FEET/SEC.) =   4.47   FLOW DEPTH(FEET) =   1.11
  TRAVEL TIME(MIN.) =   5.03   Tc(MIN.) =   18.41
  LONGEST FLOWPATH FROM NODE     26.00 TO NODE     30.00 = 7001350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.989
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   31.97   SUBAREA RUNOFF(CFS) =   28.61
  TOTAL AREA(ACRES) =       42.0   TOTAL RUNOFF(CFS) =      37.56
  TC(MIN.) =   18.41

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    365.00  DOWNSTREAM(FEET) =    330.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1250.00   CHANNEL SLOPE =  0.0280
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      37.56
  FLOW VELOCITY(FEET/SEC.) =   5.48   FLOW DEPTH(FEET) =   1.85
  TRAVEL TIME(MIN.) =   3.80   Tc(MIN.) =   22.22
  LONGEST FLOWPATH FROM NODE     26.00 TO NODE     35.00 = 7002600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.762
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4777
  SUBAREA AREA(ACRES) =   16.10   SUBAREA RUNOFF(CFS) =   15.60
  TOTAL AREA(ACRES) =       58.1   TOTAL RUNOFF(CFS) =      48.88
  TC(MIN.) =   22.22
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       58.1  TC(MIN.) =     22.22
  PEAK FLOW RATE(CFS)   =      48.88
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Node 216 in proposed conditions

25-Year Existing Condition Hydrology Model For Node 19

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                              Analysis prepared by:

                     Hunsaker & Associates San Diego, Inc.
                               9707 Waples Street
                              San Diego,  CA 92121


 ************************* DESCRIPTION OF STUDY *************************
* Carlton Oaks / Hydrology Analysis                                      *
* 25-YEAR RAINFALL EVENT                                                 *
* EXISTING CONDITIONS TO NODES 19 & 216                                  *
 ************************************************************************

  FILE NAME: R:\1759\HYD\DR\CALCS\AES\25\25EX.DAT
  TIME/DATE OF STUDY: 15:13 12/14/2023
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.900
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   17.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   20.0     12.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  4   16.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  5   26.0     18.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  6   44.0     12.0    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 =  0.50 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      1.00 TO NODE      2.00 IS CODE =  22
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  USER SPECIFIED Tc(MIN.) =   11.930
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.857
  SUBAREA RUNOFF(CFS) =     12.86
  TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     12.86

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2000.00   CHANNEL SLOPE =  0.0625
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.86
  FLOW VELOCITY(FEET/SEC.) =   5.66   FLOW DEPTH(FEET) =   1.07
  TRAVEL TIME(MIN.) =   5.88   Tc(MIN.) =   17.81
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    2700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.206
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   71.00   SUBAREA RUNOFF(CFS) =   70.48
  TOTAL AREA(ACRES) =       81.0   TOTAL RUNOFF(CFS) =      80.40
  TC(MIN.) =   17.81

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    420.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0467
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      80.40
  FLOW VELOCITY(FEET/SEC.) =   8.02   FLOW DEPTH(FEET) =   2.24
  TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   20.93
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =    4200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.988
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   53.00   SUBAREA RUNOFF(CFS) =   47.42
  TOTAL AREA(ACRES) =      134.0   TOTAL RUNOFF(CFS) =     119.88
  TC(MIN.) =   20.93

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    420.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1700.00   CHANNEL SLOPE =  0.0271
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     119.88
  FLOW VELOCITY(FEET/SEC.) =   7.23   FLOW DEPTH(FEET) =   2.88
  TRAVEL TIME(MIN.) =   3.92   Tc(MIN.) =   24.85
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    5900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

```
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.780
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   43.00   SUBAREA RUNOFF(CFS) =   34.44
  TOTAL AREA(ACRES) =      177.0   TOTAL RUNOFF(CFS) =     141.76
  TC(MIN.) =   24.85

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 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.) =   24.85
  RAINFALL INTENSITY(INCH/HR) =   1.78
  TOTAL STREAM AREA(ACRES) =   177.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    141.76

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  USER SPECIFIED Tc(MIN.) =   12.460
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.778
  SUBAREA RUNOFF(CFS) =     12.50
  TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     12.50

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    560.00  DOWNSTREAM(FEET) =    430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0867
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.50
  FLOW VELOCITY(FEET/SEC.) =   6.39   FLOW DEPTH(FEET) =   0.99
  TRAVEL TIME(MIN.) =   3.91   Tc(MIN.) =   16.37
  LONGEST FLOWPATH FROM NODE      6.00 TO NODE      8.00 =   71500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.329
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   41.93
  TOTAL AREA(ACRES) =       50.0   TOTAL RUNOFF(CFS) =      52.41
  TC(MIN.) =   16.37

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      5.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0373
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      52.41
```

```
  FLOW VELOCITY(FEET/SEC.) =   6.64   FLOW DEPTH(FEET) =   1.99
  TRAVEL TIME(MIN.) =   3.76   Tc(MIN.) =   20.14
  LONGEST FLOWPATH FROM NODE      6.00 TO NODE      5.00 =   73000.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.038
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   38.00   SUBAREA RUNOFF(CFS) =   34.85
  TOTAL AREA(ACRES) =       88.0   TOTAL RUNOFF(CFS) =      80.71
  TC(MIN.) =   20.14

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 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.) =   20.14
  RAINFALL INTENSITY(INCH/HR) =   2.04
  TOTAL STREAM AREA(ACRES) =    88.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     80.71

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      141.76    24.85        1.780        177.00
      2       80.71    20.14        2.038         88.00

  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      195.59    20.14       2.038
      2      212.24    24.85       1.780

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     212.24   Tc(MIN.) =   24.85
  TOTAL AREA(ACRES) =      265.0
  LONGEST FLOWPATH FROM NODE      6.00 TO NODE      5.00 =   73000.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE     10.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   369.00
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.15
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     212.24
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   25.08
  LONGEST FLOWPATH FROM NODE      6.00 TO NODE     10.00 =   73250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.769
```

```
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4574
  SUBAREA AREA(ACRES) =   21.12   SUBAREA RUNOFF(CFS) =   20.55
  TOTAL AREA(ACRES) =      286.1   TOTAL RUNOFF(CFS) =     231.53
  TC(MIN.) =   25.08

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   369.00  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =  1900.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  40.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.34
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     231.53
  PIPE TRAVEL TIME(MIN.) =   1.64    Tc(MIN.) =   26.71
  LONGEST FLOWPATH FROM NODE      6.00 TO NODE     15.00 =   75150.00 FEET.

  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.699
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4691
  SUBAREA AREA(ACRES) =   41.62   SUBAREA RUNOFF(CFS) =   38.88
  TOTAL AREA(ACRES) =      327.7   TOTAL RUNOFF(CFS) =     261.16
  TC(MIN.) =   26.71

+----------------------------------------------------------------------------+
|                                                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  USER SPECIFIED Tc(MIN.) =   13.380
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.653
  SUBAREA RUNOFF(CFS) =     11.94
  TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     11.94

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     30.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    365.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1350.00   CHANNEL SLOPE =  0.0370
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.94
  FLOW VELOCITY(FEET/SEC.) =   4.58   FLOW DEPTH(FEET) =   1.14
  TRAVEL TIME(MIN.) =   4.91   Tc(MIN.) =   18.29
  LONGEST FLOWPATH FROM NODE     26.00 TO NODE     30.00 = 7001350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
```

Node 19 in proposed conditions

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.169
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   31.97   SUBAREA RUNOFF(CFS) =   31.20
  TOTAL AREA(ACRES) =       42.0   TOTAL RUNOFF(CFS) =      40.96
  TC(MIN.) =   18.29

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    365.00  DOWNSTREAM(FEET) =    330.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1250.00   CHANNEL SLOPE =  0.0280
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      40.96
  FLOW VELOCITY(FEET/SEC.) =   5.60   FLOW DEPTH(FEET) =   1.91
  TRAVEL TIME(MIN.) =   3.72   Tc(MIN.) =   22.01
  LONGEST FLOWPATH FROM NODE     26.00 TO NODE     35.00 = 7002600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.925
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4777
  SUBAREA AREA(ACRES) =   16.10   SUBAREA RUNOFF(CFS) =   17.04
  TOTAL AREA(ACRES) =       58.1   TOTAL RUNOFF(CFS) =      53.39
  TC(MIN.) =   22.01
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       58.1  TC(MIN.) =     22.01
  PEAK FLOW RATE(CFS)   =      53.39
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

100-Year Existing Condition Hydrology Model

CARLTON OAKS / EXISTING CONDITIONS

AES INPUT DATA

Node #			Elevation		Length		Area (AC)		perviousne	Soil Type*	C value	If Channel			If memory
From	To	code	Up	Down	(FT)	slope	total	impervious				Base (ft)	Z:1	maning	Bank #
301	302	2	320.0	315.0	85	6%	0.16	0.04	25%	D	0.49				
302	303	5	315.0	310.6	488	0.9%	3.33	0.83	25%	D/A	0.49	3	1:20	0.030	
303	264	1													4-1
315	316	2	321.5	315.0	85	8%	0.11	0.03	25%	D	0.49				
316	317	5	315.0	310.0	648	0.8%	4.81	1.20	25%	D/A	0.49	3	1:20	0.030	
317	264	1													4-2
261	262	2	349.5	347.5	100	2%	0.13	0.07	50%	D	0.63				
262	263	6	347.5	322.0	880	3%	2.08	1.04	50%	D/A	0.63				
263	264	5	322.0	314.0	624	1.3%	0.00	0.00	0%	A	0.35	16	1:20	0.030	
264	264	1													4-3
250	251	2	351.5	350.0	85	2%	0.22	0.06	25%	D	0.49				
251	264	5	350.0	319.1	1127	2.7%	11.10	2.78	25%	D/A	0.49	3	1:20	0.030	
264	264	1													4-4
264	143	5	314.0	304.0	1590	0.6%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
143	143	1													2-1
216	216	7				A=	58.07			Tc =	21.43	Q =	80		
216	143	5	335.0	310.0	856	2.9%	10.71	8.57	80%	D	0.79	3	1:20	0.030	
143	143	1													2-2
143	132	5	304.0	301.4	518	0.5%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
132	132	8					2.66	1.33	50%	D	0.63				
132	132	1													2-1
129	130	2	417.0	413.0	100	4%	0.22	0.11	50%	D	0.63				
130	131	6	413.0	354.0	1282	5%	12.47	6.24	50%	D	0.63				
131	132	3	349.0	305.0	912	4.8%								0.013	
132	132	8					14.50	7.25	50%	D	0.61				
132	132	1													2-2
132	127	5	301.4	299.8	311	0.5%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
127	127	8					0.92	0.46	50%	D	0.44				
127	127	1													2-1
124	125	2	355.0	353.0	85	2%	0.12	0.06	50%	D	0.63				
125	126	6	353.0	335.0	756	2%	3.69	1.85	50%	D	0.63				
126	127	3	331.0	315.0	442	3.6%								0.013	
127	127	1													2-2
127	112	5	299.8	296.4	678	0.5%	0.00	0.00	0%	D/A	0.35	16	1:20	0.030	
112	112	8					1.43	0.72	50%	D	0.50				
112	112	1													2-1
112	112	7				A =	54.44			Tc =	21.61	Q =	79.21		
112	112	1													2-2
112	103	5	296.4	289.5	1386	0.5%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
103	103	8					1.92	0.96	50%	D/B	0.63				
103	20	5	289.5	286.4	609	0.5%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
20	20	1													2-1
19	19	7				A =	327.74			Tc =	25.61	Q =	405.36		
19	20	5	315.0	296.8	718	2.5%	7.20	0.72	10%	D	0.41	3	1:20	0.030	
20	20	1													2-2
20	40	5	286.4	284.0	482	0.5%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
40	40	1													2-1
38	39	2	330.0	308.0	100	22%	0.18	0.02	10%	D	0.41				
39	40	5	308.0	295.9	656	1.8%	4.90	0.49	10%	D/A	0.35	3	1:20	0.030	
40	40	1													2-2
Total							523.11	29.79	6%	D	0.38				

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                              Analysis prepared by:

                     Hunsaker & Associates San Diego, Inc.
                               9707 Waples Street
                              San Diego,  CA 92121


 ************************* DESCRIPTION OF STUDY *************************
* Carlton Oaks / Hydrology Analysis                                      *
* 100-YEAR RAINFALL EVENT                                                *
* EXISTING CODITIONS                                                     *
 ************************************************************************

  FILE NAME: R:\1759\HYD\DR\CALCS\AES\100EX.DAT
  TIME/DATE OF STUDY: 15:33 12/14/2023
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.450
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   17.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   20.0     12.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  4   16.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  5   26.0     18.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  6   44.0     12.0    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 =  0.50 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    301.00 TO NODE    302.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  PARKS, GOLF COURSES RUNOFF COEFFICIENT = .4900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    320.00
  DOWNSTREAM ELEVATION(FEET) =    315.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.608
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.994
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.47

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

```
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    310.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   488.00   CHANNEL SLOPE =  0.0090
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.854
 *USER SPECIFIED(SUBAREA):
 PARKS, GOLF COURSES RUNOFF COEFFICIENT = .4900
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.70
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.47
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   5.52
 Tc(MIN.) =   11.13
 SUBAREA AREA(ACRES) =     3.33       SUBAREA RUNOFF(CFS) =    6.29
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
 TOTAL AREA(ACRES) =        3.5         PEAK FLOW RATE(CFS) =       6.59

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =   1.70
 LONGEST FLOWPATH FROM NODE    301.00 TO NODE    303.00 =     573.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  4
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.13
 RAINFALL INTENSITY(INCH/HR) =   3.85
 TOTAL STREAM AREA(ACRES) =     3.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.59

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4900
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
 UPSTREAM ELEVATION(FEET) =    321.50
 DOWNSTREAM ELEVATION(FEET) =    315.00
 ELEVATION DIFFERENCE(FEET) =      6.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.139
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.342
 SUBAREA RUNOFF(CFS) =      0.34
 TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
 FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    310.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   648.00   CHANNEL SLOPE =  0.0077
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.587
 *USER SPECIFIED(SUBAREA):
 SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4900
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.48
 AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   7.29
 Tc(MIN.) =   12.43
 SUBAREA AREA(ACRES) =     4.81       SUBAREA RUNOFF(CFS) =    8.45
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
```

```
 TOTAL AREA(ACRES) =        4.9         PEAK FLOW RATE(CFS) =       8.65

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   1.72
 LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     733.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    317.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  4
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.43
 RAINFALL INTENSITY(INCH/HR) =   3.59
 TOTAL STREAM AREA(ACRES) =     4.92
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.65

****************************************************************************
 FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    349.50
 DOWNSTREAM ELEVATION(FEET) =    347.50
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.006
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    80.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.735
 SUBAREA RUNOFF(CFS) =      0.47
 TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
 FLOW PROCESS FROM NODE    262.00 TO NODE    263.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  347.50  DOWNSTREAM ELEVATION(FEET) =  322.00
 STREET LENGTH(FEET) =   880.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.19
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =    8.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.58
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.15
 STREET FLOW TRAVEL TIME(MIN.) =   4.10   Tc(MIN.) =   10.11
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.100
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
 SUBAREA AREA(ACRES) =    2.08      SUBAREA RUNOFF(CFS) =    5.37
 TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       5.71
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.68
  FLOW VELOCITY(FEET/SEC.) =  4.04   DEPTH*VELOCITY(FT*FT/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    263.00 =     980.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    264.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    322.00  DOWNSTREAM(FEET) =    314.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   624.00   CHANNEL SLOPE =  0.0128
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.71
  FLOW VELOCITY(FEET/SEC.) =   1.80   FLOW DEPTH(FEET) =   0.19
  TRAVEL TIME(MIN.) =   5.78   Tc(MIN.) =   15.88
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    264.00 =    1604.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.88
  RAINFALL INTENSITY(INCH/HR) =   3.06
  TOTAL STREAM AREA(ACRES) =     2.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.71

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    251.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    351.50
  DOWNSTREAM ELEVATION(FEET) =    350.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.201
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    81.47
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.691
  SUBAREA RUNOFF(CFS) =      0.51
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.51

****************************************************************************
  FLOW PROCESS FROM NODE    251.00 TO NODE    264.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    319.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1127.00   CHANNEL SLOPE =  0.0274
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.616
  *USER SPECIFIED(SUBAREA):
  PARKS, GOLF COURSES RUNOFF COEFFICIENT = .4900
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.61
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   4.08
  Tc(MIN.) =   12.28
  SUBAREA AREA(ACRES) =    11.10       SUBAREA RUNOFF(CFS) =   19.67
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
```

```
  TOTAL AREA(ACRES) =       11.3         PEAK FLOW RATE(CFS) =      20.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.79   FLOW VELOCITY(FEET/SEC.) =   5.54
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1212.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  4 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.28
  RAINFALL INTENSITY(INCH/HR) =   3.62
  TOTAL STREAM AREA(ACRES) =    11.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.06

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.59    11.13        3.854          3.49
      2        8.65    12.43        3.587          4.92
      3        5.71    15.88        3.063          2.21
      4       20.06    12.28        3.616         11.32

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  4 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       36.50    11.13       3.854
      2       39.19    12.28       3.616
      3       39.15    12.43       3.587
      4       35.32    15.88       3.063

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      39.19   Tc(MIN.) =   12.28
  TOTAL AREA(ACRES) =       21.9
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    264.00 =    1604.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    143.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    314.00  DOWNSTREAM(FEET) =    304.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1590.00   CHANNEL SLOPE =  0.0063
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.19
  FLOW VELOCITY(FEET/SEC.) =   3.02   FLOW DEPTH(FEET) =   0.74
  TRAVEL TIME(MIN.) =   8.78   Tc(MIN.) =   21.06
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    143.00 =    3194.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 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.) =   21.06
  RAINFALL INTENSITY(INCH/HR) =   2.55
  TOTAL STREAM AREA(ACRES) =    21.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.19

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

```
 FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  21.43   RAIN INTENSITY(INCH/HOUR) =  2.52
 TOTAL AREA(ACRES) =    58.07   TOTAL RUNOFF(CFS) =     80.00

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    143.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    335.00  DOWNSTREAM(FEET) =    310.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   856.00   CHANNEL SLOPE =  0.0292
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.405
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL AREA RUNOFF COEFFICIENT = .7900
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      90.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.53
 AVERAGE FLOW DEPTH(FEET) =   1.67   TRAVEL TIME(MIN.) =   1.67
 Tc(MIN.) =   23.10
 SUBAREA AREA(ACRES) =    10.71       SUBAREA RUNOFF(CFS) =   20.35
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.584
 TOTAL AREA(ACRES) =       68.8         PEAK FLOW RATE(CFS) =      96.57

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.73   FLOW VELOCITY(FEET/SEC.) =   8.66
 LONGEST FLOWPATH FROM NODE    315.00 TO NODE    143.00 =    1589.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 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.) =   23.10
 RAINFALL INTENSITY(INCH/HR) =   2.41
 TOTAL STREAM AREA(ACRES) =    68.78
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     96.57

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       39.19    21.06        2.553         21.94
     2       96.57    23.10        2.405         68.78

 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      127.24    21.06       2.553
     2      133.49    23.10       2.405

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     133.49   Tc(MIN.) =   23.10
 TOTAL AREA(ACRES) =       90.7
 LONGEST FLOWPATH FROM NODE    261.00 TO NODE    143.00 =    3194.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    143.00 TO NODE    132.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    304.00  DOWNSTREAM(FEET) =    301.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   518.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     133.49
  FLOW VELOCITY(FEET/SEC.) =   4.28   FLOW DEPTH(FEET) =   1.62
  TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =   25.12
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    132.00 =    3712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.279
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5663
  SUBAREA AREA(ACRES) =    2.66   SUBAREA RUNOFF(CFS) =    3.82
  TOTAL AREA(ACRES) =       93.4   TOTAL RUNOFF(CFS) =     133.49
  TC(MIN.) =   25.12
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   25.12
  RAINFALL INTENSITY(INCH/HR) =   2.28
  TOTAL STREAM AREA(ACRES) =    93.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    133.49

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    417.00
  DOWNSTREAM ELEVATION(FEET) =    413.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.263
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    97.50
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.245
  SUBAREA RUNOFF(CFS) =      0.87
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.87

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  413.00  DOWNSTREAM ELEVATION(FEET) =  354.00
  STREET LENGTH(FEET) =  1282.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   13.01
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.12
  STREET FLOW TRAVEL TIME(MIN.) =   3.99   Tc(MIN.) =    9.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.342
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  SUBAREA AREA(ACRES) =   12.47      SUBAREA RUNOFF(CFS) =   34.11
  TOTAL AREA(ACRES) =       12.7        PEAK FLOW RATE(CFS) =      34.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.07
  FLOW VELOCITY(FEET/SEC.) =  6.21   DEPTH*VELOCITY(FT*FT/SEC.) =   2.90
  LONGEST FLOWPATH FROM NODE    129.00 TO NODE    131.00 =    1382.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   349.00  DOWNSTREAM(FEET) =   305.00
  FLOW LENGTH(FEET) =   912.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.41
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.71
  PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   10.17
  LONGEST FLOWPATH FROM NODE    129.00 TO NODE    132.00 =    2294.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.082
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6193
  SUBAREA AREA(ACRES) =   14.50   SUBAREA RUNOFF(CFS) =   36.11
  TOTAL AREA(ACRES) =       27.2   TOTAL RUNOFF(CFS) =      68.74
  TC(MIN.) =   10.17

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.17
  RAINFALL INTENSITY(INCH/HR) =   4.08
  TOTAL STREAM AREA(ACRES) =    27.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     68.74

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      133.49    25.12        2.279         93.38
      2       68.74    10.17        4.082         27.19

  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      143.26    10.17       4.082
      2      171.87    25.12       2.279

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     171.87   Tc(MIN.) =   25.12
  TOTAL AREA(ACRES) =      120.6
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    132.00 =    3712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    127.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    301.40  DOWNSTREAM(FEET) =    299.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   311.00   CHANNEL SLOPE =  0.0051
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     171.87
  FLOW VELOCITY(FEET/SEC.) =   4.67   FLOW DEPTH(FEET) =   1.86
  TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   26.23
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    127.00 =    4023.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.216
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .4100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5770
  SUBAREA AREA(ACRES) =    0.92   SUBAREA RUNOFF(CFS) =    0.84
  TOTAL AREA(ACRES) =      121.5   TOTAL RUNOFF(CFS) =     171.87
  TC(MIN.) =   26.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.23
  RAINFALL INTENSITY(INCH/HR) =   2.22
  TOTAL STREAM AREA(ACRES) =   121.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    171.87

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    355.00
  DOWNSTREAM ELEVATION(FEET) =    353.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.864
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.824
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.44

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

```
 FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  353.00  DOWNSTREAM ELEVATION(FEET) =  335.00
 STREET LENGTH(FEET) =   756.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.36
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.31
   HALFSTREET FLOOD WIDTH(FEET) =    8.53
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.18
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
 STREET FLOW TRAVEL TIME(MIN.) =   3.96   Tc(MIN.) =    9.83
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.175
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
 SUBAREA AREA(ACRES) =    3.69      SUBAREA RUNOFF(CFS) =    9.70
 TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.02

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.52
 FLOW VELOCITY(FEET/SEC.) =  3.63   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
 LONGEST FLOWPATH FROM NODE    124.00 TO NODE    126.00 =     841.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   331.00  DOWNSTREAM(FEET) =   315.00
 FLOW LENGTH(FEET) =   442.00   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.) =  10.88
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.02
 PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   10.50
 LONGEST FLOWPATH FROM NODE    124.00 TO NODE    127.00 =    1283.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.50
 RAINFALL INTENSITY(INCH/HR) =   4.00
 TOTAL STREAM AREA(ACRES) =     3.81
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.02

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      171.87    26.23        2.216        121.49
     2       10.02    10.50        3.999          3.81
```

```
  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      105.27    10.50       3.999
      2      177.42    26.23       2.216

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     177.42   Tc(MIN.) =   26.23
  TOTAL AREA(ACRES) =      125.3
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    127.00 =    4023.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    299.80  DOWNSTREAM(FEET) =    296.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     177.42
  FLOW VELOCITY(FEET/SEC.) =   4.69   FLOW DEPTH(FEET) =   1.91
  TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   28.64
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    112.00 =    4701.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.094
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .4900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5776
  SUBAREA AREA(ACRES) =    1.43   SUBAREA RUNOFF(CFS) =    1.47
  TOTAL AREA(ACRES) =      126.7   TOTAL RUNOFF(CFS) =     177.42
  TC(MIN.) =   28.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   28.64
  RAINFALL INTENSITY(INCH/HR) =   2.09
  TOTAL STREAM AREA(ACRES) =   126.73
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    177.42

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  21.61   RAIN INTENSITY(INCH/HOUR) =  2.51
  TOTAL AREA(ACRES) =    54.44   TOTAL RUNOFF(CFS) =     79.21

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.61
  RAINFALL INTENSITY(INCH/HR) =   2.51
  TOTAL STREAM AREA(ACRES) =    54.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     79.21

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      177.42    28.64        2.094        126.73
      2       79.21    21.61        2.511         54.44

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      227.15    21.61       2.511
      2      243.47    28.64       2.094

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     243.47   Tc(MIN.) =   28.64
  TOTAL AREA(ACRES) =      181.2
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    112.00 =    4701.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    296.40  DOWNSTREAM(FEET) =    289.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1386.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     243.47
  FLOW VELOCITY(FEET/SEC.) =   5.16   FLOW DEPTH(FEET) =   2.29
  TRAVEL TIME(MIN.) =   4.48   Tc(MIN.) =   33.12
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    103.00 =    6087.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.907
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5787
  SUBAREA AREA(ACRES) =    1.92   SUBAREA RUNOFF(CFS) =    2.31
  TOTAL AREA(ACRES) =      183.1   TOTAL RUNOFF(CFS) =     243.47
  TC(MIN.) =   33.12
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE     20.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    289.50  DOWNSTREAM(FEET) =    286.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   609.00   CHANNEL SLOPE =  0.0051
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     243.47
  FLOW VELOCITY(FEET/SEC.) =   5.20   FLOW DEPTH(FEET) =   2.28
  TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   35.07
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE     20.00 =    6696.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   35.07
  RAINFALL INTENSITY(INCH/HR) =   1.84
  TOTAL STREAM AREA(ACRES) =   183.09
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    243.47

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  25.61   RAIN INTENSITY(INCH/HOUR) =  2.25
  TOTAL AREA(ACRES) =   327.74   TOTAL RUNOFF(CFS) =    405.36

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    296.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   718.00   CHANNEL SLOPE =  0.0253
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.196
  *USER SPECIFIED(SUBAREA):
  PARKS, GOLF COURSES RUNOFF COEFFICIENT = .4100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     408.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.91
  AVERAGE FLOW DEPTH(FEET) =   3.46   TRAVEL TIME(MIN.) =   1.00
  Tc(MIN.) =   26.61
  SUBAREA AREA(ACRES) =     7.20       SUBAREA RUNOFF(CFS) =    6.48
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.547
  TOTAL AREA(ACRES) =      334.9         PEAK FLOW RATE(CFS) =     405.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.45   FLOW VELOCITY(FEET/SEC.) =  11.89
  LONGEST FLOWPATH FROM NODE    124.00 TO NODE     20.00 =    2001.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.61
  RAINFALL INTENSITY(INCH/HR) =   2.20
  TOTAL STREAM AREA(ACRES) =   334.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    405.36

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      243.47    35.07        1.838        183.09
      2      405.36    26.61        2.196        334.94

  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      609.15    26.61       2.196
     2      582.77    35.07       1.838

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     609.15   Tc(MIN.) =   26.61
  TOTAL AREA(ACRES) =      518.0
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE     20.00 =    6696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    286.40  DOWNSTREAM(FEET) =    284.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   482.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     609.15
  FLOW VELOCITY(FEET/SEC.) =   6.81   FLOW DEPTH(FEET) =   3.79
  TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =   27.80
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE     40.00 =    7178.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   27.80
  RAINFALL INTENSITY(INCH/HR) =   2.13
  TOTAL STREAM AREA(ACRES) =   518.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    609.15

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  PARKS, GOLF COURSES RUNOFF COEFFICIENT = .4100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    330.00
  DOWNSTREAM ELEVATION(FEET) =    308.00
  ELEVATION DIFFERENCE(FEET) =     22.00
  URBAN 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) =  5.889
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    308.00  DOWNSTREAM(FEET) =    295.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   656.00   CHANNEL SLOPE =  0.0184
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.292
  *USER SPECIFIED(SUBAREA):
  PARKS, GOLF COURSES RUNOFF COEFFICIENT = .3500
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.00
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   3.65
  Tc(MIN.) =    9.42
  SUBAREA AREA(ACRES) =     4.90       SUBAREA RUNOFF(CFS) =    7.36
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.352
```

```
  TOTAL AREA(ACRES) =        5.1         PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   3.62
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =     756.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   4.29
  TOTAL STREAM AREA(ACRES) =     5.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.68

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      609.15    27.80        2.135        518.03
      2        7.68     9.42        4.292          5.08

  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      310.71     9.42       4.292
      2      612.97    27.80       2.135

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     612.97   Tc(MIN.) =   27.80
  TOTAL AREA(ACRES) =      523.1
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE     40.00 =    7178.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      523.1  TC(MIN.) =     27.80
  PEAK FLOW RATE(CFS)   =     612.97
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

–AES Hydrology Analysis
Proposed Conditions

CARLTON OAKS / PROPOSED CONDITIONS

AES INPUT DATA

Node #			Elevation		Length		Area		imperviousness	Soil Type*	C value	If Channel			If memory
From	To	code	Up	Down		slope	total	impervious				Base (ft)	Z:1	maning	Bank #
300	301	2	324.5	323.5	60	1.7%	0.09	0.08	85%	D	0.82				
301	302	6	323.5	320.3	317	1.0%	1.28	1.09	85%	D	0.82				
302	302	8					0.32	0.27	85%	D	0.82				
302	303	3	316.3	314.9	275	0.5%								0.012	
264	264	1													4-1
310	311	2	324.5	323.5	60	1.7%	0.07	0.06	85%	D	0.82				
311	312	6	323.5	321.3	293	0.7%	1.31	1.11	85%	D	0.82				
312	312	8					1.36	1.16	85%	D	0.82				
312	313	3	317.3	310.5	295	2.3%								0.012	
313	264	1													4-2
315	316	2	327.6	327.0	60	1.0%	0.05	0.04	85%	A	0.82				
316	317	6	327.0	320.6	637	1.0%	0.70	0.60	85%	D	0.82				
317	317	8					1.60	1.36	85%	D	0.82				
317	317	8					0.41	0.04	10%	D	0.41				
264	264	1													4-3
320	321	2	322.0	315.0	100	7.0%	0.05	0.01	25%	D	0.49				
321	322	6	315.0	312.5	245	1.0%	1.23	0.31	25%	D	0.49				
322	264	1													4-4
264	264	10													10-1
250	251	2	346.0	344.7	65	2.0%	0.08	0.06	80%	D	0.79				
251	252	6	344.7	327.6	634	2.7%	1.38	1.10	80%	D	0.79				
252	252	8					1.16	0.93	80%	D/A	0.79				
252	257	3	322.6	318.1	447	1.0%								0.012	
257	257	1													2-1
253	254	2	331.3	330.0	65	2.0%	0.08	0.06	80%	A	0.76				
254	255	6	330.0	325.9	294	1.4%	0.75	0.60	80%	A	0.76				
255	255	8					0.39	0.31	80%	A	0.76				
255	256	3	320.9	318.5	326	0.7%								0.012	
256	256	8					2.00	1.60	80%	A	0.76				
256	256	8					1.82	1.46	80%	A	0.76				
256	257	3	318.5	318.1	78	0.5%								0.012	
257	257	1													2-2
257	264	3	315.5	314.0	96	1.5%								0.012	
264	264	1													3-1
258	259	2	342.0	341.0	100	1.0%	0.06	0.03	50%	D	0.63				
259	260	5	341.0	323.0	574	3.1%	0.90	0.45	50%	A	0.55	2	1:10	0.015	
260	264	5	323.0	314.0	151	6.0%	0.00	0.00	0%	A	0.20	16	1:20	0.030	
264	264	1													3-2
261	262	2	349.5	347.5	100	2.00%	0.10	0.05	50%	D	0.63				
262	263	6	347.5	322.0	880	2.90%	1.82	0.91	50%	D	0.63				
263	264	5	322.0	314.0	184	4.3%	0.00	0.00	0%	A/D	0.35	16	1:20	0.030	
264	264	1													3-3
264	264	11													11-1
264	264	12													12-1
264	218	5	314.0	304.0	2044	0.5%	0.00	0.00	0%	A/D	0.35	16	1:20	0.030	
218	218	10													10-1
200	201	2	346.0	344.7	65	2.00%	0.08	0.06	80%	D	0.79				
201	202	6	344.7	334.4	458	2.26%	0.89	0.71	80%	D	0.79				
202	203	3	330.4	328.7	168	1.00%								0.012	
203	203	8					1.17	0.94	80%	D	0.79				
203	204	3	328.7	326.7	195	1.00%								0.012	
204	204	8					1.06	0.85	80%	D	0.79				
204	205	3	326.7	321.2	220	2.50%								0.012	
205	205	8					0.66	0.53	80%	D	0.79				
205	211	3	321.2	316.6	187	2.50%								0.012	
211	211	1													2-1
206	207	2	337.4	334.5	85	3.47%	0.05	0.04	80%	D	0.79				
207	208	6	334.5	325.0	296	3.18%	1.33	1.06	80%	D	0.79				
208	208	8					0.76	0.61	80%	D	0.79				
208	209	3	320.0	319.4	120	0.50%								0.012	
209	209	8					0.89	0.71	80%	D	0.79				
209	209	8					0.44	0.35	80%	D	0.79				
209	210	3	319.4	317.5	382	0.50%								0.012	
210	210	8					1.22	0.98	80%	D	0.79				
210	210	8					0.55	0.44	80%	D	0.79				
210	211	3	317.5	316.6	141	0.69%								0.012	
211	211	1													2-2
211	217	3	316.6	315.2	132	1.00%								0.012	
217	217	1													2-1
212	213	2	333.7	331.4	75	3.01%	0.08	0.06	80%	D	0.79				
213	217	6	331.4	320.8	523	2.03%	1.12	0.90	80%	D	0.79				
217	217	8					0.62	0.50	80%	D	0.79				
217	217	1													2-2
217	217	10													10-2

CARLTON OAKS / PROPOSED CONDITIONS															
AES INPUT DATA															
214	215	2	351.0	350.0	100	1.00%	0.15	0.08	50%	D	0.63				
215	216	5	350.0	330.0	228	8.77%	0.71	0.36	50%	D	0.63	16	1:20	0.030	
216	216	1													2-1
216	216	7				A =	58.07	Tc =	21.43	Q =	80.00				
216	216	1													2-2
216	217	3	326.9	315.2	551	2.11%								0.012	
217	217	8					2.03	1.02	50%	D	0.63				
217	217	11													11-2
217	217	12													12-2
217	218	3	307.7	304.0	383	0.98%								0.013	
218	218	8					0.38	0.36	95%	D	0.87				
218	218	11													11-1
218	218	12													12-1
218	133	5	304.0	301.4	518	0.5%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
133	133	10													10-1
130	131	2	335	328	100	7%	0.27	0.14	50%	D	0.63				
131	132	5	323.0	315.7	732	1.0%	1.66	0.83	50%	D	0.63	2	1:10	0.015	
132	132	8					0.44	0.22	50%	D	0.63				
132	132	1													2-1
132	132	7				A =	27.19	Tc =	9.91	Q =	73.41				
132	132	1													2-2
132	133	3	311.7	301.4	124	8.28%								0.013	
133	133	8					0.31	0.29	95%	D	0.87				
133	133	11													11-1
133	133	12													12-1
133	128	5	301.4	299.9	311	0.5%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
128	128	10													10-1
125	126	2	326	317	100	9%	0.13	0.13	100%	D	0.90				
126	127	5	317.0	313.6	336	1.0%	0.50	0.25	50%	D	0.63	2	1:10	0.015	
127	127	8					0.19	0.10	50%	D	0.63				
127	127	1													2-1
127	127	7				A =	3.81	Tc =	10.22	Q =	10.53				
127	127	1													2-2
127	128	3	309.6	299.9	146	6.70%								0.013	
128	128	8					0.48	0.24	50%	D	0.63				
128	128	11													11-1
128	128	12													12-1
128	113	5	299.9	296.5	678	0.5%	0.00	0.00	0%	D	0.35	16	1:20	0.030	
113	113	10													10-1
110	111	2	324	321	85	4%	0.08	0.04	50%	B	0.58				
111	112	5	321.0	315.0	291	2.1%	0.30	0.15	50%	B	0.58	2	1:10	0.015	
112	112	8					0.29	0.15	50%	B	0.58				
112	112	1													2-1
112	112	7				A =	54.44	Tc =	21.61	Q =	79.21				
112	112	1													2-2
112	113	3	311.0	306.8	212	2.00%								0.012	
113	113	11													11-1
113	113	12													12-1
113	105	5	306.8	300.0	585	1.2%			0%	D	0.35	16	1:20	0.030	
105	105	8					0.42	0.40	95%	D	0.87				
105	105	8					0.08	0.04	50%	D	0.63				
105	20	5	300.0	295.1	974	0.5%			0%	D	0.35	16	1:20	0.030	
20	20	8					0.32	0.30	95%	D	0.87				
20	20	8					0.17	0.16	95%	D	0.87				
20	20	1													2-1
100	101	2	324	322.5	85	2%	0.07	0.04	50%	D	0.63				
101	101.3	5	322.5	309.8	344	3.7%	0.65	0.33	50%	D	0.63	2	1:10	0.015	
101.3	103	3	309.0	305.0	248	1.61%								0.012	
102	103	8					0.27	0.14	50%	D	0.63				
102	103	8					0.83	0.42	50%	D	0.63				
103	20	3	305.0	296.0	65	13.85%								0.012	
20	20	1													2-2
20	20	10													10-1
10	11	2	318.5	317.8	75	1.0%	0.10	0.07	65%	D	0.71				
11	12	6	317.8	311.9	406	1.4%	0.83	0.54	65%	D	0.71				
12	15	3	307.9	306.8	108	1.0%								0.012	
15	15	1													2-1
13	14	2	318.4	317.7	75	1.0%	0.10	0.07	65%	D	0.71				
14	15	6	317.7	311.3	522	1.2%	1.43	0.93	65%	D	0.71				
15	15	1													2-2
15	16	3	306.8	301.5	66	8.0%								0.012	
16	16	8					1.16	0.75	65%	D	0.71				
16	16	10													10-1
17	18	2	331.5	326.5	100	5.00%	0.10	0.05	50%	D	0.63				
18	19	5	315.0	306.0	385	2.34%	0.64	0.32	50%	D	0.63	1	1:01	0.015	
19	19	8					0.44	0.22	50%	D	0.63				

CARLTON OAKS / PROPOSED CONDITIONS															
AES INPUT DATA															
19	19	1													2-1
19	19	7				A =	327.74	Tc =	25.61	Q =	405.36				
19	19	1													2-2
19	16	3	307.0	301.5	726	0.8%								0.012	
16	16	11													11-1
16	16	12													12-1
16	20	3	294.9	296.0	137	-0.8%								0.012	
20	20	11													11-1
20	20	12													12-1
20	40	5	296.0	291.5	860	0.52%	0.00	0.00	0%	D	0.35	16	1:02	0.030	
40	40	10													10-1
30	31	2	318.4	317.7	75	1.0%	0.10	0.07	65%	D	0.71				
31	32	6	317.7	312.3	393	1.4%	1.25	0.81	65%	D	0.71				
32	35	3	308.3	305.7	265	1.0%								0.012	
35	35	1													2-1
33	34	2	318.5	317.8	75	1.0%	0.10	0.07	65%	D	0.71				
34	35	6	317.8	310.6	614	1.2%	1.16	0.75	65%	D	0.71				
35	35	8					0.68	0.44	65%	D	0.71				
35	35	1													2-2
35	36	3	305.7	304.8	180	0.5%								0.012	
36	36	8					1.04	0.68	65%	D	0.71				
36	39	3	304.8	304.6	31	0.5%								0.012	
39	39	1													2-1
37	38	2	317.5	315.7	75	2.3%	0.09	0.06	65%	D	0.71				
38	39	6	315.7	310.6	508	1.0%	1.12	0.73	65%	D	0.71				
39	39	1													2-2
39	40	3	297.2	296.0	116	1.0%								0.012	
40	40	11													11-1
40	40	12													12-1
40	40	1													2-1
41	42	2	334.0	314.0	100	20.00%	0.13	0.07	50%	D	0.63				
42	43	5	314.0	301.0	385	3.38%	0.27	0.14	50%	D	0.63	1	1:02	0.015	
43	40	3	301.0	300.5	100	0.5%								0.013	
44	40	8					0.46	0.23	50%	D	0.63				
40	40	1													2-2
Total							523.11	35.55							

10-Year Proposed Condition Hydrology Model

Analysis was performed to obtain peak flows at node 218 for preliminary hydraulic calculations. SD line 5 profile is in Exhibit B were modeled with the 100-yr onsite and 10-yr in the river as well as the 10-yr onsite and 100-yr in the river.

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                              Analysis prepared by:

                     Hunsaker & Associates San Diego, Inc.
                               9707 Waples Street
                              San Diego,  CA 92121


 ************************* DESCRIPTION OF STUDY *************************
* Carlton Oaks / Hydrology Analysis                                      *
* 10-YEAR RAINFALL EVENT                                                 *
* W.O. 2167-0228                                                         *
 ************************************************************************

  FILE NAME: R:\1759\HYD\DR\CALCS\AES\10PR.DAT
  TIME/DATE OF STUDY: 17:07 01/30/2024
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.750
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   17.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   20.0     12.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  4   16.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  5   26.0     18.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  6   44.0     12.0    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 =  0.50 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.*

+------------------------------------------------------------------------+
| BEGINING OF ANALYSIS GOLF RESORT                                       |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    324.50
  DOWNSTREAM ELEVATION(FEET) =    323.50
  ELEVATION DIFFERENCE(FEET) =      1.00
```

```
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.293
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.34
 TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  323.50  DOWNSTREAM ELEVATION(FEET) =  320.30
 STREET LENGTH(FEET) =   317.00   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)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.59
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   10.11
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.27
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
 STREET FLOW TRAVEL TIME(MIN.) =   2.32   Tc(MIN.) =    5.62
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.278
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
 SUBAREA AREA(ACRES) =    1.28      SUBAREA RUNOFF(CFS) =    4.49
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       4.81

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.11
 FLOW VELOCITY(FEET/SEC.) =  2.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.02
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     377.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.278
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
 SUBAREA AREA(ACRES) =    0.32   SUBAREA RUNOFF(CFS) =    1.12
 TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       5.93
 TC(MIN.) =    5.62

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   316.30  DOWNSTREAM(FEET) =   314.90
 FLOW LENGTH(FEET) =  1091.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.88
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.93
 PIPE TRAVEL TIME(MIN.) =   6.31    Tc(MIN.) =   11.93
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =    1468.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.93
  RAINFALL INTENSITY(INCH/HR) =   2.63
  TOTAL STREAM AREA(ACRES) =     1.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.93

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    324.50
  DOWNSTREAM ELEVATION(FEET) =    323.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.293
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  323.50  DOWNSTREAM ELEVATION(FEET) =  321.30
  STREET LENGTH(FEET) =   293.00   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)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.67
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.69
  STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =    5.70
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.235
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    1.31      SUBAREA RUNOFF(CFS) =    4.55
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       4.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.86
  FLOW VELOCITY(FEET/SEC.) =  2.35   DEPTH*VELOCITY(FT*FT/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    312.00 =     353.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    312.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.235
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
  SUBAREA AREA(ACRES) =    1.36   SUBAREA RUNOFF(CFS) =    4.72
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =       9.52
  TC(MIN.) =    5.70

****************************************************************************
  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) =   317.30  DOWNSTREAM(FEET) =   310.50
  FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.012
  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.) =   9.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.52
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    6.21
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    313.00 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.21
  RAINFALL INTENSITY(INCH/HR) =   4.01
  TOTAL STREAM AREA(ACRES) =     2.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.52

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    327.60
  DOWNSTREAM ELEVATION(FEET) =    327.00
  ELEVATION DIFFERENCE(FEET) =      0.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.904
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  327.00  DOWNSTREAM ELEVATION(FEET) =  320.60
  STREET LENGTH(FEET) =   637.00   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)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.49
  STREET FLOW TRAVEL TIME(MIN.) =   5.70   Tc(MIN.) =    9.61
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.026
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    1.74
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       1.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.80
  FLOW VELOCITY(FEET/SEC.) =  2.09   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     697.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.026
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
  SUBAREA AREA(ACRES) =    1.60   SUBAREA RUNOFF(CFS) =    3.97
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       5.83
  TC(MIN.) =    9.61

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.026
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7591
  SUBAREA AREA(ACRES) =    0.41   SUBAREA RUNOFF(CFS) =    0.51
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       6.34
  TC(MIN.) =    9.61

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.61
  RAINFALL INTENSITY(INCH/HR) =   3.03
  TOTAL STREAM AREA(ACRES) =     2.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.34

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    321.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .4900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    322.00
  DOWNSTREAM ELEVATION(FEET) =    315.00
  ELEVATION DIFFERENCE(FEET) =      7.00
```

```
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.740
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.218
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  315.00  DOWNSTREAM ELEVATION(FEET) =  312.50
  STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   2.16   Tc(MIN.) =    7.90
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.434
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .4900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
  SUBAREA AREA(ACRES) =    1.23      SUBAREA RUNOFF(CFS) =    2.07
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       2.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.32
  FLOW VELOCITY(FEET/SEC.) =  2.18   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    322.00 =     345.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  4 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.90
  RAINFALL INTENSITY(INCH/HR) =   3.43
  TOTAL STREAM AREA(ACRES) =     1.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.15

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.93    11.93        2.631          1.69
      2        9.52     6.21        4.007          2.74
      3        6.34     9.61        3.026          2.76
      4        2.15     7.90        3.434          1.28

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  4 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       18.40     6.21       4.007
```

```
      2       19.44     7.90       3.434
      3       20.20     9.61       3.026
      4       19.34    11.93       2.631

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      20.20   Tc(MIN.) =    9.61
  TOTAL AREA(ACRES) =        8.5
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    264.00 =    1468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BEGINING OF ANALYSIS PA-2                                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    251.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    346.00
  DOWNSTREAM ELEVATION(FEET) =    344.70
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.571
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    251.00 TO NODE    252.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  344.70  DOWNSTREAM ELEVATION(FEET) =  327.60
  STREET LENGTH(FEET) =   634.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
  STREET FLOW TRAVEL TIME(MIN.) =   3.25   Tc(MIN.) =    6.82
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.774
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.38      SUBAREA RUNOFF(CFS) =    4.11
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.35
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.24
  FLOW VELOCITY(FEET/SEC.) =  3.73   DEPTH*VELOCITY(FT*FT/SEC.) =   1.23
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    252.00 =     699.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    252.00 TO NODE    252.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.774
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    3.46
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       7.81
  TC(MIN.) =    6.82

****************************************************************************
  FLOW PROCESS FROM NODE    252.00 TO NODE    257.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   322.60  DOWNSTREAM(FEET) =   318.10
  FLOW LENGTH(FEET) =   447.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.81
  PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =    7.94
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    257.00 =    1146.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    257.00 TO NODE    257.00 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.) =    7.94
  RAINFALL INTENSITY(INCH/HR) =   3.42
  TOTAL STREAM AREA(ACRES) =     2.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.81

****************************************************************************
  FLOW PROCESS FROM NODE    253.00 TO NODE    254.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    331.30
  DOWNSTREAM ELEVATION(FEET) =    330.00
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.916
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    255.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  330.00  DOWNSTREAM ELEVATION(FEET) =  325.90
  STREET LENGTH(FEET) =   294.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00
```

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.20
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
  STREET FLOW TRAVEL TIME(MIN.) =   2.16   Tc(MIN.) =    6.08
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.066
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
  SUBAREA AREA(ACRES) =    0.75      SUBAREA RUNOFF(CFS) =    2.32
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       2.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.38
  FLOW VELOCITY(FEET/SEC.) =  2.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE    253.00 TO NODE    255.00 =     359.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.066
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    1.21
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       3.77
  TC(MIN.) =    6.08

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    256.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   320.90  DOWNSTREAM(FEET) =   318.50
  FLOW LENGTH(FEET) =   326.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.98
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.77
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =    7.17
  LONGEST FLOWPATH FROM NODE    253.00 TO NODE    256.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    256.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.655
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    2.00   SUBAREA RUNOFF(CFS) =    5.56
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       8.94
  TC(MIN.) =    7.17
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    256.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.655
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    1.82   SUBAREA RUNOFF(CFS) =    5.06
  TOTAL AREA(ACRES) =        5.0   TOTAL RUNOFF(CFS) =      14.00
  TC(MIN.) =    7.17

****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    257.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   318.50  DOWNSTREAM(FEET) =   318.10
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.94
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.00
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    7.39
  LONGEST FLOWPATH FROM NODE    253.00 TO NODE    257.00 =     763.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    257.00 TO NODE    257.00 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.) =    7.39
  RAINFALL INTENSITY(INCH/HR) =   3.58
  TOTAL STREAM AREA(ACRES) =     5.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.00

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.81     7.94        3.422          2.62
      2       14.00     7.39        3.585          5.04

  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       21.27     7.39       3.585
      2       21.18     7.94       3.422

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.27   Tc(MIN.) =    7.39
  TOTAL AREA(ACRES) =        7.7
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    257.00 =    1146.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    257.00 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) =   315.50  DOWNSTREAM(FEET) =   314.50
  FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.55
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.27
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.57
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    264.00 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.) =    7.57
 RAINFALL INTENSITY(INCH/HR) =   3.53
 TOTAL STREAM AREA(ACRES) =     7.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.27

****************************************************************************
 FLOW PROCESS FROM NODE    258.00 TO NODE    259.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    342.00
 DOWNSTREAM ELEVATION(FEET) =    341.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.078
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.685
 SUBAREA RUNOFF(CFS) =      0.14
 TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
 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) =    341.00  DOWNSTREAM(FEET) =    323.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   574.00   CHANNEL SLOPE =  0.0314
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.031
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.82
 AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   2.50
 Tc(MIN.) =    9.58
 SUBAREA AREA(ACRES) =     0.90       SUBAREA RUNOFF(CFS) =    1.50
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.555
 TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       1.62

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.76
 LONGEST FLOWPATH FROM NODE    258.00 TO NODE    260.00 =     674.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    264.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    323.00  DOWNSTREAM(FEET) =    314.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00   CHANNEL SLOPE =  0.0596
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
```

```
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.62
 FLOW VELOCITY(FEET/SEC.) =   1.78   FLOW DEPTH(FEET) =   0.06
 TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =   10.99
 LONGEST FLOWPATH FROM NODE    258.00 TO NODE    264.00 =     825.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    264.00 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.) =   10.99
 RAINFALL INTENSITY(INCH/HR) =   2.77
 TOTAL STREAM AREA(ACRES) =     0.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.62

****************************************************************************
 FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    349.50
 DOWNSTREAM ELEVATION(FEET) =    347.50
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.006
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    80.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.097
 SUBAREA RUNOFF(CFS) =      0.26
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
 FLOW PROCESS FROM NODE    262.00 TO NODE    263.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  347.50  DOWNSTREAM ELEVATION(FEET) =  322.00
 STREET LENGTH(FEET) =   880.00   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) =       1.92
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    6.66
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
 STREET FLOW TRAVEL TIME(MIN.) =   4.51   Tc(MIN.) =   10.51
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.855
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
 SUBAREA AREA(ACRES) =    1.82      SUBAREA RUNOFF(CFS) =    3.27
 TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =       3.45
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.22
  FLOW VELOCITY(FEET/SEC.) =  3.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    263.00 =     980.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    264.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    322.00  DOWNSTREAM(FEET) =    314.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE =  0.0435
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.45
  FLOW VELOCITY(FEET/SEC.) =   2.21   FLOW DEPTH(FEET) =   0.10
  TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =   11.90
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    264.00 =    1164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 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.) =   11.90
  RAINFALL INTENSITY(INCH/HR) =   2.64
  TOTAL STREAM AREA(ACRES) =     1.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.45

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       21.27     7.57        3.527          7.66
      2        1.62    10.99        2.774          0.96
      3        3.45    11.90        2.636          1.92

  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       24.58     7.57       3.527
      2       21.53    10.99       2.774
      3       20.88    11.90       2.636

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      24.58   Tc(MIN.) =    7.57
  TOTAL AREA(ACRES) =       10.5
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 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       24.58     7.57       3.527       10.54
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       20.20     9.61       3.026        8.47
```

```
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    264.00 =    1468.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      40.50       7.57        3.527
     2      41.28       9.61        3.026

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      41.28   Tc(MIN.) =    9.61
 TOTAL AREA(ACRES) =       19.0

****************************************************************************
 FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    264.00 TO NODE    143.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    314.00  DOWNSTREAM(FEET) =    304.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2044.00   CHANNEL SLOPE =  0.0049
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      41.28
 FLOW VELOCITY(FEET/SEC.) =   2.83   FLOW DEPTH(FEET) =   0.83
 TRAVEL TIME(MIN.) =  12.05   Tc(MIN.) =   21.65
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    143.00 =    3512.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
 UPSTREAM ELEVATION(FEET) =    346.00
 DOWNSTREAM ELEVATION(FEET) =    344.70
 ELEVATION DIFFERENCE(FEET) =      1.30
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.571
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  344.70  DOWNSTREAM ELEVATION(FEET) =  334.40
 STREET LENGTH(FEET) =   458.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.83
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   2.70   Tc(MIN.) =    6.27
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.984
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    2.80
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       3.05

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.15
  FLOW VELOCITY(FEET/SEC.) =  3.20   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     523.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   330.40  DOWNSTREAM(FEET) =   328.70
  FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.05
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =    6.80
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.781
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    1.17   SUBAREA RUNOFF(CFS) =    3.49
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       6.39
  TC(MIN.) =    6.80

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   328.70  DOWNSTREAM(FEET) =   326.70
  FLOW LENGTH(FEET) =   195.00   MANNING'S N =  0.012
  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.) =   6.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.39
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    7.31
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     886.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.610
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    1.06   SUBAREA RUNOFF(CFS) =    3.02
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       9.13
  TC(MIN.) =    7.31

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.70  DOWNSTREAM(FEET) =   321.20
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.012
  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.) =   9.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.13
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    7.68
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1106.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.496
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.66   SUBAREA RUNOFF(CFS) =    1.82
  TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =      10.66
  TC(MIN.) =    7.68

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    211.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   321.20  DOWNSTREAM(FEET) =   316.60
  FLOW LENGTH(FEET) =   187.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.66
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    7.99
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    211.00 =    1293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 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.) =    7.99
  RAINFALL INTENSITY(INCH/HR) =   3.41
  TOTAL STREAM AREA(ACRES) =     3.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.66

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
```

```
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    337.40
  DOWNSTREAM ELEVATION(FEET) =    334.50
  ELEVATION DIFFERENCE(FEET) =      2.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.417
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  334.50  DOWNSTREAM ELEVATION(FEET) =  325.00
  STREET LENGTH(FEET) =   296.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
  STREET FLOW TRAVEL TIME(MIN.) =   1.38   Tc(MIN.) =    4.80
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    4.84
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.48
  FLOW VELOCITY(FEET/SEC.) =  4.13   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    208.00 =     381.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.76   SUBAREA RUNOFF(CFS) =    2.77
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       7.80
  TC(MIN.) =    4.80

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   320.00  DOWNSTREAM(FEET) =   319.40
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.14
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.80
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    5.19
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    209.00 =     501.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.502
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.89   SUBAREA RUNOFF(CFS) =    3.17
  TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =      10.78
  TC(MIN.) =    5.19

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.502
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    1.56
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =      12.34
  TC(MIN.) =    5.19

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   319.40  DOWNSTREAM(FEET) =   317.50
  FLOW LENGTH(FEET) =   382.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.34
  PIPE TRAVEL TIME(MIN.) =   1.11    Tc(MIN.) =    6.30
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    210.00 =     883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.973
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    1.22   SUBAREA RUNOFF(CFS) =    3.83
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      14.72
  TC(MIN.) =    6.30

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.973
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
```

```
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.55   SUBAREA RUNOFF(CFS) =    1.73
 TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      16.45
 TC(MIN.) =    6.30

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   317.50  DOWNSTREAM(FEET) =   316.60
 FLOW LENGTH(FEET) =   141.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.68
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.45
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    6.65
 LONGEST FLOWPATH FROM NODE    206.00 TO NODE    211.00 =    1024.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 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.) =    6.65
 RAINFALL INTENSITY(INCH/HR) =   3.84
 TOTAL STREAM AREA(ACRES) =     5.24
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.45

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       10.66     7.99        3.408          3.86
     2       16.45     6.65        3.836          5.24

 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       25.32     6.65       3.836
     2       25.27     7.99       3.408

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      25.32   Tc(MIN.) =    6.65
 TOTAL AREA(ACRES) =        9.1
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    211.00 =    1293.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    211.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   316.60  DOWNSTREAM(FEET) =   315.20
 FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.10
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.32
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    6.89
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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.) =    6.89
  RAINFALL INTENSITY(INCH/HR) =   3.75
  TOTAL STREAM AREA(ACRES) =     9.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.32

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    213.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    333.70
  DOWNSTREAM ELEVATION(FEET) =    331.40
  ELEVATION DIFFERENCE(FEET) =      2.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.326
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    217.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  331.40  DOWNSTREAM ELEVATION(FEET) =  320.80
  STREET LENGTH(FEET) =   523.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
  STREET FLOW TRAVEL TIME(MIN.) =   3.11   Tc(MIN.) =    6.44
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.916
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.12      SUBAREA RUNOFF(CFS) =    3.46
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       3.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.16
  FLOW VELOCITY(FEET/SEC.) =  3.22   DEPTH*VELOCITY(FT*FT/SEC.) =   1.06
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =     598.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.916
  *USER SPECIFIED(SUBAREA):
```

```
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.62   SUBAREA RUNOFF(CFS) =    1.92
 TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       5.63
 TC(MIN.) =    6.44

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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.) =    6.44
 RAINFALL INTENSITY(INCH/HR) =   3.92
 TOTAL STREAM AREA(ACRES) =     1.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.63

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       25.32     6.89        3.749          9.10
     2        5.63     6.44        3.916          1.82

 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       29.87     6.44       3.916
     2       30.71     6.89       3.749

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      30.71   Tc(MIN.) =    6.89
 TOTAL AREA(ACRES) =       10.9
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    214.00 TO NODE    215.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    351.00
 DOWNSTREAM ELEVATION(FEET) =    350.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.078
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.685
 SUBAREA RUNOFF(CFS) =      0.35
 TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    330.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   228.00   CHANNEL SLOPE =  0.0877
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.477
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.13
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.70
 AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.67
 Tc(MIN.) =    7.75
 SUBAREA AREA(ACRES) =     0.71       SUBAREA RUNOFF(CFS) =    1.56
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
 TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       1.88

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   6.98
 LONGEST FLOWPATH FROM NODE    214.00 TO NODE    216.00 =     328.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 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.) =    7.75
 RAINFALL INTENSITY(INCH/HR) =   3.48
 TOTAL STREAM AREA(ACRES) =     0.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.88

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  22.22   RAIN INTENSITY(INCH/HOUR) =  1.76
 TOTAL AREA(ACRES) =    58.07   TOTAL RUNOFF(CFS) =     48.88

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 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.) =   22.22
 RAINFALL INTENSITY(INCH/HR) =   1.76
 TOTAL STREAM AREA(ACRES) =    58.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     48.88

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.88     7.75        3.477          0.86
     2       48.88    22.22        1.762         58.07

 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       18.92     7.75       3.477
     2       49.83    22.22       1.762

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      49.83   Tc(MIN.) =   22.22
 TOTAL AREA(ACRES) =       58.9
```

```
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    216.00 =     598.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   326.90  DOWNSTREAM(FEET) =   315.20
 FLOW LENGTH(FEET) =   551.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.03
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      49.83
 PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   22.92
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =    1149.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.727
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4850
 SUBAREA AREA(ACRES) =    2.03   SUBAREA RUNOFF(CFS) =    2.21
 TOTAL AREA(ACRES) =       61.0   TOTAL RUNOFF(CFS) =      51.05
 TC(MIN.) =   22.92

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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       51.05    22.92       1.727       60.96
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =    1149.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       30.71     6.89       3.749       10.92
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      46.06       6.89        3.749
     2      65.20      22.92        1.727

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      65.20   Tc(MIN.) =   22.92
 TOTAL AREA(ACRES) =       71.9

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    218.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   307.70  DOWNSTREAM(FEET) =   304.00
```

```
 FLOW LENGTH(FEET) =   383.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.41
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      65.20
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   23.54
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    218.00 =    1808.00 FEET.
```

Outfall of SD Line #5

```
 FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.698
 *USER SPECIFIED(SUBAREA):
 PAVED SURFACE RUNOFF COEFFICIENT = .8700
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5331
 SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.56
 TOTAL AREA(ACRES) =       72.3   TOTAL RUNOFF(CFS) =      65.39
 TC(MIN.) =   23.54

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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       65.39    23.54       1.698       72.26
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    218.00 =    1808.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       41.28    21.65       1.791       19.01
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    218.00 =    3512.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     101.44      21.65        1.791
     2     104.51      23.54        1.698

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     104.51   Tc(MIN.) =   23.54
 TOTAL AREA(ACRES) =       91.3

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    133.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    304.00  DOWNSTREAM(FEET) =    301.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   518.00   CHANNEL SLOPE =  0.0050
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     104.51
 FLOW VELOCITY(FEET/SEC.) =   3.94   FLOW DEPTH(FEET) =   1.41
 TRAVEL TIME(MIN.) =   2.19   Tc(MIN.) =   25.73
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    133.00 =    4030.00 FEET.

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

```
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    335.00
 DOWNSTREAM ELEVATION(FEET) =    328.00
 ELEVATION DIFFERENCE(FEET) =      7.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.423
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.78
 TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      0.78

****************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    323.00  DOWNSTREAM(FEET) =    315.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   732.00   CHANNEL SLOPE =  0.0100
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.521
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.66
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.85
 AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   3.17
 Tc(MIN.) =    7.59
 SUBAREA AREA(ACRES) =     1.66       SUBAREA RUNOFF(CFS) =    3.68
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
 TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       4.28

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   4.47
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     832.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.521
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
 SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    0.98
 TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       5.26
 TC(MIN.) =    7.59

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.59
 RAINFALL INTENSITY(INCH/HR) =   3.52
 TOTAL STREAM AREA(ACRES) =     2.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.26
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.91   RAIN INTENSITY(INCH/HOUR) =  2.97
  TOTAL AREA(ACRES) =    27.19   TOTAL RUNOFF(CFS) =     73.41

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.91
  RAINFALL INTENSITY(INCH/HR) =   2.97
  TOTAL STREAM AREA(ACRES) =    27.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     73.41

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.26     7.59        3.521          2.37
      2       73.41     9.91        2.966         27.19

  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       61.51     7.59       3.521
      2       77.84     9.91       2.966

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.84   Tc(MIN.) =    9.91
  TOTAL AREA(ACRES) =       29.6
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.40  DOWNSTREAM(FEET) =   301.40
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.76
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.84
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   10.01
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    133.00 =     956.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.946
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8877
  SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    0.79
  TOTAL AREA(ACRES) =       29.9   TOTAL RUNOFF(CFS) =      78.11
  TC(MIN.) =   10.01
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 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       78.11    10.01       2.946       29.87
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    133.00 =     956.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      104.51    25.73       1.603       91.27
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    133.00 =    4030.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     118.79      10.01        2.946
      2     147.01      25.73        1.603

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     147.01   Tc(MIN.) =   25.73
  TOTAL AREA(ACRES) =      121.1

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    128.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    301.40  DOWNSTREAM(FEET) =    299.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   311.00   CHANNEL SLOPE =  0.0051
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     147.01
  FLOW VELOCITY(FEET/SEC.) =   4.44   FLOW DEPTH(FEET) =   1.70
  TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =   26.89
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    128.00 =    4341.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .9000
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    326.00
  DOWNSTREAM ELEVATION(FEET) =    317.00
  ELEVATION DIFFERENCE(FEET) =      9.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.731
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.54
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    313.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   336.00   CHANNEL SLOPE =  0.0101
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.98
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.88
  Tc(MIN.) =    3.61
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    1.45
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.686
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   3.47
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    127.00 =     436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6728
  SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.55
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       2.54
  TC(MIN.) =    3.61

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    3.61
  RAINFALL INTENSITY(INCH/HR) =   4.61
  TOTAL STREAM AREA(ACRES) =     0.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.54

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.22   RAIN INTENSITY(INCH/HOUR) =  2.91
  TOTAL AREA(ACRES) =     3.81   TOTAL RUNOFF(CFS) =     10.53

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.22
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.91
  TOTAL STREAM AREA(ACRES) =     3.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.54     3.61        4.611          0.82
      2       10.53    10.22        2.907          3.81

  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        6.26     3.61       4.611
      2       12.13    10.22       2.907

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.13   Tc(MIN.) =   10.22
  TOTAL AREA(ACRES) =        4.6
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    127.00 =     598.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   309.60  DOWNSTREAM(FEET) =   299.80
  FLOW LENGTH(FEET) =   146.00   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.) =  14.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.13
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    128.00 =     744.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.877
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8759
  SUBAREA AREA(ACRES) =    0.48   SUBAREA RUNOFF(CFS) =    0.87
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      12.88
  TC(MIN.) =   10.39

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 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       12.88    10.39       2.877        5.11
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    128.00 =     744.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      147.01    26.89       1.558      121.14
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    128.00 =    4341.00 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      69.67      10.39        2.877
     2     153.98      26.89        1.558

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     153.98   Tc(MIN.) =   26.89
 TOTAL AREA(ACRES) =      126.2

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    299.80  DOWNSTREAM(FEET) =    296.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  0.0050
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     153.98
 FLOW VELOCITY(FEET/SEC.) =   4.47   FLOW DEPTH(FEET) =   1.77
 TRAVEL TIME(MIN.) =   2.53   Tc(MIN.) =   29.42
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    113.00 =    5019.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
 UPSTREAM ELEVATION(FEET) =    324.00
 DOWNSTREAM ELEVATION(FEET) =    321.00
 ELEVATION DIFFERENCE(FEET) =      3.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.668
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.253
 SUBAREA RUNOFF(CFS) =      0.20
 TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    321.00  DOWNSTREAM(FEET) =    315.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   291.00   CHANNEL SLOPE =  0.0206
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.570
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.75
 AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.77
 Tc(MIN.) =    7.43
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.62
```

```
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.580
 TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.79

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   3.17
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     376.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.570
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5800
 SUBAREA AREA(ACRES) =    0.29   SUBAREA RUNOFF(CFS) =    0.60
 TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.39
 TC(MIN.) =    7.43

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.43
 RAINFALL INTENSITY(INCH/HR) =   3.57
 TOTAL STREAM AREA(ACRES) =     0.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.39

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  21.61   RAIN INTENSITY(INCH/HOUR) =  1.79
 TOTAL AREA(ACRES) =    54.44   TOTAL RUNOFF(CFS) =     79.21

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   21.61
 RAINFALL INTENSITY(INCH/HR) =   1.79
 TOTAL STREAM AREA(ACRES) =    54.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     79.21

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.39     7.43        3.570          0.67
     2       79.21    21.61        1.794         54.44

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       28.63     7.43       3.570
     2       79.91    21.61       1.794

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      79.91   Tc(MIN.) =   21.61
```

```
  TOTAL AREA(ACRES) =       55.1
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    112.00 =     598.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   311.00  DOWNSTREAM(FEET) =   306.80
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.25
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      79.91
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   21.86
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    113.00 =     810.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 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       79.91    21.86       1.781       55.11
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    113.00 =     810.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      153.98    29.42       1.470      126.25
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    113.00 =    5019.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     194.30      21.86        1.781
      2     219.95      29.42        1.470

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     219.95   Tc(MIN.) =   29.42
  TOTAL AREA(ACRES) =      181.4

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    306.80  DOWNSTREAM(FEET) =    300.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   585.00   CHANNEL SLOPE =  0.0116
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     219.95
  FLOW VELOCITY(FEET/SEC.) =   6.68   FLOW DEPTH(FEET) =   1.70
  TRAVEL TIME(MIN.) =   1.46   Tc(MIN.) =   30.88
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    105.00 =    5604.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.425
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7065
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    0.52
  TOTAL AREA(ACRES) =      181.8   TOTAL RUNOFF(CFS) =     219.95
  TC(MIN.) =   30.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.425
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7064
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.07
  TOTAL AREA(ACRES) =      181.9   TOTAL RUNOFF(CFS) =     219.95
  TC(MIN.) =   30.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE     20.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    300.00  DOWNSTREAM(FEET) =    295.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   974.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     219.95
  FLOW VELOCITY(FEET/SEC.) =   5.02   FLOW DEPTH(FEET) =   2.16
  TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =   34.12
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     20.00 =    6578.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.336
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7067
  SUBAREA AREA(ACRES) =    0.32   SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =      182.2   TOTAL RUNOFF(CFS) =     219.95
  TC(MIN.) =   34.12
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.336
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7069
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.20
  TOTAL AREA(ACRES) =      182.4   TOTAL RUNOFF(CFS) =     219.95
  TC(MIN.) =   34.12
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   34.12
  RAINFALL INTENSITY(INCH/HR) =   1.34
  TOTAL STREAM AREA(ACRES) =   182.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    219.95

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    324.00
  DOWNSTREAM ELEVATION(FEET) =    322.50
  ELEVATION DIFFERENCE(FEET) =      1.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.169
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    77.65
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.026
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    322.50  DOWNSTREAM(FEET) =    309.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   344.00   CHANNEL SLOPE =  0.0369
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.532
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.13
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   1.39
  Tc(MIN.) =    7.56
  SUBAREA AREA(ACRES) =     0.65       SUBAREA RUNOFF(CFS) =    1.45
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       1.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   4.98
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    101.30 =     429.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.30 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   309.00  DOWNSTREAM(FEET) =   305.00
  FLOW LENGTH(FEET) =   248.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.60
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    8.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     677.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
```

```
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.300
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.27   SUBAREA RUNOFF(CFS) =    0.56
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.06
  TC(MIN.) =    8.40

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.300
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.83   SUBAREA RUNOFF(CFS) =    1.73
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       3.78
  TC(MIN.) =    8.40

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE     20.00 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) =   296.00
  FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.78
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    8.83
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE     20.00 =     895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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.) =    8.83
  RAINFALL INTENSITY(INCH/HR) =   3.19
  TOTAL STREAM AREA(ACRES) =     1.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.78

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      219.95    34.12        1.336        182.35
      2        3.78     8.83        3.195          1.82

  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       60.71     8.83       3.195
      2      221.53    34.12       1.336

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     221.53   Tc(MIN.) =   34.12
  TOTAL AREA(ACRES) =      184.2
```

 LONGEST FLOWPATH FROM NODE   300.00 TO NODE   20.00 =   6578.00 FEET.

****
 FLOW PROCESS FROM NODE   20.00 TO NODE   20.00 IS CODE = 10

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

+--+
| BEGINING OF ANALYSIS PA-1 |
| |
| |
+--+

****
 FLOW PROCESS FROM NODE   10.00 TO NODE   11.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   75.00
 UPSTREAM ELEVATION(FEET) =   318.50
 DOWNSTREAM ELEVATION(FEET) =   317.80
 ELEVATION DIFFERENCE(FEET) =   0.70
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   5.702
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   63.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.236
 SUBAREA RUNOFF(CFS) =   0.30
 TOTAL AREA(ACRES) =   0.10   TOTAL RUNOFF(CFS) =   0.30

****
 FLOW PROCESS FROM NODE   11.00 TO NODE   12.00 IS CODE = 62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION # 2 USED)<<<<<
==
 UPSTREAM ELEVATION(FEET) = 317.80 DOWNSTREAM ELEVATION(FEET) = 311.90
 STREET LENGTH(FEET) =   406.00   CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 17.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   1.26
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) = 0.26
   HALFSTREET FLOOD WIDTH(FEET) =   6.70
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   2.22
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   0.58
 STREET FLOW TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =   8.76
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.213
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.710
 SUBAREA AREA(ACRES) =   0.83   SUBAREA RUNOFF(CFS) =   1.89
 TOTAL AREA(ACRES) =   0.9   PEAK FLOW RATE(CFS) =   2.12

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.52
 FLOW VELOCITY(FEET/SEC.) = 2.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
 LONGEST FLOWPATH FROM NODE   10.00 TO NODE   12.00 =   481.00 FEET.

```
****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   309.60  DOWNSTREAM(FEET) =   308.60
  FLOW LENGTH(FEET) =   108.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.61
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.12
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    9.15
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =    9.15
  RAINFALL INTENSITY(INCH/HR) =   3.12
  TOTAL STREAM AREA(ACRES) =     0.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.12

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.40
  DOWNSTREAM ELEVATION(FEET) =    317.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.236
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.70  DOWNSTREAM ELEVATION(FEET) =  311.30
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
```

```
    HALFSTREET FLOOD WIDTH(FEET) =    5.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.97
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   4.42   Tc(MIN.) =   10.12
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.926
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.43      SUBAREA RUNOFF(CFS) =    2.97
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.82
  FLOW VELOCITY(FEET/SEC.) =  2.18   DEPTH*VELOCITY(FT*FT/SEC.) =   0.62
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     15.00 =     597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   10.12
  RAINFALL INTENSITY(INCH/HR) =   2.93
  TOTAL STREAM AREA(ACRES) =     1.53
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.18

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.12     9.15        3.123          0.93
      2        3.18    10.12        2.926          1.53

  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        4.99     9.15       3.123
      2        5.17    10.12       2.926

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.17   Tc(MIN.) =   10.12
  TOTAL AREA(ACRES) =        2.5
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     15.00 =     597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   308.60  DOWNSTREAM(FEET) =   303.30
  FLOW LENGTH(FEET) =    66.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.88
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.17
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   10.21
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =     663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.910
```

```
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    2.40
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =       7.48
  TC(MIN.) =   10.21

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    331.50
  DOWNSTREAM ELEVATION(FEET) =    326.50
  ELEVATION DIFFERENCE(FEET) =      5.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.948
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    306.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   385.00   CHANNEL SLOPE =  0.0234
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.936
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.45
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   1.44
  Tc(MIN.) =    6.39
  SUBAREA AREA(ACRES) =     0.64       SUBAREA RUNOFF(CFS) =    1.59
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       1.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   5.18
  LONGEST FLOWPATH FROM NODE     17.00 TO NODE     19.00 =     485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.936
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    1.09
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       2.93
  TC(MIN.) =    6.39

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =    6.39
  RAINFALL INTENSITY(INCH/HR) =   3.94
  TOTAL STREAM AREA(ACRES) =     1.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.93

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  27.01   RAIN INTENSITY(INCH/HOUR) =  1.55
  TOTAL AREA(ACRES) =   327.74   TOTAL RUNOFF(CFS) =    238.87

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =   27.01
  RAINFALL INTENSITY(INCH/HR) =   1.55
  TOTAL STREAM AREA(ACRES) =   327.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    238.87

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.93     6.39        3.936          1.18
      2      238.87    27.01        1.553        327.74

  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       59.44     6.39       3.936
      2      240.02    27.01       1.553

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     240.02   Tc(MIN.) =   27.01
  TOTAL AREA(ACRES) =      328.9
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     19.00 =     597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.00  DOWNSTREAM(FEET) =   303.30
  FLOW LENGTH(FEET) =   726.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  52.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.82
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     240.02
  PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =   28.03
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =    1323.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 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      240.02    28.03       1.517      328.92
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =    1323.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        7.48    10.21       2.910        3.62
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =     663.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      94.86      10.21        2.910
      2     243.92      28.03        1.517

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     243.92   Tc(MIN.) =   28.03
  TOTAL AREA(ACRES) =      332.5

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.70  DOWNSTREAM(FEET) =   296.00
  FLOW LENGTH(FEET) =   137.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  53.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.84
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     243.92
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   28.23
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     20.00 =    1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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      243.92    28.23       1.510      332.54
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     20.00 =    1460.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      221.53    34.12       1.336      184.17
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     20.00 =    6578.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     427.21      28.23        1.510
      2     437.39      34.12        1.336

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     437.39   Tc(MIN.) =   34.12
  TOTAL AREA(ACRES) =      516.7
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    296.00  DOWNSTREAM(FEET) =    291.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   859.50   CHANNEL SLOPE =  0.0052
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     437.39
  FLOW VELOCITY(FEET/SEC.) =   6.29   FLOW DEPTH(FEET) =   3.13
  TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =   36.39
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.40
  DOWNSTREAM ELEVATION(FEET) =    317.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.236
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.70  DOWNSTREAM ELEVATION(FEET) =  312.30
  STREET LENGTH(FEET) =   393.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.98
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   2.79   Tc(MIN.) =    8.49
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.276
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.25      SUBAREA RUNOFF(CFS) =    2.91
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       3.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.32
  FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.60  DOWNSTREAM(FEET) =   305.00
  FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.26
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.14
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    9.33
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =     733.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 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.) =    9.33
  RAINFALL INTENSITY(INCH/HR) =   3.08
  TOTAL STREAM AREA(ACRES) =     1.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.14

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.50
  DOWNSTREAM ELEVATION(FEET) =    317.80
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.236
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.80  DOWNSTREAM ELEVATION(FEET) =  310.60
  STREET LENGTH(FEET) =   614.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.13
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   4.81   Tc(MIN.) =   10.52
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.854
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.16      SUBAREA RUNOFF(CFS) =    2.35
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       2.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.70
  FLOW VELOCITY(FEET/SEC.) =  2.41   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
  LONGEST FLOWPATH FROM NODE     33.00 TO NODE     35.00 =     689.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.854
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    0.68   SUBAREA RUNOFF(CFS) =    1.38
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       3.93
  TC(MIN.) =   10.52

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 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.) =   10.52
  RAINFALL INTENSITY(INCH/HR) =   2.85
  TOTAL STREAM AREA(ACRES) =     1.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.93

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.14     9.33        3.083          1.35
      2        3.93    10.52        2.854          1.94

  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        6.63     9.33       3.083
      2        6.84    10.52       2.854
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.84   Tc(MIN.) =   10.52
 TOTAL AREA(ACRES) =        3.3
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =     733.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   305.00  DOWNSTREAM(FEET) =   304.10
 FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.89
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.84
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   11.13
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     36.00 =     913.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.752
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
 SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    2.03
 TOTAL AREA(ACRES) =        4.3   TOTAL RUNOFF(CFS) =       8.46
 TC(MIN.) =   11.13

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   304.10  DOWNSTREAM(FEET) =   303.90
 FLOW LENGTH(FEET) =    31.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.46
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   11.22
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     39.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =   11.22
 RAINFALL INTENSITY(INCH/HR) =   2.74
 TOTAL STREAM AREA(ACRES) =     4.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.46

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     38.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    317.50
 DOWNSTREAM ELEVATION(FEET) =    315.70
 ELEVATION DIFFERENCE(FEET) =      1.80
```

```
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.541
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
 FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  315.70  DOWNSTREAM ELEVATION(FEET) =  310.60
 STREET LENGTH(FEET) =   508.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.60
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    8.21
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.02
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
 STREET FLOW TRAVEL TIME(MIN.) =   4.19   Tc(MIN.) =    8.73
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.218
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
 SUBAREA AREA(ACRES) =    1.12      SUBAREA RUNOFF(CFS) =    2.56
 TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       2.76

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.40
 FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
 LONGEST FLOWPATH FROM NODE     37.00 TO NODE     39.00 =     583.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =    8.73
 RAINFALL INTENSITY(INCH/HR) =   3.22
 TOTAL STREAM AREA(ACRES) =     1.21
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.76

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        8.46    11.22        2.737          4.33
     2        2.76     8.73        3.218          1.21

 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        9.96     8.73       3.218
     2       10.81    11.22       2.737
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.81   Tc(MIN.) =   11.22
  TOTAL AREA(ACRES) =        5.5
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     39.00 =     944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.50  DOWNSTREAM(FEET) =   296.00
  FLOW LENGTH(FEET) =   116.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.27
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.81
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   11.59
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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       10.81    11.59       2.681        5.54
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1060.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      437.39    36.39       1.282      516.71
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     150.08      11.59        2.681
      2     442.56      36.39        1.282

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     442.56   Tc(MIN.) =   36.39
  TOTAL AREA(ACRES) =      522.2

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =   36.39
  RAINFALL INTENSITY(INCH/HR) =   1.28
  TOTAL STREAM AREA(ACRES) =   522.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    442.56

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    334.00
  DOWNSTREAM ELEVATION(FEET) =    314.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.927
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.38

******************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    314.00  DOWNSTREAM(FEET) =    301.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   521.00   CHANNEL SLOPE =  0.0250
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.851
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.23
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   2.68
  Tc(MIN.) =    6.61
  SUBAREA AREA(ACRES) =     0.27       SUBAREA RUNOFF(CFS) =    0.65
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   3.66
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     43.00 =     621.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     40.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   301.00  DOWNSTREAM(FEET) =   300.50
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.97
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =    7.21
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     40.00 =     721.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     40.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.642
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    1.06
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       1.97
  TC(MIN.) =    7.21

******************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    7.21
  RAINFALL INTENSITY(INCH/HR) =   3.64
  TOTAL STREAM AREA(ACRES) =     0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.97

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      442.56    36.39        1.282        522.25
      2        1.97     7.21        3.642          0.86

  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       89.60     7.21       3.642
      2      443.25    36.39       1.282

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     443.25   Tc(MIN.) =   36.39
  TOTAL AREA(ACRES) =      523.1
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      523.1  TC(MIN.) =     36.39
  PEAK FLOW RATE(CFS)   =     443.25
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

25-Year Proposed Condition Hydrology Model

Analysis was performed to obtain peak flows at node 20 for preliminary hydraulic calculations. SD line 1 profile in Exhibit B were modeled with the 100-yr onsite and 25-yr in the river as well as the 25-yr onsite and 100-yr in the river.

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                              Analysis prepared by:

                     Hunsaker & Associates San Diego, Inc.
                               9707 Waples Street
                              San Diego,  CA 92121


 ************************* DESCRIPTION OF STUDY *************************
* Carlton Oaks / Hydrology Analysis                                      *
* 25-YEAR RAINFALL EVENT                                                 *
* W.O. 2167-0228                                                         *
 ************************************************************************

  FILE NAME: R:\1759\HYD\DR\CALCS\AES\25\25PR.DAT
  TIME/DATE OF STUDY: 17:14 01/30/2024
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.900
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   17.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   20.0     12.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  4   16.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  5   26.0     18.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  6   44.0     12.0    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 =  0.50 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.*

+------------------------------------------------------------------------+
| BEGINING OF ANALYSIS GOLF RESORT                                       |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    324.50
  DOWNSTREAM ELEVATION(FEET) =    323.50
  ELEVATION DIFFERENCE(FEET) =      1.00
```

```
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.293
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  323.50  DOWNSTREAM ELEVATION(FEET) =  320.30
  STREET LENGTH(FEET) =   317.00   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)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.32
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =    5.57
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.670
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    1.28      SUBAREA RUNOFF(CFS) =    4.90
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.58
  FLOW VELOCITY(FEET/SEC.) =  2.67   DEPTH*VELOCITY(FT*FT/SEC.) =   1.06
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     377.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.670
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
  SUBAREA AREA(ACRES) =    0.32   SUBAREA RUNOFF(CFS) =    1.23
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       6.47
  TC(MIN.) =    5.57

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   316.30  DOWNSTREAM(FEET) =   314.90
  FLOW LENGTH(FEET) =  1091.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.93
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.47
  PIPE TRAVEL TIME(MIN.) =   6.21    Tc(MIN.) =   11.77
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =    1468.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.77
  RAINFALL INTENSITY(INCH/HR) =   2.88
  TOTAL STREAM AREA(ACRES) =     1.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.47

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    324.50
  DOWNSTREAM ELEVATION(FEET) =    323.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.293
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  323.50  DOWNSTREAM ELEVATION(FEET) =  321.30
  STREET LENGTH(FEET) =   293.00   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)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.78
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.14
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =    5.68
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.610
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    1.31      SUBAREA RUNOFF(CFS) =    4.95
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.33
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    312.00 =     353.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    312.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.610
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
  SUBAREA AREA(ACRES) =    1.36   SUBAREA RUNOFF(CFS) =    5.14
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =      10.36
  TC(MIN.) =    5.68

****************************************************************************
  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) =   317.30  DOWNSTREAM(FEET) =   310.50
  FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.81
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.36
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    6.18
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    313.00 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.18
  RAINFALL INTENSITY(INCH/HR) =   4.37
  TOTAL STREAM AREA(ACRES) =     2.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.36

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    327.60
  DOWNSTREAM ELEVATION(FEET) =    327.00
  ELEVATION DIFFERENCE(FEET) =      0.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.904
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  327.00  DOWNSTREAM ELEVATION(FEET) =  320.60
  STREET LENGTH(FEET) =   637.00   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)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
```

```
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.11
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   5.59   Tc(MIN.) =    9.49
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.311
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    1.90
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       2.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.08
  FLOW VELOCITY(FEET/SEC.) =  2.16   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     697.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.311
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
  SUBAREA AREA(ACRES) =    1.60   SUBAREA RUNOFF(CFS) =    4.34
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       6.38
  TC(MIN.) =    9.49

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.311
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7591
  SUBAREA AREA(ACRES) =    0.41   SUBAREA RUNOFF(CFS) =    0.56
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       6.94
  TC(MIN.) =    9.49

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.49
  RAINFALL INTENSITY(INCH/HR) =   3.31
  TOTAL STREAM AREA(ACRES) =     2.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.94

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    321.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .4900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    322.00
  DOWNSTREAM ELEVATION(FEET) =    315.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.740
```

```
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.579
 SUBAREA RUNOFF(CFS) =      0.11
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
 FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  315.00  DOWNSTREAM ELEVATION(FEET) =  312.50
 STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.25
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.21
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.95
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.53
 STREET FLOW TRAVEL TIME(MIN.) =   2.09   Tc(MIN.) =    7.83
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.748
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .4900
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
 SUBAREA AREA(ACRES) =    1.23      SUBAREA RUNOFF(CFS) =    2.26
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       2.35

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.71
 FLOW VELOCITY(FEET/SEC.) =  2.22   DEPTH*VELOCITY(FT*FT/SEC.) =   0.71
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    322.00 =     345.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    322.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  4
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  4 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.83
 RAINFALL INTENSITY(INCH/HR) =   3.75
 TOTAL STREAM AREA(ACRES) =     1.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.35

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        6.47    11.77        2.881          1.69
     2       10.36     6.18        4.365          2.74
     3        6.94     9.49        3.311          2.76
     4        2.35     7.83        3.748          1.28

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  4 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       20.13     6.18       4.365
     2       21.27     7.83       3.748
```

```
      3       22.09     9.49       3.311
      4       21.15    11.77       2.881

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.09   Tc(MIN.) =    9.49
  TOTAL AREA(ACRES) =        8.5
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    264.00 =    1468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BEGINING OF ANALYSIS PA-2                                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    251.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    346.00
  DOWNSTREAM ELEVATION(FEET) =    344.70
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.571
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    251.00 TO NODE    252.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  344.70  DOWNSTREAM ELEVATION(FEET) =  327.60
  STREET LENGTH(FEET) =   634.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.59
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.32
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.96
  STREET FLOW TRAVEL TIME(MIN.) =   3.18   Tc(MIN.) =    6.75
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.124
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.38      SUBAREA RUNOFF(CFS) =    4.50
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.76

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.63
 FLOW VELOCITY(FEET/SEC.) =  3.81   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    252.00 =     699.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    252.00 TO NODE    252.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.124
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    3.78
 TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       8.54
 TC(MIN.) =    6.75

****************************************************************************
 FLOW PROCESS FROM NODE    252.00 TO NODE    257.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   322.60  DOWNSTREAM(FEET) =   318.10
 FLOW LENGTH(FEET) =   447.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.54
 PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =    7.85
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    257.00 =    1146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    257.00 TO NODE    257.00 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.) =    7.85
 RAINFALL INTENSITY(INCH/HR) =   3.74
 TOTAL STREAM AREA(ACRES) =     2.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.54

****************************************************************************
 FLOW PROCESS FROM NODE    253.00 TO NODE    254.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
 UPSTREAM ELEVATION(FEET) =    331.30
 DOWNSTREAM ELEVATION(FEET) =    330.00
 ELEVATION DIFFERENCE(FEET) =      1.30
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.916
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.30
 TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
 FLOW PROCESS FROM NODE    254.00 TO NODE    255.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  330.00  DOWNSTREAM ELEVATION(FEET) =  325.90
 STREET LENGTH(FEET) =   294.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.00
```

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.51
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
  STREET FLOW TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =    6.04
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.430
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
  SUBAREA AREA(ACRES) =    0.75      SUBAREA RUNOFF(CFS) =    2.53
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       2.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.77
  FLOW VELOCITY(FEET/SEC.) =  2.60   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
  LONGEST FLOWPATH FROM NODE    253.00 TO NODE    255.00 =     359.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.430
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    1.31
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       4.11
  TC(MIN.) =    6.04

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    256.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   320.90  DOWNSTREAM(FEET) =   318.50
  FLOW LENGTH(FEET) =   326.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.11
  PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =    7.11
  LONGEST FLOWPATH FROM NODE    253.00 TO NODE    256.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    256.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.988
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    2.00   SUBAREA RUNOFF(CFS) =    6.06
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       9.76
  TC(MIN.) =    7.11

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

```
 FLOW PROCESS FROM NODE    256.00 TO NODE    256.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.988
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    1.82   SUBAREA RUNOFF(CFS) =    5.52
 TOTAL AREA(ACRES) =        5.0   TOTAL RUNOFF(CFS) =      15.28
 TC(MIN.) =    7.11

****************************************************************************
 FLOW PROCESS FROM NODE    256.00 TO NODE    257.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   318.50  DOWNSTREAM(FEET) =   318.10
 FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.01
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.28
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    7.33
 LONGEST FLOWPATH FROM NODE    253.00 TO NODE    257.00 =     763.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    257.00 TO NODE    257.00 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.) =    7.33
 RAINFALL INTENSITY(INCH/HR) =   3.91
 TOTAL STREAM AREA(ACRES) =     5.04
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.28

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        8.54     7.85        3.742          2.62
     2       15.28     7.33        3.912          5.04

 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       23.25     7.33       3.912
     2       23.15     7.85       3.742

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      23.25   Tc(MIN.) =    7.33
 TOTAL AREA(ACRES) =        7.7
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    257.00 =    1146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    257.00 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) =   315.50  DOWNSTREAM(FEET) =   314.50
 FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.61
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      23.25
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.51
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 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.) =    7.51
  RAINFALL INTENSITY(INCH/HR) =   3.85
  TOTAL STREAM AREA(ACRES) =     7.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.25

****************************************************************************
  FLOW PROCESS FROM NODE    258.00 TO NODE    259.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    342.00
  DOWNSTREAM ELEVATION(FEET) =    341.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.078
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.001
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  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) =    341.00  DOWNSTREAM(FEET) =    323.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   574.00   CHANNEL SLOPE =  0.0314
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.309
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.95
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   2.42
  Tc(MIN.) =    9.50
  SUBAREA AREA(ACRES) =     0.90       SUBAREA RUNOFF(CFS) =    1.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.555
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       1.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.94
  LONGEST FLOWPATH FROM NODE    258.00 TO NODE    260.00 =     674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    264.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    323.00  DOWNSTREAM(FEET) =    314.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00   CHANNEL SLOPE =  0.0596
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.76
  FLOW VELOCITY(FEET/SEC.) =   1.88   FLOW DEPTH(FEET) =   0.06
  TRAVEL TIME(MIN.) =   1.34   Tc(MIN.) =   10.84
  LONGEST FLOWPATH FROM NODE    258.00 TO NODE    264.00 =     825.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 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.) =   10.84
  RAINFALL INTENSITY(INCH/HR) =   3.04
  TOTAL STREAM AREA(ACRES) =     0.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.76

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    349.50
  DOWNSTREAM ELEVATION(FEET) =    347.50
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.006
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    80.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.448
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE    263.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  347.50  DOWNSTREAM ELEVATION(FEET) =  322.00
  STREET LENGTH(FEET) =   880.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
  STREET FLOW TRAVEL TIME(MIN.) =   4.46   Tc(MIN.) =   10.47
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.108
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  SUBAREA AREA(ACRES) =    1.82      SUBAREA RUNOFF(CFS) =    3.56
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =       3.76

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.59
  FLOW VELOCITY(FEET/SEC.) =  3.70   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    263.00 =     980.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    264.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    322.00  DOWNSTREAM(FEET) =    314.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE =  0.0435
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.76
  FLOW VELOCITY(FEET/SEC.) =   2.23   FLOW DEPTH(FEET) =   0.10
  TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   11.84
  LONGEST FLOWPATH FROM NODE    261.00 TO NODE    264.00 =    1164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 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.) =   11.84
  RAINFALL INTENSITY(INCH/HR) =   2.87
  TOTAL STREAM AREA(ACRES) =     1.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.76

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       23.25     7.51        3.849          7.66
      2        1.76    10.84        3.039          0.96
      3        3.76    11.84        2.871          1.92

  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       26.85     7.51       3.849
      2       23.56    10.84       3.039
      3       22.76    11.84       2.871

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.85   Tc(MIN.) =    7.51
  TOTAL AREA(ACRES) =       10.5
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 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       26.85     7.51       3.849       10.54
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       22.09     9.49       3.311        8.47
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    264.00 =    1468.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      44.34       7.51        3.849
      2      45.18       9.49        3.311

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      45.18   Tc(MIN.) =    9.49
  TOTAL AREA(ACRES) =       19.0

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    143.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    314.00  DOWNSTREAM(FEET) =    304.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2044.00   CHANNEL SLOPE =  0.0049
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      45.18
  FLOW VELOCITY(FEET/SEC.) =   2.92   FLOW DEPTH(FEET) =   0.87
  TRAVEL TIME(MIN.) =  11.68   Tc(MIN.) =   21.17
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    143.00 =    3512.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    346.00
  DOWNSTREAM ELEVATION(FEET) =    344.70
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.571
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  344.70  DOWNSTREAM ELEVATION(FEET) =  334.40
  STREET LENGTH(FEET) =   458.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =    6.24
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.341
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    3.05
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       3.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.46
  FLOW VELOCITY(FEET/SEC.) =  3.28   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     523.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   330.40  DOWNSTREAM(FEET) =   328.70
  FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.33
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =    6.75
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.124
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    1.17   SUBAREA RUNOFF(CFS) =    3.81
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       6.97
  TC(MIN.) =    6.75

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   328.70  DOWNSTREAM(FEET) =   326.70
  FLOW LENGTH(FEET) =   195.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.97
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    7.25
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     886.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.940
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    1.06   SUBAREA RUNOFF(CFS) =    3.30
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       9.96
  TC(MIN.) =    7.25

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.70  DOWNSTREAM(FEET) =   321.20
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.012
  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.) =  10.04
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.96
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    7.61
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1106.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.817
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.66   SUBAREA RUNOFF(CFS) =    1.99
  TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =      11.64
  TC(MIN.) =    7.61

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    211.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   321.20  DOWNSTREAM(FEET) =   316.60
  FLOW LENGTH(FEET) =   187.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.64
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    7.92
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    211.00 =    1293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 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.) =    7.92
  RAINFALL INTENSITY(INCH/HR) =   3.72
  TOTAL STREAM AREA(ACRES) =     3.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.64

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    337.40
  DOWNSTREAM ELEVATION(FEET) =    334.50
  ELEVATION DIFFERENCE(FEET) =      2.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.417
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  334.50  DOWNSTREAM ELEVATION(FEET) =  325.00
  STREET LENGTH(FEET) =   296.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.63
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
  STREET FLOW TRAVEL TIME(MIN.) =   1.36   Tc(MIN.) =    4.78
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    5.26
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.87
  FLOW VELOCITY(FEET/SEC.) =  4.20   DEPTH*VELOCITY(FT*FT/SEC.) =   1.44
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    208.00 =     381.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.76   SUBAREA RUNOFF(CFS) =    3.01
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       8.46
  TC(MIN.) =    4.78

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   320.00  DOWNSTREAM(FEET) =   319.40
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.012
```

```
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.23
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.46
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    5.16
 LONGEST FLOWPATH FROM NODE    206.00 TO NODE    209.00 =     501.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.905
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.89   SUBAREA RUNOFF(CFS) =    3.45
 TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =      11.74
 TC(MIN.) =    5.16

****************************************************************************
 FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.905
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    1.71
 TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =      13.45
 TC(MIN.) =    5.16

****************************************************************************
 FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   319.40  DOWNSTREAM(FEET) =   317.50
 FLOW LENGTH(FEET) =   382.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.83
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.45
 PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =    6.25
 LONGEST FLOWPATH FROM NODE    206.00 TO NODE    210.00 =     883.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.334
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    1.22   SUBAREA RUNOFF(CFS) =    4.18
 TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      16.06
 TC(MIN.) =    6.25

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.334
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.55   SUBAREA RUNOFF(CFS) =    1.88
```

```
  TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      17.94
  TC(MIN.) =    6.25

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   317.50  DOWNSTREAM(FEET) =   316.60
  FLOW LENGTH(FEET) =   141.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.74
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.94
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    6.60
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    211.00 =    1024.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 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.) =    6.60
  RAINFALL INTENSITY(INCH/HR) =   4.18
  TOTAL STREAM AREA(ACRES) =     5.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.94

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.64     7.92        3.722          3.86
      2       17.94     6.60        4.185          5.24

  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       27.65     6.60       4.185
      2       27.60     7.92       3.722

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.65   Tc(MIN.) =    6.60
  TOTAL AREA(ACRES) =        9.1
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    211.00 =    1293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   316.60  DOWNSTREAM(FEET) =   315.20
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.25
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.65
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    6.84
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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.) =    6.84
  RAINFALL INTENSITY(INCH/HR) =   4.09
  TOTAL STREAM AREA(ACRES) =     9.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.65

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    213.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    333.70
  DOWNSTREAM ELEVATION(FEET) =    331.40
  ELEVATION DIFFERENCE(FEET) =      2.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.326
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    217.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  331.40  DOWNSTREAM ELEVATION(FEET) =  320.80
  STREET LENGTH(FEET) =   523.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.23
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
  STREET FLOW TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =    6.38
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.279
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.12      SUBAREA RUNOFF(CFS) =    3.79
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       4.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.55
  FLOW VELOCITY(FEET/SEC.) =  3.29   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =     598.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.279
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
```

```
  SUBAREA AREA(ACRES) =    0.62   SUBAREA RUNOFF(CFS) =    2.10
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       6.15
  TC(MIN.) =    6.38

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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.) =    6.38
  RAINFALL INTENSITY(INCH/HR) =   4.28
  TOTAL STREAM AREA(ACRES) =     1.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.15

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       27.65     6.84        4.090          9.10
      2        6.15     6.38        4.279          1.82

  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       32.58     6.38       4.279
      2       33.53     6.84       4.090

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      33.53   Tc(MIN.) =    6.84
  TOTAL AREA(ACRES) =       10.9
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    215.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    351.00
  DOWNSTREAM ELEVATION(FEET) =    350.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.078
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.001
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    330.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   228.00   CHANNEL SLOPE =  0.0877
```

```
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.788
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.06
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.63
  Tc(MIN.) =    7.70
  SUBAREA AREA(ACRES) =     0.71       SUBAREA RUNOFF(CFS) =    1.69
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.05

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   7.15
  LONGEST FLOWPATH FROM NODE    214.00 TO NODE    216.00 =     328.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 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.) =    7.70
  RAINFALL INTENSITY(INCH/HR) =   3.79
  TOTAL STREAM AREA(ACRES) =     0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.05

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  22.01   RAIN INTENSITY(INCH/HOUR) =  1.92
  TOTAL AREA(ACRES) =    58.07   TOTAL RUNOFF(CFS) =     53.39

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 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.) =   22.01
  RAINFALL INTENSITY(INCH/HR) =   1.92
  TOTAL STREAM AREA(ACRES) =    58.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     53.39

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.05     7.70        3.788          0.86
      2       53.39    22.01        1.925         58.07

  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       20.74     7.70       3.788
      2       54.43    22.01       1.925

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      54.43   Tc(MIN.) =   22.01
  TOTAL AREA(ACRES) =       58.9
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    216.00 =     598.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.90  DOWNSTREAM(FEET) =   315.20
  FLOW LENGTH(FEET) =   551.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.15
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      54.43
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   22.71
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =    1149.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.886
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4849
  SUBAREA AREA(ACRES) =    2.03   SUBAREA RUNOFF(CFS) =    2.41
  TOTAL AREA(ACRES) =       61.0   TOTAL RUNOFF(CFS) =      55.76
  TC(MIN.) =   22.71

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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       55.76    22.71       1.886       60.96
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =    1149.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       33.53     6.84       4.090       10.92
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      50.32       6.84        4.090
      2      71.22      22.71        1.886

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      71.22   Tc(MIN.) =   22.71
  TOTAL AREA(ACRES) =       71.9

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    218.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.70  DOWNSTREAM(FEET) =   304.00
  FLOW LENGTH(FEET) =   383.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.6 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.54
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      71.22
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   23.31
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    218.00 =    1808.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.854
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5331
  SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.61
  TOTAL AREA(ACRES) =       72.3   TOTAL RUNOFF(CFS) =      71.43
  TC(MIN.) =   23.31

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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       71.43    23.31       1.854       72.26
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    218.00 =    1808.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       45.18    21.17       1.974       19.01
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    218.00 =    3512.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     110.04      21.17        1.974
      2     113.89      23.31        1.854

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     113.89   Tc(MIN.) =   23.31
  TOTAL AREA(ACRES) =       91.3

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    133.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    304.00  DOWNSTREAM(FEET) =    301.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   518.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     113.89
  FLOW VELOCITY(FEET/SEC.) =   4.05   FLOW DEPTH(FEET) =   1.48
  TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =   25.45
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    133.00 =    4030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  10
----------------------------------------------------------------------------
```

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

********************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    335.00
  DOWNSTREAM ELEVATION(FEET) =    328.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.423
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      0.85

********************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    323.00  DOWNSTREAM(FEET) =    315.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   732.00   CHANNEL SLOPE =  0.0100
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.852
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.96
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   3.08
  Tc(MIN.) =    7.51
  SUBAREA AREA(ACRES) =     1.66       SUBAREA RUNOFF(CFS) =    4.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       4.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   4.65
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     832.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.852
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    1.07
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       5.75
  TC(MIN.) =    7.51

********************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.51
  RAINFALL INTENSITY(INCH/HR) =   3.85
  TOTAL STREAM AREA(ACRES) =     2.37
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.75

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

```
 FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =   9.91   RAIN INTENSITY(INCH/HOUR) =  3.22
 TOTAL AREA(ACRES) =    27.19   TOTAL RUNOFF(CFS) =     73.41

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.91
 RAINFALL INTENSITY(INCH/HR) =   3.22
 TOTAL STREAM AREA(ACRES) =    27.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     73.41

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        5.75     7.51        3.852          2.37
     2       73.41     9.91        3.220         27.19

 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       61.35     7.51       3.852
     2       78.22     9.91       3.220

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      78.22   Tc(MIN.) =    9.91
 TOTAL AREA(ACRES) =       29.6
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     832.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   307.40  DOWNSTREAM(FEET) =   301.40
 FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.77
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      78.22
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   10.01
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    133.00 =     956.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.198
 *USER SPECIFIED(SUBAREA):
 PAVED SURFACE RUNOFF COEFFICIENT = .8700
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8223
 SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    0.86
 TOTAL AREA(ACRES) =       29.9   TOTAL RUNOFF(CFS) =      78.55
 TC(MIN.) =   10.01

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 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       78.55    10.01       3.198       29.87
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    133.00 =     956.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      113.89    25.45       1.753       91.27
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    133.00 =    4030.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     123.37      10.01        3.198
      2     156.93      25.45        1.753

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     156.93   Tc(MIN.) =   25.45
  TOTAL AREA(ACRES) =      121.1

********************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    128.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    301.40  DOWNSTREAM(FEET) =    299.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   311.00   CHANNEL SLOPE =  0.0051
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     156.93
  FLOW VELOCITY(FEET/SEC.) =   4.55   FLOW DEPTH(FEET) =   1.77
  TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =   26.59
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    128.00 =    4341.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =  10
--------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .9000
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    326.00
  DOWNSTREAM ELEVATION(FEET) =    317.00
  ELEVATION DIFFERENCE(FEET) =      9.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.731
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.59
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.59

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

```
 FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    313.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   336.00   CHANNEL SLOPE =  0.0101
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
 AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   1.81
 Tc(MIN.) =    3.54
 SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    1.58
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.686
 TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       2.16

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   3.62
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    127.00 =     436.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6728
 SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.60
 TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       2.76
 TC(MIN.) =    3.54

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    3.54
 RAINFALL INTENSITY(INCH/HR) =   5.01
 TOTAL STREAM AREA(ACRES) =     0.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.76

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  10.22   RAIN INTENSITY(INCH/HOUR) =  3.16
 TOTAL AREA(ACRES) =     3.81   TOTAL RUNOFF(CFS) =     10.53

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.22
 RAINFALL INTENSITY(INCH/HR) =   3.16
 TOTAL STREAM AREA(ACRES) =     3.81
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.76     3.54        5.006          0.82
      2       10.53    10.22        3.157          3.81

  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        6.40     3.54       5.006
      2       12.27    10.22       3.157

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.27   Tc(MIN.) =   10.22
  TOTAL AREA(ACRES) =        4.6
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    127.00 =     598.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   309.60  DOWNSTREAM(FEET) =   299.80
  FLOW LENGTH(FEET) =   146.00   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.) =  14.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.27
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    128.00 =     744.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.124
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8199
  SUBAREA AREA(ACRES) =    0.48   SUBAREA RUNOFF(CFS) =    0.94
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      13.09
  TC(MIN.) =   10.39

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 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       13.09    10.39       3.124        5.11
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    128.00 =     744.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      156.93    26.59       1.704      121.14
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    128.00 =    4341.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
```

```
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      74.41      10.39        3.124
      2     164.07      26.59        1.704

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     164.07   Tc(MIN.) =   26.59
  TOTAL AREA(ACRES) =      126.2

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    299.80  DOWNSTREAM(FEET) =    296.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     164.07
  FLOW VELOCITY(FEET/SEC.) =   4.57   FLOW DEPTH(FEET) =   1.83
  TRAVEL TIME(MIN.) =   2.47   Tc(MIN.) =   29.06
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    113.00 =    5019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    324.00
  DOWNSTREAM ELEVATION(FEET) =    321.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.668
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.617
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    321.00  DOWNSTREAM(FEET) =    315.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   291.00   CHANNEL SLOPE =  0.0206
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.887
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.80
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.73
  Tc(MIN.) =    7.40
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.68
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.580
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.86
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   3.23
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.887
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5800
  SUBAREA AREA(ACRES) =    0.29   SUBAREA RUNOFF(CFS) =    0.65
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.51
  TC(MIN.) =    7.40

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.40
  RAINFALL INTENSITY(INCH/HR) =   3.89
  TOTAL STREAM AREA(ACRES) =     0.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.51

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  21.61   RAIN INTENSITY(INCH/HOUR) =  1.95
  TOTAL AREA(ACRES) =    54.44   TOTAL RUNOFF(CFS) =     79.21

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.61
  RAINFALL INTENSITY(INCH/HR) =   1.95
  TOTAL STREAM AREA(ACRES) =    54.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     79.21

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.51     7.40        3.887          0.67
      2       79.21    21.61        1.947         54.44

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       28.64     7.40       3.887
      2       79.97    21.61       1.947

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      79.97   Tc(MIN.) =   21.61
  TOTAL AREA(ACRES) =       55.1
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    112.00 =     598.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   311.00  DOWNSTREAM(FEET) =   306.80
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.25
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      79.97
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   21.86
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    113.00 =     810.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 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       79.97    21.86       1.933       55.11
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    113.00 =     810.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      164.07    29.06       1.609      126.25
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    113.00 =    5019.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     203.37      21.86        1.933
      2     230.62      29.06        1.609

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     230.62   Tc(MIN.) =   29.06
  TOTAL AREA(ACRES) =      181.4

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    306.80  DOWNSTREAM(FEET) =    300.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   585.00   CHANNEL SLOPE =  0.0116
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     230.62
  FLOW VELOCITY(FEET/SEC.) =   6.78   FLOW DEPTH(FEET) =   1.74
  TRAVEL TIME(MIN.) =   1.44   Tc(MIN.) =   30.50
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    105.00 =    5604.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.559
```

```
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6750
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =      181.8   TOTAL RUNOFF(CFS) =     230.62
  TC(MIN.) =   30.50
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.559
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6749
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.08
  TOTAL AREA(ACRES) =      181.9   TOTAL RUNOFF(CFS) =     230.62
  TC(MIN.) =   30.50
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE     20.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    300.00  DOWNSTREAM(FEET) =    295.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   974.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     230.62
  FLOW VELOCITY(FEET/SEC.) =   5.10   FLOW DEPTH(FEET) =   2.22
  TRAVEL TIME(MIN.) =   3.19   Tc(MIN.) =   33.68
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     20.00 =    6578.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.463
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6753
  SUBAREA AREA(ACRES) =    0.32   SUBAREA RUNOFF(CFS) =    0.41
  TOTAL AREA(ACRES) =      182.2   TOTAL RUNOFF(CFS) =     230.62
  TC(MIN.) =   33.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.463
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6755
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.22
  TOTAL AREA(ACRES) =      182.4   TOTAL RUNOFF(CFS) =     230.62
  TC(MIN.) =   33.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   33.68
  RAINFALL INTENSITY(INCH/HR) =   1.46
  TOTAL STREAM AREA(ACRES) =   182.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    230.62

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    324.00
  DOWNSTREAM ELEVATION(FEET) =    322.50
  ELEVATION DIFFERENCE(FEET) =      1.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.169
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    77.65
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.372
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    322.50  DOWNSTREAM(FEET) =    309.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   344.00   CHANNEL SLOPE =  0.0369
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.839
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.17
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.38
  Tc(MIN.) =    7.54
  SUBAREA AREA(ACRES) =     0.65       SUBAREA RUNOFF(CFS) =    1.57
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       1.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   5.13
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    101.30 =     429.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.30 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   309.00  DOWNSTREAM(FEET) =   305.00
  FLOW LENGTH(FEET) =   248.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.74
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =    8.37
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     677.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.592
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.27   SUBAREA RUNOFF(CFS) =    0.61
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.24
  TC(MIN.) =    8.37

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.592
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.83   SUBAREA RUNOFF(CFS) =    1.88
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       4.12
  TC(MIN.) =    8.37

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE     20.00 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) =   296.00
  FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.61
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.12
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    8.79
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE     20.00 =     895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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.) =    8.79
  RAINFALL INTENSITY(INCH/HR) =   3.48
  TOTAL STREAM AREA(ACRES) =     1.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.12

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      230.62    33.68        1.463        182.35
      2        4.12     8.79        3.479          1.82

  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       64.29     8.79       3.479
      2      232.35    33.68       1.463

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     232.35   Tc(MIN.) =   33.68
  TOTAL AREA(ACRES) =      184.2
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     20.00 =    6578.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BEGINING OF ANALYSIS PA-1                                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.50
  DOWNSTREAM ELEVATION(FEET) =    317.80
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.600
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.80  DOWNSTREAM ELEVATION(FEET) =  311.90
  STREET LENGTH(FEET) =   406.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
  STREET FLOW TRAVEL TIME(MIN.) =   2.97   Tc(MIN.) =    8.67
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.509
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.07
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       2.32

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.54   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     481.00 FEET.

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

```
 FLOW PROCESS FROM NODE     12.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   309.60  DOWNSTREAM(FEET) =   308.60
 FLOW LENGTH(FEET) =   108.00   MANNING'S N =  0.012
 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.) =   4.73
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.32
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    9.05
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     589.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =    9.05
 RAINFALL INTENSITY(INCH/HR) =   3.41
 TOTAL STREAM AREA(ACRES) =     0.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.32

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    318.40
 DOWNSTREAM ELEVATION(FEET) =    317.70
 ELEVATION DIFFERENCE(FEET) =      0.70
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.599
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  317.70  DOWNSTREAM ELEVATION(FEET) =  311.30
 STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.97
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.01
```

```
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   4.33   Tc(MIN.) =   10.04
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.194
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.43      SUBAREA RUNOFF(CFS) =    3.24
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.13
  FLOW VELOCITY(FEET/SEC.) =  2.23   DEPTH*VELOCITY(FT*FT/SEC.) =   0.64
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     15.00 =     597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   10.04
  RAINFALL INTENSITY(INCH/HR) =   3.19
  TOTAL STREAM AREA(ACRES) =     1.53
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.32     9.05        3.413          0.93
      2        3.47    10.04        3.194          1.53

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.45     9.05       3.413
      2        5.64    10.04       3.194

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.64   Tc(MIN.) =   10.04
  TOTAL AREA(ACRES) =        2.5
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     15.00 =     597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   308.60  DOWNSTREAM(FEET) =   303.30
  FLOW LENGTH(FEET) =    66.00   MANNING'S N =  0.012
  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.) =  13.21
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.64
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.12
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =     663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.177
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    2.62
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =       8.17
  TC(MIN.) =   10.12

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    331.50
  DOWNSTREAM ELEVATION(FEET) =    326.50
  ELEVATION DIFFERENCE(FEET) =      5.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.948
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    306.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   385.00   CHANNEL SLOPE =  0.0234
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.279
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   1.43
  Tc(MIN.) =    6.38
  SUBAREA AREA(ACRES) =     0.64       SUBAREA RUNOFF(CFS) =    1.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       1.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   5.27
  LONGEST FLOWPATH FROM NODE     17.00 TO NODE     19.00 =     485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.279
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    1.19
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       3.18
  TC(MIN.) =    6.38

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =    6.38
  RAINFALL INTENSITY(INCH/HR) =   4.28
  TOTAL STREAM AREA(ACRES) =     1.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.18

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  26.71   RAIN INTENSITY(INCH/HOUR) =  1.70
  TOTAL AREA(ACRES) =   327.74   TOTAL RUNOFF(CFS) =    261.16

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.71
  RAINFALL INTENSITY(INCH/HR) =   1.70
  TOTAL STREAM AREA(ACRES) =   327.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    261.16

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.18     6.38        4.279          1.18
      2      261.16    26.71        1.699        327.74

  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       65.53     6.38       4.279
      2      262.42    26.71       1.699

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     262.42   Tc(MIN.) =   26.71
  TOTAL AREA(ACRES) =      328.9
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     19.00 =     597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.00  DOWNSTREAM(FEET) =   303.30
  FLOW LENGTH(FEET) =   726.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  53.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.15
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     262.42
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   27.71
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =    1323.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 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      262.42    27.71       1.659      328.92
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =    1323.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        8.17    10.12       3.177        3.62
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =     663.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     104.02      10.12        3.177
      2     266.69      27.71        1.659

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     266.69   Tc(MIN.) =   27.71
  TOTAL AREA(ACRES) =      332.5

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

----------------------------------------------------------------------------
  FLOW PROCESS FROM NODE     16.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.70  DOWNSTREAM(FEET) =   296.00
  FLOW LENGTH(FEET) =   137.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  54.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.18
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     266.69
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   27.89
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     20.00 =    1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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      266.69    27.89       1.652      332.54
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     20.00 =    1460.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      232.35    33.68       1.463      184.17
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     20.00 =    6578.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     459.09      27.89        1.652
      2     468.48      33.68        1.463

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     468.48   Tc(MIN.) =   33.68
  TOTAL AREA(ACRES) =      516.7

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

Outfall of SD Line #1

```
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    296.00  DOWNSTREAM(FEET) =    291.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   859.50   CHANNEL SLOPE =  0.0052
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     468.48
  FLOW VELOCITY(FEET/SEC.) =   6.41   FLOW DEPTH(FEET) =   3.25
  TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   35.92
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.40
  DOWNSTREAM ELEVATION(FEET) =    317.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.599
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.70  DOWNSTREAM ELEVATION(FEET) =  312.30
  STREET LENGTH(FEET) =   393.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   2.74   Tc(MIN.) =    8.44
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.572
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.25      SUBAREA RUNOFF(CFS) =    3.17
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       3.42

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.63
  FLOW VELOCITY(FEET/SEC.) =  2.74   DEPTH*VELOCITY(FT*FT/SEC.) =   0.93
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.60  DOWNSTREAM(FEET) =   305.00
  FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.012
  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.) =   5.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.42
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =    9.26
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =     733.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 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.) =    9.26
  RAINFALL INTENSITY(INCH/HR) =   3.36
  TOTAL STREAM AREA(ACRES) =     1.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.42

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.50
  DOWNSTREAM ELEVATION(FEET) =    317.80
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.600
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.80  DOWNSTREAM ELEVATION(FEET) =  310.60
  STREET LENGTH(FEET) =   614.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00
```

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.17
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
  STREET FLOW TRAVEL TIME(MIN.) =   4.72   Tc(MIN.) =   10.42
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.118
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.16      SUBAREA RUNOFF(CFS) =    2.57
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       2.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.09
  FLOW VELOCITY(FEET/SEC.) =  2.46   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE     33.00 TO NODE     35.00 =     689.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.118
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    0.68   SUBAREA RUNOFF(CFS) =    1.51
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       4.29
  TC(MIN.) =   10.42

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 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.) =   10.42
  RAINFALL INTENSITY(INCH/HR) =   3.12
  TOTAL STREAM AREA(ACRES) =     1.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.29

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.42     9.26        3.365          1.35
      2        4.29    10.42        3.118          1.94

  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        7.24     9.26       3.365
      2        7.47    10.42       3.118

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.47   Tc(MIN.) =   10.42
```

```
  TOTAL AREA(ACRES) =        3.3
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =     733.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   305.00  DOWNSTREAM(FEET) =   304.10
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.92
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.47
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   11.03
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     36.00 =     913.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.005
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    2.22
  TOTAL AREA(ACRES) =        4.3   TOTAL RUNOFF(CFS) =       9.24
  TC(MIN.) =   11.03

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     39.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   304.10  DOWNSTREAM(FEET) =   303.90
  FLOW LENGTH(FEET) =    31.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.90
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.24
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   11.12
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     39.00 =     944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =   11.12
  RAINFALL INTENSITY(INCH/HR) =   2.99
  TOTAL STREAM AREA(ACRES) =     4.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.24

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     38.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    317.50
  DOWNSTREAM ELEVATION(FEET) =    315.70
  ELEVATION DIFFERENCE(FEET) =      1.80
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.541
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
```

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  315.70  DOWNSTREAM ELEVATION(FEET) =  310.60
  STREET LENGTH(FEET) =   508.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
  STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =    8.63
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.520
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.12      SUBAREA RUNOFF(CFS) =    2.80
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.79
  FLOW VELOCITY(FEET/SEC.) =  2.36   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE     37.00 TO NODE     39.00 =     583.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =    8.63
  RAINFALL INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =     1.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.02

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.24    11.12        2.990          4.33
      2        3.02     8.63        3.520          1.21

  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       10.87     8.63       3.520
      2       11.81    11.12       2.990

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      11.81   Tc(MIN.) =   11.12
  TOTAL AREA(ACRES) =        5.5
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     39.00 =     944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.50  DOWNSTREAM(FEET) =   296.00
  FLOW LENGTH(FEET) =   116.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.37
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.81
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   11.48
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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       11.81    11.48       2.929        5.54
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1060.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      468.48    35.92       1.403      516.71
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     161.50      11.48        2.929
      2     474.14      35.92        1.403

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     474.14   Tc(MIN.) =   35.92
  TOTAL AREA(ACRES) =      522.2

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   35.92
  RAINFALL INTENSITY(INCH/HR) =   1.40
  TOTAL STREAM AREA(ACRES) =   522.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    474.14

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
```

```
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    334.00
  DOWNSTREAM ELEVATION(FEET) =    314.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.927
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.006
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    314.00  DOWNSTREAM(FEET) =    301.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   521.00   CHANNEL SLOPE =  0.0250
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.217
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.35
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   2.60
  Tc(MIN.) =    6.52
  SUBAREA AREA(ACRES) =     0.27       SUBAREA RUNOFF(CFS) =    0.72
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   3.76
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     43.00 =     621.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     40.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   301.00  DOWNSTREAM(FEET) =   300.50
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.88
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.06
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =    7.10
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     40.00 =     721.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.992
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    1.16
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.16
  TC(MIN.) =    7.10

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    7.10
  RAINFALL INTENSITY(INCH/HR) =   3.99
  TOTAL STREAM AREA(ACRES) =     0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.16

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      474.14    35.92        1.403        522.25
      2        2.16     7.10        3.992          0.86

  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       95.91     7.10       3.992
      2      474.90    35.92       1.403

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     474.90   Tc(MIN.) =   35.92
  TOTAL AREA(ACRES) =      523.1
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      523.1  TC(MIN.) =     35.92
  PEAK FLOW RATE(CFS)   =     474.90
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

100-Year Proposed Condition Hydrology Model

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                              Analysis prepared by:

                     Hunsaker & Associates San Diego, Inc.
                               9707 Waples Street
                              San Diego,  CA 92121


 ************************* DESCRIPTION OF STUDY *************************
* Carlton Oaks / Hydrology Analysis                                      *
* 100-YEAR RAINFALL EVENT                                                *
* W.O. 2167-0228                                                         *
 ************************************************************************

  FILE NAME: R:\1759\HYD\DR\CALCS\AES\100PR.DAT
  TIME/DATE OF STUDY: 17:10 01/30/2024
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.450
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   17.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   20.0     12.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  4   16.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  5   26.0     18.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  6   44.0     12.0    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 =  0.50 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.*

+----------------------------------------------------------------------+
| BEGINING OF ANALYSIS GOLF RESORT                                     |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    324.50
  DOWNSTREAM ELEVATION(FEET) =    323.50
  ELEVATION DIFFERENCE(FEET) =      1.00
```

```
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.293
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.48
 TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.48

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  323.50  DOWNSTREAM ELEVATION(FEET) =  320.30
 STREET LENGTH(FEET) =   317.00   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)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.69
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =   11.70
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.48
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
 STREET FLOW TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =    5.42
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.127
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
 SUBAREA AREA(ACRES) =    1.28      SUBAREA RUNOFF(CFS) =    6.43
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       6.88

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.08
 FLOW VELOCITY(FEET/SEC.) =  2.88   DEPTH*VELOCITY(FT*FT/SEC.) =   1.23
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     377.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.127
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
 SUBAREA AREA(ACRES) =    0.32   SUBAREA RUNOFF(CFS) =    1.61
 TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       8.49
 TC(MIN.) =    5.42

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   316.30  DOWNSTREAM(FEET) =   314.90
 FLOW LENGTH(FEET) =  1091.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.14
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.49
 PIPE TRAVEL TIME(MIN.) =   5.78    Tc(MIN.) =   11.20
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =    1468.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.20
  RAINFALL INTENSITY(INCH/HR) =   3.84
  TOTAL STREAM AREA(ACRES) =     1.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.49

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    324.50
  DOWNSTREAM ELEVATION(FEET) =    323.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.293
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  323.50  DOWNSTREAM ELEVATION(FEET) =  321.30
  STREET LENGTH(FEET) =   293.00   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)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.45
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.18
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
  STREET FLOW TRAVEL TIME(MIN.) =   2.24   Tc(MIN.) =    5.53
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.048
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    1.31      SUBAREA RUNOFF(CFS) =    6.50
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       6.84

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.02
  FLOW VELOCITY(FEET/SEC.) =  2.55   DEPTH*VELOCITY(FT*FT/SEC.) =   1.14
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    312.00 =     353.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    312.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.048
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
  SUBAREA AREA(ACRES) =    1.36   SUBAREA RUNOFF(CFS) =    6.74
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =      13.59
  TC(MIN.) =    5.53

****************************************************************************
  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) =   317.30  DOWNSTREAM(FEET) =   310.50
  FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.59
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    313.00 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.01
  RAINFALL INTENSITY(INCH/HR) =   5.74
  TOTAL STREAM AREA(ACRES) =     2.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.59

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    327.60
  DOWNSTREAM ELEVATION(FEET) =    327.00
  ELEVATION DIFFERENCE(FEET) =      0.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.904
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  327.00  DOWNSTREAM ELEVATION(FEET) =  320.60
  STREET LENGTH(FEET) =   637.00   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)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
```

```
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.58
  STREET FLOW TRAVEL TIME(MIN.) =   5.24   Tc(MIN.) =    9.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.373
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    2.51
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       2.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.30
  FLOW VELOCITY(FEET/SEC.) =  2.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     697.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.373
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL AREA RUNOFF COEFFICIENT = .8200
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
  SUBAREA AREA(ACRES) =    1.60   SUBAREA RUNOFF(CFS) =    5.74
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       8.43
  TC(MIN.) =    9.14

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.373
  *USER SPECIFIED(SUBAREA):
  SUBURBAN PROPERTY (RE) RUNOFF COEFFICIENT = .4100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7591
  SUBAREA AREA(ACRES) =    0.41   SUBAREA RUNOFF(CFS) =    0.74
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       9.16
  TC(MIN.) =    9.14

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.14
  RAINFALL INTENSITY(INCH/HR) =   4.37
  TOTAL STREAM AREA(ACRES) =     2.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.16

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    321.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .4900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    322.00
  DOWNSTREAM ELEVATION(FEET) =    315.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.740
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.905
 SUBAREA RUNOFF(CFS) =      0.14
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
 FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  315.00  DOWNSTREAM ELEVATION(FEET) =  312.50
 STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.62
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    8.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
 STREET FLOW TRAVEL TIME(MIN.) =   2.00   Tc(MIN.) =    7.74
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.870
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .4900
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
 SUBAREA AREA(ACRES) =    1.23      SUBAREA RUNOFF(CFS) =    2.93
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       3.05

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.80
 FLOW VELOCITY(FEET/SEC.) =  2.38   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    322.00 =     345.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    322.00 TO NODE    264.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  4
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  4 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.74
 RAINFALL INTENSITY(INCH/HR) =   4.87
 TOTAL STREAM AREA(ACRES) =     1.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.05

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        8.49    11.20        3.836          1.69
     2       13.59     6.01        5.735          2.74
     3        9.16     9.14        4.373          2.76
     4        3.05     7.74        4.870          1.28

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  4 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       26.53     6.01       5.735
     2       28.21     7.74       4.870
```

```
      3       29.19     9.14       4.373
      4       28.02    11.20       3.836

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      29.19   Tc(MIN.) =    9.14
  TOTAL AREA(ACRES) =        8.5
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    264.00 =    1468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BEGINING OF ANALYSIS PA-2                                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    251.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    346.00
  DOWNSTREAM ELEVATION(FEET) =    344.70
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.571
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    251.00 TO NODE    252.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  344.70  DOWNSTREAM ELEVATION(FEET) =  327.60
  STREET LENGTH(FEET) =   634.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   2.98   Tc(MIN.) =    6.55
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.425
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.38      SUBAREA RUNOFF(CFS) =    5.91
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       6.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.88
 FLOW VELOCITY(FEET/SEC.) =  4.09   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    252.00 =     699.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    252.00 TO NODE    252.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.425
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    4.97
 TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =      11.23
 TC(MIN.) =    6.55

****************************************************************************
 FLOW PROCESS FROM NODE    252.00 TO NODE    257.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   322.60  DOWNSTREAM(FEET) =   318.10
 FLOW LENGTH(FEET) =   447.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.32
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.23
 PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =    7.56
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    257.00 =    1146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    257.00 TO NODE    257.00 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.) =    7.56
 RAINFALL INTENSITY(INCH/HR) =   4.94
 TOTAL STREAM AREA(ACRES) =     2.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.23

****************************************************************************
 FLOW PROCESS FROM NODE    253.00 TO NODE    254.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
 UPSTREAM ELEVATION(FEET) =    331.30
 DOWNSTREAM ELEVATION(FEET) =    330.00
 ELEVATION DIFFERENCE(FEET) =      1.30
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.916
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.39
 TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.39

****************************************************************************
 FLOW PROCESS FROM NODE    254.00 TO NODE    255.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  330.00  DOWNSTREAM ELEVATION(FEET) =  325.90
 STREET LENGTH(FEET) =   294.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.00
```

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    5.94
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.778
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
  SUBAREA AREA(ACRES) =    0.75      SUBAREA RUNOFF(CFS) =    3.29
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       3.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.95
  FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE    253.00 TO NODE    255.00 =     359.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.778
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    1.71
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       5.36
  TC(MIN.) =    5.94

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    256.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   320.90  DOWNSTREAM(FEET) =   318.50
  FLOW LENGTH(FEET) =   326.00   MANNING'S N =  0.012
  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.) =   5.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.36
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =    6.94
  LONGEST FLOWPATH FROM NODE    253.00 TO NODE    256.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    256.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.226
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    2.00   SUBAREA RUNOFF(CFS) =    7.94
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =      12.79
  TC(MIN.) =    6.94

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

```
 FLOW PROCESS FROM NODE    256.00 TO NODE    256.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.226
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7600
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    1.82   SUBAREA RUNOFF(CFS) =    7.23
 TOTAL AREA(ACRES) =        5.0   TOTAL RUNOFF(CFS) =      20.02
 TC(MIN.) =    6.94

****************************************************************************
 FLOW PROCESS FROM NODE    256.00 TO NODE    257.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   318.50  DOWNSTREAM(FEET) =   318.10
 FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.47
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.02
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.14
 LONGEST FLOWPATH FROM NODE    253.00 TO NODE    257.00 =     763.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    257.00 TO NODE    257.00 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.) =    7.14
 RAINFALL INTENSITY(INCH/HR) =   5.13
 TOTAL STREAM AREA(ACRES) =     5.04
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.02

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.23     7.56        4.942          2.62
     2       20.02     7.14        5.131          5.04

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       30.61     7.14       5.131
     2       30.51     7.56       4.942

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      30.61   Tc(MIN.) =    7.14
 TOTAL AREA(ACRES) =        7.7
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    257.00 =    1146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    257.00 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) =   315.50  DOWNSTREAM(FEET) =   314.50
 FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.30
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      30.61
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    7.31
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 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.) =    7.31
  RAINFALL INTENSITY(INCH/HR) =   5.05
  TOTAL STREAM AREA(ACRES) =     7.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     30.61

****************************************************************************
  FLOW PROCESS FROM NODE    258.00 TO NODE    259.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    342.00
  DOWNSTREAM ELEVATION(FEET) =    341.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.078
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.159
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  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) =    341.00  DOWNSTREAM(FEET) =    323.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   574.00   CHANNEL SLOPE =  0.0314
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.319
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5500
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.27
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   2.24
  Tc(MIN.) =    9.32
  SUBAREA AREA(ACRES) =     0.90       SUBAREA RUNOFF(CFS) =    2.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.555
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   5.36
  LONGEST FLOWPATH FROM NODE    258.00 TO NODE    260.00 =     674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    264.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    323.00  DOWNSTREAM(FEET) =    314.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00   CHANNEL SLOPE =  0.0596
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.30
  FLOW VELOCITY(FEET/SEC.) =   1.99   FLOW DEPTH(FEET) =   0.07
  TRAVEL TIME(MIN.) =   1.26   Tc(MIN.) =   10.58
  LONGEST FLOWPATH FROM NODE    258.00 TO NODE    264.00 =     825.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 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.) =   10.58
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =     0.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.30

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    349.50
  DOWNSTREAM ELEVATION(FEET) =    347.50
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.006
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    80.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.735
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE    263.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  347.50  DOWNSTREAM ELEVATION(FEET) =  322.00
  STREET LENGTH(FEET) =   880.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.46
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.07
  STREET FLOW TRAVEL TIME(MIN.) =   4.24   Tc(MIN.) =   10.24
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.065
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  SUBAREA AREA(ACRES) =    1.82      SUBAREA RUNOFF(CFS) =    4.66
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =       4.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  10.90
 FLOW VELOCITY(FEET/SEC.) =  3.92   DEPTH*VELOCITY(FT*FT/SEC.) =   1.40
 LONGEST FLOWPATH FROM NODE    261.00 TO NODE    263.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    263.00 TO NODE    264.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    322.00  DOWNSTREAM(FEET) =    314.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE =  0.0435
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.92
 FLOW VELOCITY(FEET/SEC.) =   2.54   FLOW DEPTH(FEET) =   0.12
 TRAVEL TIME(MIN.) =   1.21   Tc(MIN.) =   11.45
 LONGEST FLOWPATH FROM NODE    261.00 TO NODE    264.00 =    1164.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    264.00 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.) =   11.45
 RAINFALL INTENSITY(INCH/HR) =   3.78
 TOTAL STREAM AREA(ACRES) =     1.92
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.92

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       30.61     7.31        5.053          7.66
     2        2.30    10.58        3.980          0.96
     3        4.92    11.45        3.783          1.92

 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       35.34     7.31       5.053
     2       30.96    10.58       3.980
     3       30.02    11.45       3.783

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      35.34   Tc(MIN.) =    7.31
 TOTAL AREA(ACRES) =       10.5
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 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       35.34     7.31       5.053       10.54
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    264.00 =    1242.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       29.19     9.14       4.373        8.47
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    264.00 =    1468.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      58.68       7.31        5.053
      2      59.78       9.14        4.373

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.78   Tc(MIN.) =    9.14
  TOTAL AREA(ACRES) =       19.0

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    143.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    314.00  DOWNSTREAM(FEET) =    304.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2044.00   CHANNEL SLOPE =  0.0049
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      59.78
  FLOW VELOCITY(FEET/SEC.) =   3.23   FLOW DEPTH(FEET) =   1.03
  TRAVEL TIME(MIN.) =  10.54   Tc(MIN.) =   19.69
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    143.00 =    3512.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    346.00
  DOWNSTREAM ELEVATION(FEET) =    344.70
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.571
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  344.70  DOWNSTREAM ELEVATION(FEET) =  334.40
  STREET LENGTH(FEET) =   458.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
  STREET FLOW TRAVEL TIME(MIN.) =   2.50   Tc(MIN.) =    6.07
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.697
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    4.01
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       4.37

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.63
  FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   1.18
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     523.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   330.40  DOWNSTREAM(FEET) =   328.70
  FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.012
  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.) =   5.81
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.37
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =    6.55
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.423
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    1.17   SUBAREA RUNOFF(CFS) =    5.01
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       9.17
  TC(MIN.) =    6.55

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   328.70  DOWNSTREAM(FEET) =   326.70
  FLOW LENGTH(FEET) =   195.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.17
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    7.02
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     886.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.187
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    1.06   SUBAREA RUNOFF(CFS) =    4.34
 TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =      13.11
 TC(MIN.) =    7.02

****************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   326.70  DOWNSTREAM(FEET) =   321.20
 FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.66
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.11
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    7.36
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1106.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.029
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.66   SUBAREA RUNOFF(CFS) =    2.62
 TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =      15.34
 TC(MIN.) =    7.36

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    211.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   321.20  DOWNSTREAM(FEET) =   316.60
 FLOW LENGTH(FEET) =   187.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.86
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.34
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    7.65
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    211.00 =    1293.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 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.) =    7.65
 RAINFALL INTENSITY(INCH/HR) =   4.91
 TOTAL STREAM AREA(ACRES) =     3.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.34

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
```

```
  UPSTREAM ELEVATION(FEET) =    337.40
  DOWNSTREAM ELEVATION(FEET) =    334.50
  ELEVATION DIFFERENCE(FEET) =      2.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.417
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  334.50  DOWNSTREAM ELEVATION(FEET) =  325.00
  STREET LENGTH(FEET) =   296.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.18
  STREET FLOW TRAVEL TIME(MIN.) =   1.29   Tc(MIN.) =    4.71
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    6.78
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       7.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.04
  FLOW VELOCITY(FEET/SEC.) =  4.49   DEPTH*VELOCITY(FT*FT/SEC.) =   1.65
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    208.00 =     381.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.76   SUBAREA RUNOFF(CFS) =    3.88
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =      10.91
  TC(MIN.) =    4.71

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   320.00  DOWNSTREAM(FEET) =   319.40
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.3 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.91
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    5.08
 LONGEST FLOWPATH FROM NODE    206.00 TO NODE    209.00 =     501.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.392
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.89   SUBAREA RUNOFF(CFS) =    4.49
 TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =      15.30
 TC(MIN.) =    5.08

****************************************************************************
 FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.392
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    2.22
 TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =      17.52
 TC(MIN.) =    5.08

****************************************************************************
 FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   319.40  DOWNSTREAM(FEET) =   317.50
 FLOW LENGTH(FEET) =   382.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.25
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.52
 PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =    6.10
 LONGEST FLOWPATH FROM NODE    206.00 TO NODE    210.00 =     883.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.681
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    1.22   SUBAREA RUNOFF(CFS) =    5.47
 TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      21.05
 TC(MIN.) =    6.10

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.681
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.55   SUBAREA RUNOFF(CFS) =    2.47
 TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      23.52
```

```
  TC(MIN.) =    6.10

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   317.50  DOWNSTREAM(FEET) =   316.60
  FLOW LENGTH(FEET) =   141.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.26
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.52
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    6.42
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    211.00 =    1024.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 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.) =    6.42
  RAINFALL INTENSITY(INCH/HR) =   5.49
  TOTAL STREAM AREA(ACRES) =     5.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.52

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       15.34     7.65        4.906          3.86
      2       23.52     6.42        5.494          5.24

  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       36.38     6.42       5.494
      2       36.33     7.65       4.906

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      36.38   Tc(MIN.) =    6.42
  TOTAL AREA(ACRES) =        9.1
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    211.00 =    1293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   316.60  DOWNSTREAM(FEET) =   315.20
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.91
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.38
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    6.64
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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.) =    6.64
  RAINFALL INTENSITY(INCH/HR) =   5.38
  TOTAL STREAM AREA(ACRES) =     9.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     36.38

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    213.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    333.70
  DOWNSTREAM ELEVATION(FEET) =    331.40
  ELEVATION DIFFERENCE(FEET) =      2.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.326
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    217.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  331.40  DOWNSTREAM ELEVATION(FEET) =  320.80
  STREET LENGTH(FEET) =   523.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.92
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
  STREET FLOW TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =    6.18
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.630
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    1.12      SUBAREA RUNOFF(CFS) =    4.98
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       5.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.80
  FLOW VELOCITY(FEET/SEC.) =  3.53   DEPTH*VELOCITY(FT*FT/SEC.) =   1.28
  LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =     598.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.630
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7900
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.62   SUBAREA RUNOFF(CFS) =    2.76
```

```
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       8.10
  TC(MIN.) =    6.18

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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.) =    6.18
  RAINFALL INTENSITY(INCH/HR) =   5.63
  TOTAL STREAM AREA(ACRES) =     1.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       36.38     6.64        5.375          9.10
      2        8.10     6.18        5.630          1.82

  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       42.83     6.18       5.630
      2       44.11     6.64       5.375

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      44.11   Tc(MIN.) =    6.64
  TOTAL AREA(ACRES) =       10.9
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    215.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    351.00
  DOWNSTREAM ELEVATION(FEET) =    350.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.078
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.159
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.49

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    330.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   228.00   CHANNEL SLOPE =  0.0877
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
```

```
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.897
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.38
 AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.60
 Tc(MIN.) =    7.67
 SUBAREA AREA(ACRES) =     0.71       SUBAREA RUNOFF(CFS) =    2.19
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
 TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.65

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   7.82
 LONGEST FLOWPATH FROM NODE    214.00 TO NODE    216.00 =     328.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 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.) =    7.67
 RAINFALL INTENSITY(INCH/HR) =   4.90
 TOTAL STREAM AREA(ACRES) =     0.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.65

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  21.43   RAIN INTENSITY(INCH/HOUR) =  2.52
 TOTAL AREA(ACRES) =    58.07   TOTAL RUNOFF(CFS) =     80.00

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   21.43
 RAINFALL INTENSITY(INCH/HR) =   2.52
 TOTAL STREAM AREA(ACRES) =    58.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     80.00

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        2.65     7.67        4.897          0.86
     2       80.00    21.43        2.525         58.07

 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       31.30     7.67       4.897
     2       81.37    21.43       2.525

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      81.37   Tc(MIN.) =   21.43
 TOTAL AREA(ACRES) =       58.9
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    216.00 =     598.00 FEET.

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

```
 FLOW PROCESS FROM NODE    216.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   326.90  DOWNSTREAM(FEET) =   315.20
 FLOW LENGTH(FEET) =   551.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.72
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      81.37
 PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   22.05
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =    1149.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.479
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5496
 SUBAREA AREA(ACRES) =    2.03   SUBAREA RUNOFF(CFS) =    3.17
 TOTAL AREA(ACRES) =       61.0   TOTAL RUNOFF(CFS) =      83.05
 TC(MIN.) =   22.05

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 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       83.05    22.05       2.479       60.96
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    217.00 =    1149.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       44.11     6.64       5.375       10.92
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =    1425.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      69.12       6.64        5.375
     2     103.39      22.05        2.479

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     103.39   Tc(MIN.) =   22.05
 TOTAL AREA(ACRES) =       71.9

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    218.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   307.70  DOWNSTREAM(FEET) =   304.00
 FLOW LENGTH(FEET) =   383.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.58
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     103.39
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   22.60
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    218.00 =    1808.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.439
 *USER SPECIFIED(SUBAREA):
 PAVED SURFACE RUNOFF COEFFICIENT = .8700
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5876
 SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.81
 TOTAL AREA(ACRES) =       72.3   TOTAL RUNOFF(CFS) =     103.58
 TC(MIN.) =   22.60

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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      103.58    22.60       2.439       72.26
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    218.00 =    1808.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       59.78    19.69       2.667       19.01
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    218.00 =    3512.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     150.01      19.69        2.667
     2     158.27      22.60        2.439

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     158.27   Tc(MIN.) =   22.60
 TOTAL AREA(ACRES) =       91.3

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    133.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    304.00  DOWNSTREAM(FEET) =    301.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   518.00   CHANNEL SLOPE =  0.0050
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     158.27
 FLOW VELOCITY(FEET/SEC.) =   4.52   FLOW DEPTH(FEET) =   1.79
 TRAVEL TIME(MIN.) =   1.91   Tc(MIN.) =   24.52
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    133.00 =    4030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
```

Outfall of SD Line #5

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

********************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    335.00
  DOWNSTREAM ELEVATION(FEET) =    328.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.423
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.10
  TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      1.10

********************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    323.00  DOWNSTREAM(FEET) =    315.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   732.00   CHANNEL SLOPE =  0.0100
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.077
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.31
  AVERAGE FLOW DEPTH(FEET) =   0.37   TRAVEL TIME(MIN.) =   2.83
  Tc(MIN.) =    7.26
  SUBAREA AREA(ACRES) =     1.66       SUBAREA RUNOFF(CFS) =    5.31
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       6.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.49   FLOW VELOCITY(FEET/SEC.) =   5.02
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     832.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.077
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    1.41
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       7.58
  TC(MIN.) =    7.26

********************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.26
  RAINFALL INTENSITY(INCH/HR) =   5.08
  TOTAL STREAM AREA(ACRES) =     2.37
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.58

********************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   7
```

```
------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.91   RAIN INTENSITY(INCH/HOUR) =  4.15
  TOTAL AREA(ACRES) =    27.19   TOTAL RUNOFF(CFS) =     73.41

************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.91
  RAINFALL INTENSITY(INCH/HR) =   4.15
  TOTAL STREAM AREA(ACRES) =    27.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     73.41

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.58     7.26        5.077          2.37
      2       73.41     9.91        4.152         27.19

  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       61.33     7.26       5.077
      2       79.61     9.91       4.152

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      79.61   Tc(MIN.) =    9.91
  TOTAL AREA(ACRES) =       29.6
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     832.00 FEET.

------------------------------------------------------------------------
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.40  DOWNSTREAM(FEET) =   301.40
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.81
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      79.61
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   10.01
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    133.00 =     956.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.124
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6509
  SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    1.11
  TOTAL AREA(ACRES) =       29.9   TOTAL RUNOFF(CFS) =      80.19
  TC(MIN.) =   10.01

************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  11
------------------------------------------------------------------------
```

Outfall of SD Line #4

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	80.19	10.01	4.124	29.87

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 133.00 = 956.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	158.27	24.52	2.315	91.27

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 133.00 = 4030.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	144.84	10.01	4.124
2	203.28	24.52	2.315

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 203.28 Tc(MIN.) = 24.52
TOTAL AREA(ACRES) = 121.1

****
FLOW PROCESS FROM NODE 133.00 TO NODE 133.00 IS CODE = 12

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

****
FLOW PROCESS FROM NODE 133.00 TO NODE 128.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 301.40 DOWNSTREAM(FEET) = 299.80
CHANNEL LENGTH THRU SUBAREA(FEET) = 311.00 CHANNEL SLOPE = 0.0051
CHANNEL BASE(FEET) = 16.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00
CHANNEL FLOW THRU SUBAREA(CFS) = 203.28
FLOW VELOCITY(FEET/SEC.) = 4.94 FLOW DEPTH(FEET) = 2.05
TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 25.57
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 128.00 = 4341.00 FEET.

****
FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 10

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

****
FLOW PROCESS FROM NODE 125.00 TO NODE 126.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA):
NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .9000
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 326.00
DOWNSTREAM ELEVATION(FEET) = 317.00
ELEVATION DIFFERENCE(FEET) = 9.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 1.731
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.455
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.76
TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.76

****
FLOW PROCESS FROM NODE 126.00 TO NODE 127.00 IS CODE = 51

```
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    313.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   336.00   CHANNEL SLOPE =  0.0101
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.40
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   1.65
  Tc(MIN.) =    3.38
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    2.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.686
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       2.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   3.92
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    127.00 =     436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6728
  SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.77
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       3.56
  TC(MIN.) =    3.38

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    3.38
  RAINFALL INTENSITY(INCH/HR) =   6.46
  TOTAL STREAM AREA(ACRES) =     0.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.56

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.22   RAIN INTENSITY(INCH/HOUR) =  4.07
  TOTAL AREA(ACRES) =     3.81   TOTAL RUNOFF(CFS) =     10.53

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.22
  RAINFALL INTENSITY(INCH/HR) =   4.07
  TOTAL STREAM AREA(ACRES) =     3.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.53
```

```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        3.56     3.38        6.455          0.82
     2       10.53    10.22        4.070          3.81

 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        7.04     3.38       6.455
     2       12.78    10.22       4.070

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.78   Tc(MIN.) =   10.22
 TOTAL AREA(ACRES) =        4.6
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    127.00 =     598.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   309.60  DOWNSTREAM(FEET) =   299.80
 FLOW LENGTH(FEET) =   146.00   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.) =  14.58
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.78
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   10.39
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    128.00 =     744.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.028
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6734
 SUBAREA AREA(ACRES) =    0.48   SUBAREA RUNOFF(CFS) =    1.22
 TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      13.86
 TC(MIN.) =   10.39

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 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       13.86    10.39       4.028        5.11
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    128.00 =     744.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      203.28    25.57       2.253      121.14
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    128.00 =    4341.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
```

Outfall of SD Line #3

```
     1      96.45      10.39        4.028
     2     211.04      25.57        2.253

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     211.04   Tc(MIN.) =   25.57
  TOTAL AREA(ACRES) =      126.2

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    299.80  DOWNSTREAM(FEET) =    296.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     211.04
  FLOW VELOCITY(FEET/SEC.) =   4.95   FLOW DEPTH(FEET) =   2.11
  TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =   27.85
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    113.00 =    5019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    324.00
  DOWNSTREAM ELEVATION(FEET) =    321.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.668
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.954
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    321.00  DOWNSTREAM(FEET) =    315.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   291.00   CHANNEL SLOPE =  0.0206
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.078
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.06
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.59
  Tc(MIN.) =    7.25
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.580
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.12
```

```
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   3.68
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     376.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.078
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .5800
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5800
 SUBAREA AREA(ACRES) =    0.29   SUBAREA RUNOFF(CFS) =    0.85
 TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.97
 TC(MIN.) =    7.25

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.25
 RAINFALL INTENSITY(INCH/HR) =   5.08
 TOTAL STREAM AREA(ACRES) =     0.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.97

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  21.61   RAIN INTENSITY(INCH/HOUR) =  2.51
 TOTAL AREA(ACRES) =    54.44   TOTAL RUNOFF(CFS) =     79.21

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   21.61
 RAINFALL INTENSITY(INCH/HR) =   2.51
 TOTAL STREAM AREA(ACRES) =    54.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     79.21

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.97     7.25        5.078          0.67
     2       79.21    21.61        2.511         54.44

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       28.56     7.25       5.078
     2       80.19    21.61       2.511

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      80.19   Tc(MIN.) =   21.61
 TOTAL AREA(ACRES) =       55.1
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    112.00 =     598.00 FEET.
```

```
 FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   311.00  DOWNSTREAM(FEET) =   306.80
 FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.26
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      80.19
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   21.86
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    113.00 =     810.00 FEET.

 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 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       80.19    21.86       2.493       55.11
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    113.00 =     810.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      211.04    27.85       2.132      126.25
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    113.00 =    5019.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     245.82      21.86        2.493
     2     279.62      27.85        2.132

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     279.62   Tc(MIN.) =   27.85
 TOTAL AREA(ACRES) =      181.4

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    306.80  DOWNSTREAM(FEET) =    300.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   585.00   CHANNEL SLOPE =  0.0116
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     279.62
 FLOW VELOCITY(FEET/SEC.) =   7.21   FLOW DEPTH(FEET) =   1.95
 TRAVEL TIME(MIN.) =   1.35   Tc(MIN.) =   29.20
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    105.00 =    5604.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.068
 *USER SPECIFIED(SUBAREA):
```

Outfall of SD Line #2

```
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6142
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    0.76
  TOTAL AREA(ACRES) =      181.8   TOTAL RUNOFF(CFS) =     279.62
  TC(MIN.) =   29.20
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.068
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6142
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.10
  TOTAL AREA(ACRES) =      181.9   TOTAL RUNOFF(CFS) =     279.62
  TC(MIN.) =   29.20
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE     20.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    300.00  DOWNSTREAM(FEET) =    295.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   974.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     279.62
  FLOW VELOCITY(FEET/SEC.) =   5.41   FLOW DEPTH(FEET) =   2.47
  TRAVEL TIME(MIN.) =   3.00   Tc(MIN.) =   32.20
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     20.00 =    6578.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.942
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6146
  SUBAREA AREA(ACRES) =    0.32   SUBAREA RUNOFF(CFS) =    0.54
  TOTAL AREA(ACRES) =      182.2   TOTAL RUNOFF(CFS) =     279.62
  TC(MIN.) =   32.20
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.942
  *USER SPECIFIED(SUBAREA):
  PAVED SURFACE RUNOFF COEFFICIENT = .8700
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6149
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.29
  TOTAL AREA(ACRES) =      182.4   TOTAL RUNOFF(CFS) =     279.62
  TC(MIN.) =   32.20
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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.) =   32.20
  RAINFALL INTENSITY(INCH/HR) =   1.94
  TOTAL STREAM AREA(ACRES) =   182.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    279.62

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    324.00
  DOWNSTREAM ELEVATION(FEET) =    322.50
  ELEVATION DIFFERENCE(FEET) =      1.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.169
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    77.65
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.637
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    322.50  DOWNSTREAM(FEET) =    309.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   344.00   CHANNEL SLOPE =  0.0369
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.996
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.51
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   1.27
  Tc(MIN.) =    7.44
  SUBAREA AREA(ACRES) =     0.65       SUBAREA RUNOFF(CFS) =    2.05
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       2.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   5.57
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    101.30 =     429.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.30 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   309.00  DOWNSTREAM(FEET) =   305.00
  FLOW LENGTH(FEET) =   248.00   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.) =   5.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.27
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =    8.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     677.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.690
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
 SUBAREA AREA(ACRES) =    0.27   SUBAREA RUNOFF(CFS) =    0.80
 TOTAL AREA(ACRES) =       1.0   TOTAL RUNOFF(CFS) =       2.93
 TC(MIN.) =    8.20

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.690
 *USER SPECIFIED(SUBAREA):
 NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
 SUBAREA AREA(ACRES) =    0.83   SUBAREA RUNOFF(CFS) =    2.45
 TOTAL AREA(ACRES) =       1.8   TOTAL RUNOFF(CFS) =       5.38
 TC(MIN.) =    8.20

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE     20.00 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) =   296.00
 FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.28
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.38
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    8.59
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE     20.00 =     895.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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.) =    8.59
 RAINFALL INTENSITY(INCH/HR) =   4.55
 TOTAL STREAM AREA(ACRES) =     1.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.38

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      279.62    32.20        1.942        182.35
     2        5.38     8.59        4.551          1.82

 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       80.01     8.59       4.551
     2      281.92    32.20       1.942

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     281.92   Tc(MIN.) =   32.20
 TOTAL AREA(ACRES) =      184.2
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE     20.00 =    6578.00 FEET.

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

```
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BEGINING OF ANALYSIS PA-1                                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.50
  DOWNSTREAM ELEVATION(FEET) =    317.80
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.931
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.80  DOWNSTREAM ELEVATION(FEET) =  311.90
  STREET LENGTH(FEET) =   406.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.78
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.68
  STREET FLOW TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =    8.52
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.579
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.70
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.01
  FLOW VELOCITY(FEET/SEC.) =  2.70   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     481.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     15.00 IS CODE =  31
```

```
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   309.60  DOWNSTREAM(FEET) =   308.60
  FLOW LENGTH(FEET) =   108.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.02
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    8.87
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =    8.87
  RAINFALL INTENSITY(INCH/HR) =   4.46
  TOTAL STREAM AREA(ACRES) =     0.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.02

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.40
  DOWNSTREAM ELEVATION(FEET) =    317.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.931
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  317.70  DOWNSTREAM ELEVATION(FEET) =  311.30
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   4.15   Tc(MIN.) =    9.85
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.169
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.43      SUBAREA RUNOFF(CFS) =    4.23
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.15
  FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     15.00 =     597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =    9.85
  RAINFALL INTENSITY(INCH/HR) =   4.17
  TOTAL STREAM AREA(ACRES) =     1.53
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.02     8.87        4.460          0.93
      2        4.53     9.85        4.169          1.53

  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        7.10     8.87       4.460
      2        7.35     9.85       4.169

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.35   Tc(MIN.) =    9.85
  TOTAL AREA(ACRES) =        2.5
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     15.00 =     597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   308.60  DOWNSTREAM(FEET) =   303.30
  FLOW LENGTH(FEET) =    66.00   MANNING'S N =  0.012
  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.) =  14.23
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.35
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    9.93
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =     663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.148
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
```

```
  SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    3.42
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =      10.66
  TC(MIN.) =    9.93

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    331.50
  DOWNSTREAM ELEVATION(FEET) =    326.50
  ELEVATION DIFFERENCE(FEET) =      5.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.948
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    306.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   385.00   CHANNEL SLOPE =  0.0234
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.593
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.95
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   1.30
  Tc(MIN.) =    6.24
  SUBAREA AREA(ACRES) =     0.64       SUBAREA RUNOFF(CFS) =    2.26
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       2.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   5.71
  LONGEST FLOWPATH FROM NODE     17.00 TO NODE     19.00 =     485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.593
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    1.55
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       4.16
  TC(MIN.) =    6.24

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =    6.24
 RAINFALL INTENSITY(INCH/HR) =   5.59
 TOTAL STREAM AREA(ACRES) =     1.18
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.16

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  25.61   RAIN INTENSITY(INCH/HOUR) =  2.25
 TOTAL AREA(ACRES) =   327.74   TOTAL RUNOFF(CFS) =    405.36

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   25.61
 RAINFALL INTENSITY(INCH/HR) =   2.25
 TOTAL STREAM AREA(ACRES) =   327.74
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    405.36

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        4.16     6.24        5.593          1.18
     2      405.36    25.61        2.251        327.74

 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      102.98     6.24       5.593
     2      407.03    25.61       2.251

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     407.03   Tc(MIN.) =   25.61
 TOTAL AREA(ACRES) =      328.9
 LONGEST FLOWPATH FROM NODE     13.00 TO NODE     19.00 =     597.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   307.00  DOWNSTREAM(FEET) =   303.30
 FLOW LENGTH(FEET) =   726.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  81.0 INCH PIPE IS  63.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.53
 ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     407.03
 PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =   26.50
 LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =    1323.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 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      407.03    26.50       2.201      328.92
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =    1323.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       10.66     9.93       4.148        3.62
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     16.00 =     663.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     163.11       9.93        4.148
      2     412.69      26.50        2.201

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     412.69   Tc(MIN.) =   26.50
  TOTAL AREA(ACRES) =      332.5

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.70  DOWNSTREAM(FEET) =   296.00
  FLOW LENGTH(FEET) =   137.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  64.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.56
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     412.69
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   26.67
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     20.00 =    1460.00 FEET.
****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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      412.69    26.67       2.192      332.54
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     20.00 =    1460.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      281.92    32.20       1.942      184.17
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     20.00 =    6578.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     646.19      26.67        2.192
      2     647.38      32.20        1.942

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     647.38   Tc(MIN.) =   32.20
  TOTAL AREA(ACRES) =      516.7

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  12
```

Outfall of SD Line #1

```
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    296.00  DOWNSTREAM(FEET) =    291.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   859.50   CHANNEL SLOPE =  0.0052
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     647.38
  FLOW VELOCITY(FEET/SEC.) =   7.04   FLOW DEPTH(FEET) =   3.87
  TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =   34.24
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    318.40
  DOWNSTREAM ELEVATION(FEET) =    317.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.931
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.70  DOWNSTREAM ELEVATION(FEET) =  312.30
  STREET LENGTH(FEET) =   393.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.51
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.30
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   2.57   Tc(MIN.) =    8.27
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.665
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
 SUBAREA AREA(ACRES) =    1.25      SUBAREA RUNOFF(CFS) =    4.14
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       4.47

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.96
 FLOW VELOCITY(FEET/SEC.) =  2.89   DEPTH*VELOCITY(FT*FT/SEC.) =   1.06
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   307.60  DOWNSTREAM(FEET) =   305.00
 FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.78
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.47
 PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =    9.04
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =     733.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 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.) =    9.04
 RAINFALL INTENSITY(INCH/HR) =   4.41
 TOTAL STREAM AREA(ACRES) =     1.35
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.47

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    318.50
 DOWNSTREAM ELEVATION(FEET) =    317.80
 ELEVATION DIFFERENCE(FEET) =      0.70
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.931
 SUBAREA RUNOFF(CFS) =      0.42
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  317.80  DOWNSTREAM ELEVATION(FEET) =  310.60
 STREET LENGTH(FEET) =   614.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.00

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

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.14
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =   4.44   Tc(MIN.) =   10.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.090
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.16      SUBAREA RUNOFF(CFS) =    3.37
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       3.66

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.34
  FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE     33.00 TO NODE     35.00 =     689.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.090
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    0.68   SUBAREA RUNOFF(CFS) =    1.97
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       5.63
  TC(MIN.) =   10.14

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 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.) =   10.14
  RAINFALL INTENSITY(INCH/HR) =   4.09
  TOTAL STREAM AREA(ACRES) =     1.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.63

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.47     9.04        4.407          1.35
      2        5.63    10.14        4.090          1.94

  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        9.49     9.04       4.407
      2        9.78    10.14       4.090

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.78   Tc(MIN.) =   10.14
  TOTAL AREA(ACRES) =        3.3
```

 LONGEST FLOWPATH FROM NODE   30.00 TO NODE   35.00 =   733.00 FEET.

****
 FLOW PROCESS FROM NODE   35.00 TO NODE   36.00 IS CODE = 31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) =   305.00 DOWNSTREAM(FEET) =   304.10
 FLOW LENGTH(FEET) =   180.00   MANNING'S N = 0.012
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.38
 ESTIMATED PIPE DIAMETER(INCH) = 21.00   NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   9.78
 PIPE TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   10.70
 LONGEST FLOWPATH FROM NODE   30.00 TO NODE   36.00 =   913.00 FEET.

****
 FLOW PROCESS FROM NODE   36.00 TO NODE   36.00 IS CODE = 81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.951
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
 SUBAREA AREA(ACRES) =   1.04   SUBAREA RUNOFF(CFS) =   2.92
 TOTAL AREA(ACRES) =   4.3   TOTAL RUNOFF(CFS) =   12.15
 TC(MIN.) =   10.70

****
 FLOW PROCESS FROM NODE   36.00 TO NODE   39.00 IS CODE = 31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) =   304.10 DOWNSTREAM(FEET) =   303.90
 FLOW LENGTH(FEET) =   31.00   MANNING'S N = 0.012
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.18
 ESTIMATED PIPE DIAMETER(INCH) = 21.00   NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   12.15
 PIPE TRAVEL TIME(MIN.) =   0.08   Tc(MIN.) =   10.78
 LONGEST FLOWPATH FROM NODE   30.00 TO NODE   39.00 =   944.00 FEET.

****
 FLOW PROCESS FROM NODE   39.00 TO NODE   39.00 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.) =   10.78
 RAINFALL INTENSITY(INCH/HR) =   3.93
 TOTAL STREAM AREA(ACRES) =   4.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   12.15

****
 FLOW PROCESS FROM NODE   37.00 TO NODE   38.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   75.00
 UPSTREAM ELEVATION(FEET) =   317.50
 DOWNSTREAM ELEVATION(FEET) =   315.70
 ELEVATION DIFFERENCE(FEET) =   1.80
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   4.541
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.455
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

```
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  315.70  DOWNSTREAM ELEVATION(FEET) =  310.60
  STREET LENGTH(FEET) =   508.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   3.86   Tc(MIN.) =    8.40
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.619
  *USER SPECIFIED(SUBAREA):
  DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7100
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    1.12      SUBAREA RUNOFF(CFS) =    3.67
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       3.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.12
  FLOW VELOCITY(FEET/SEC.) =  2.50   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE     37.00 TO NODE     39.00 =     583.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =    8.40
  RAINFALL INTENSITY(INCH/HR) =   4.62
  TOTAL STREAM AREA(ACRES) =     1.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.97

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       12.15    10.78        3.932          4.33
      2        3.97     8.40        4.619          1.21

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.31     8.40       4.619
      2       15.53    10.78       3.932

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      15.53   Tc(MIN.) =   10.78
```

```
  TOTAL AREA(ACRES) =        5.5
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     39.00 =     944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.50  DOWNSTREAM(FEET) =   296.00
  FLOW LENGTH(FEET) =   116.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.53
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   11.12
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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       15.53    11.12       3.855        5.54
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1060.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      647.38    34.24       1.866      516.71
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     225.80      11.12        3.855
      2     654.90      34.24        1.866

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     654.90   Tc(MIN.) =   34.24
  TOTAL AREA(ACRES) =      522.2

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   34.24
  RAINFALL INTENSITY(INCH/HR) =   1.87
  TOTAL STREAM AREA(ACRES) =   522.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    654.90

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    334.00
  DOWNSTREAM ELEVATION(FEET) =    314.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.927
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.455
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    314.00  DOWNSTREAM(FEET) =    301.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   521.00   CHANNEL SLOPE =  0.0250
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.587
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.73
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   2.33
  Tc(MIN.) =    6.25
  SUBAREA AREA(ACRES) =     0.27       SUBAREA RUNOFF(CFS) =    0.95
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.20
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     43.00 =     621.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     40.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   301.00  DOWNSTREAM(FEET) =   300.50
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.41
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =    6.79
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     40.00 =     721.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.299
  *USER SPECIFIED(SUBAREA):
  NORMAL RESIDENTIAL (R1) RUNOFF COEFFICIENT = .6300
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6300
  SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    1.54
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.87
  TC(MIN.) =    6.79

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    6.79
  RAINFALL INTENSITY(INCH/HR) =   5.30
  TOTAL STREAM AREA(ACRES) =     0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.87

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      654.90    34.24        1.866        522.25
      2        2.87     6.79        5.299          0.86

  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      132.75     6.79       5.299
      2      655.91    34.24       1.866

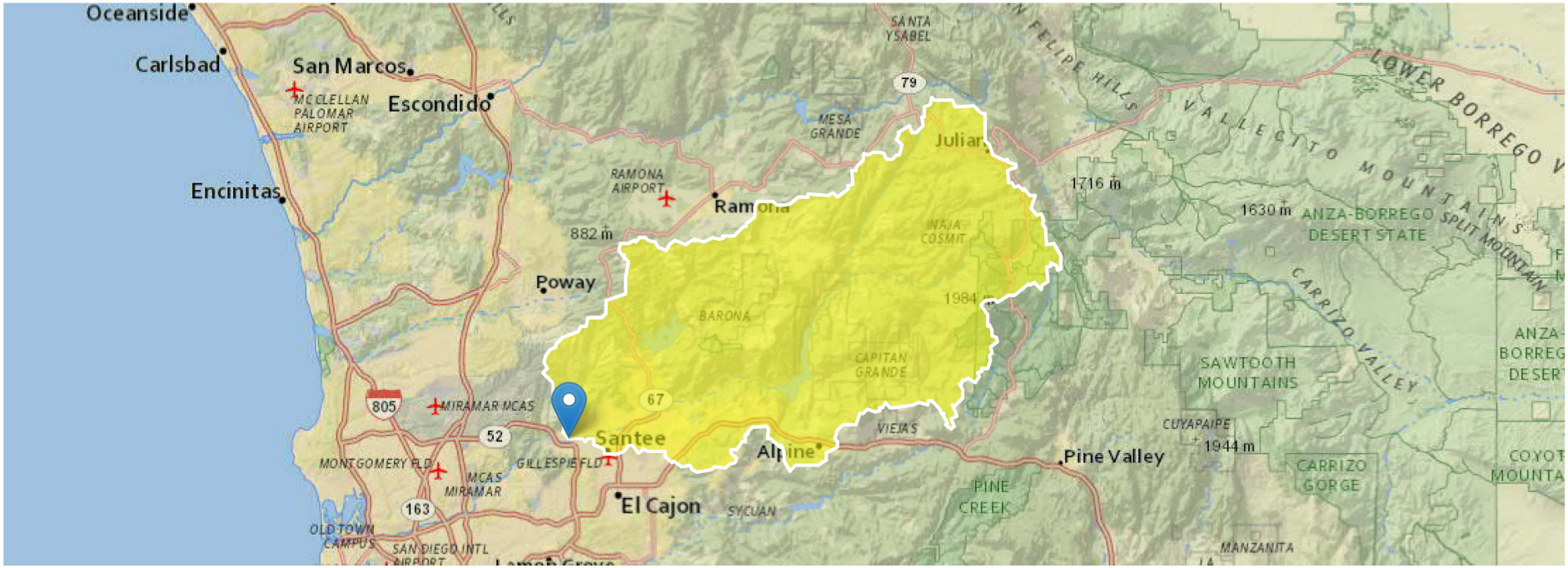
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     655.91   Tc(MIN.) =   34.24
  TOTAL AREA(ACRES) =      523.1
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE     40.00 =    7437.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      523.1  TC(MIN.) =     34.24
  PEAK FLOW RATE(CFS)   =     655.91
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

STREAM STATS REPORTS TO CACULATE THE AREA OF THE MAIN STEM

StreamStats Report

AREA OF THE MAIN STEM AT NODE 218

Region ID: CA
Workspace ID: CA20230426221609201000
Clicked Point (Latitude, Longitude): 32.84141, -117.01133
Time: 2023-04-26 15:16:33 -0700



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	339.4	square miles
ELEVMAX	Maximum basin elevation	6492	feet
LFPLENGTH	Length of longest flow path	40	miles

Parameter Code	Parameter Description	Value	Unit
MINBELEV	Minimum basin elevation	311	feet
PRECIP	Mean Annual Precipitation	21.1	inches

Peak-Flow Statistics

Peak-Flow Statistics Parameters [2012 5113 Region 5 South Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	339.4	square miles	0.04	850
PRECIP	Mean Annual Precipitation	21.1	inches	10	45

Peak-Flow Statistics Flow Report [2012 5113 Region 5 South Coast]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	ASEp
50-percent AEP flood	1800	ft^3/s	331	9790	134
20-percent AEP flood	7870	ft^3/s	2350	26300	83.1
10-percent AEP flood	16400	ft^3/s	6150	43700	64
4-percent AEP flood	33600	ft^3/s	14800	76100	51.5
2-percent AEP flood	52200	ft^3/s	24500	111000	47.6
1-percent AEP flood	75200	ft^3/s	35100	161000	47.2
0.5-percent AEP flood	105000	ft^3/s	48400	228000	47.7
0.2-percent AEP flood	149000	ft^3/s	65400	340000	52

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

Application Version: 4.14.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

StreamStats Report

Region ID: CA
Workspace ID: CA20230419191028196000
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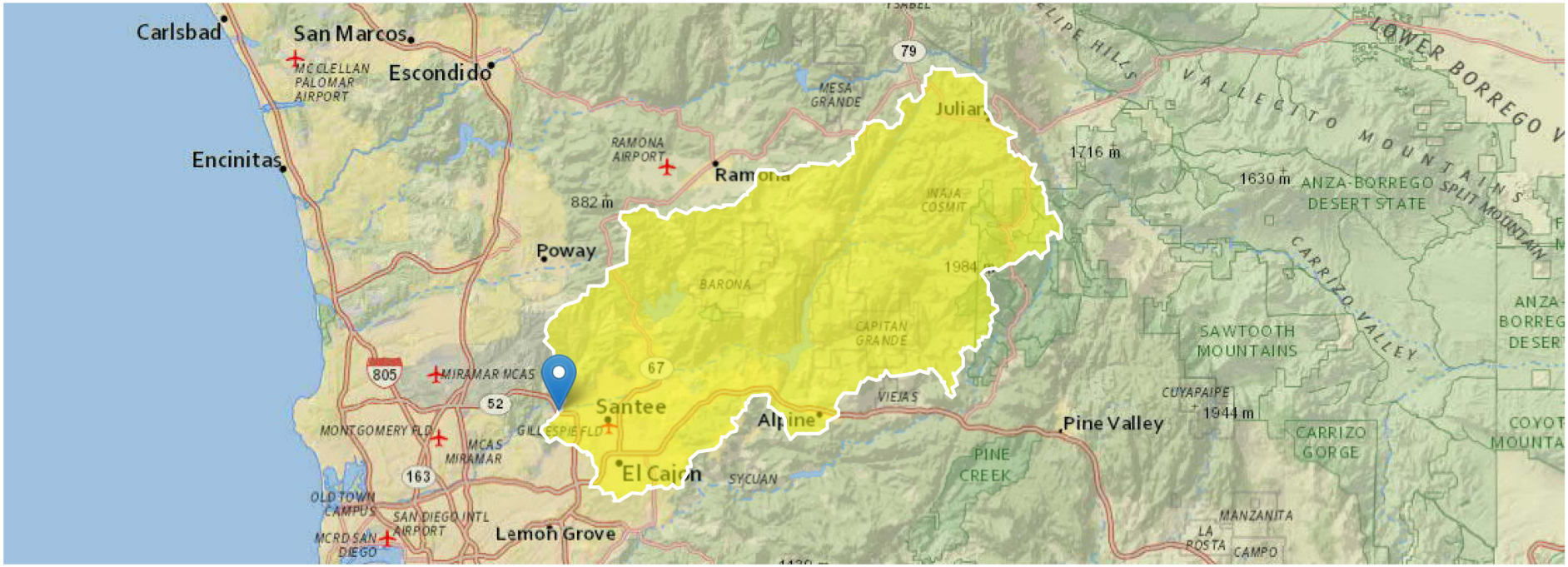
Time: 2023-04-19 12:10:51 -0700

AREA OF THE MAIN STEM AT NODE 20



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Peak-Flow Statistics

Peak-Flow Statistics Parameters [2012 5113 Region 5 South Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	367.5	square miles	0.04	850
PRECIP	Mean Annual Precipitation	20.6	inches	10	45

Peak-Flow Statistics Flow Report [2012 5113 Region 5 South Coast]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	ASEp
50-percent AEP flood	1860	ft^3/s	341	10100	134
20-percent AEP flood	8170	ft^3/s	2440	27400	83.1
10-percent AEP flood	17000	ft^3/s	6370	45400	64
4-percent AEP flood	34800	ft^3/s	15400	78900	51.5
2-percent AEP flood	54000	ft^3/s	25300	115000	47.6
1-percent AEP flood	77700	ft^3/s	36200	167000	47.2
0.5-percent AEP flood	108000	ft^3/s	49700	235000	47.7
0.2-percent AEP flood	154000	ft^3/s	67500	352000	52

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

Application Version: 4.14.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

Exhibit B

Public Storm Drain – Hydraflow Express
Bypass System 100-Year
Rip-rap Sizing

PLEASE SEE DRAINAGE EXHIBITS 1, 2, 5, AND 6 FOR STORM DRAIN LINE PLAN VIEW AND ID#

$$H_L = K_c \left(\frac{v_2^2 - v_1^2}{2g} \right) \qquad (3\text{-}15)$$

where …

K_c = contraction loss coefficient ($0.5K_e$ or Table 3-7)
v_1, v_2 = upstream and downstream flow velocity, respectively (ft/s);
g = gravitational acceleration (32.2 ft/s^2)

Table 3-7 Contraction Loss Coefficients Under Open Channel Conditions

D_2/D_1	Contraction Loss Coefficient, K_c
approaching 0	0.5
0.4	0.4
0.6	0.3
0.8	0.1
1.0	0.0

Expansion Losses – Pressure Flow

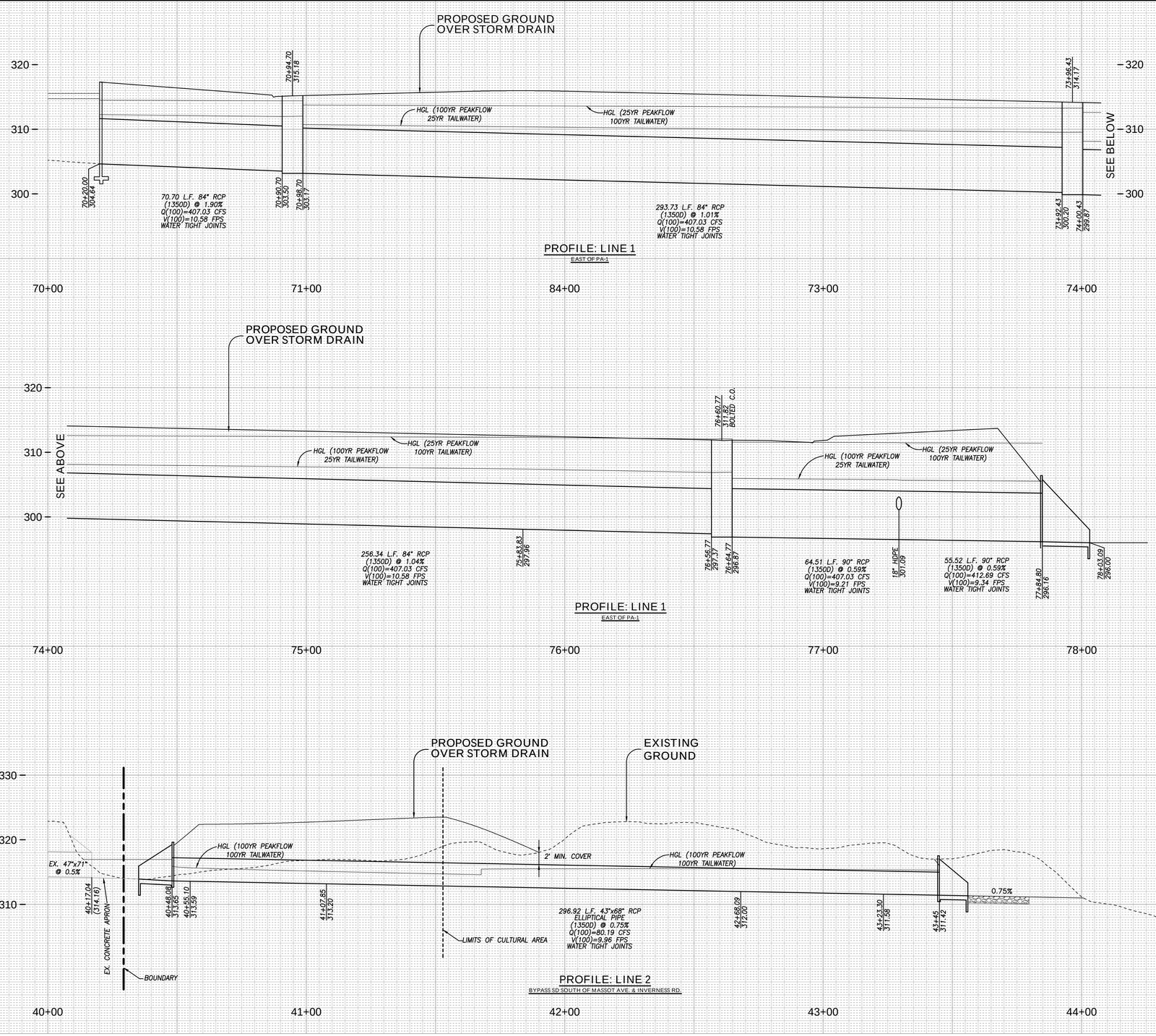
Expansion of the flow area in a storm drain under submerged conditions will result in a shearing action between the incoming high velocity jet and the surrounding conduit boundary. As a result, eddy currents and turbulence dissipate much of the kinetic energy. The head loss is expressed as:

$$H_L = K_E \frac{v_1^2}{2g} \qquad (3\text{-}16)$$

where …

v_1 = upstream flow velocity (ft/s);
K_E = expansion loss coefficient, pressure flow (Table 3-8 and Table 3-9).

The value of the expansion loss coefficient (K_E) varies from approximately 1.0 for a sudden expansion to 0.2 for a well-designed expansion transition. Table 3-8 and Table 3-9 present loss coefficients for pressure flow conditions for sudden and gradual expansions, respectively.



PROFILE SCALES

HORIZ. :	1"=20'
VERT. :	1"=8'

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC.

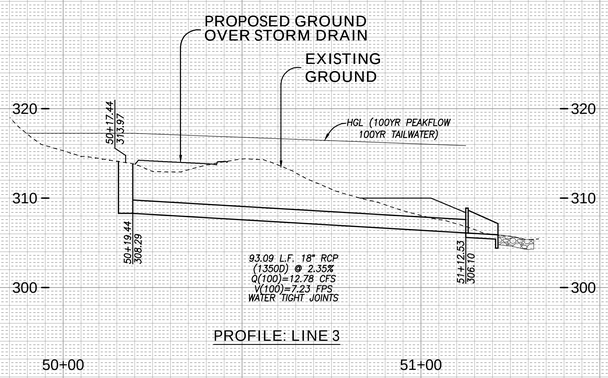
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 · FX(858)558-1414

PRELIMINARY BYPASS STORM DRAIN DESIGN EXHIBITS

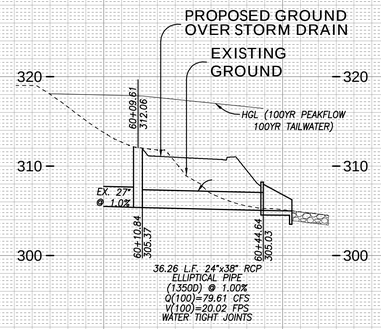
CARLTON OAKS

CITY OF SANTEE, CALIFORNIA

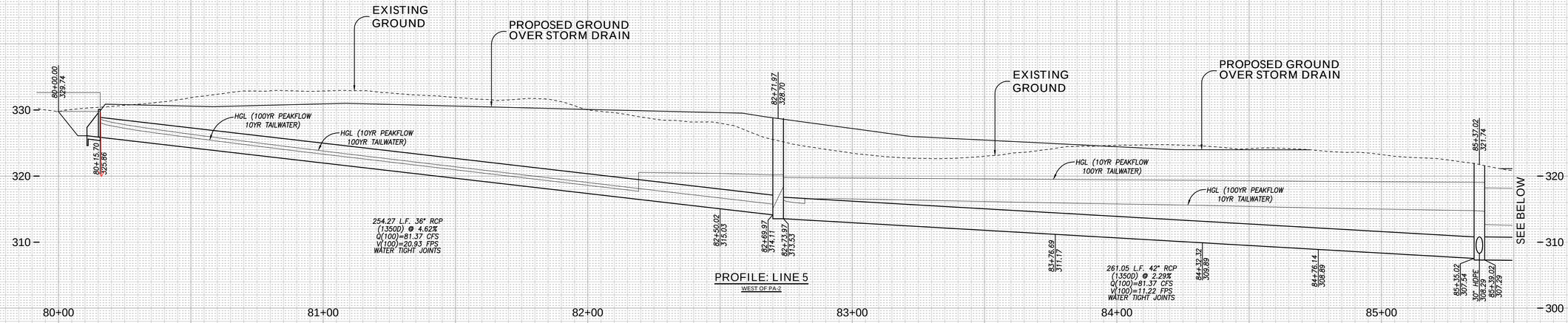
R:\1759\Hyd\DR\CAD\SD Profiles.dwg[]Dec-15-2023:18:15



PROFILE: LINE 3

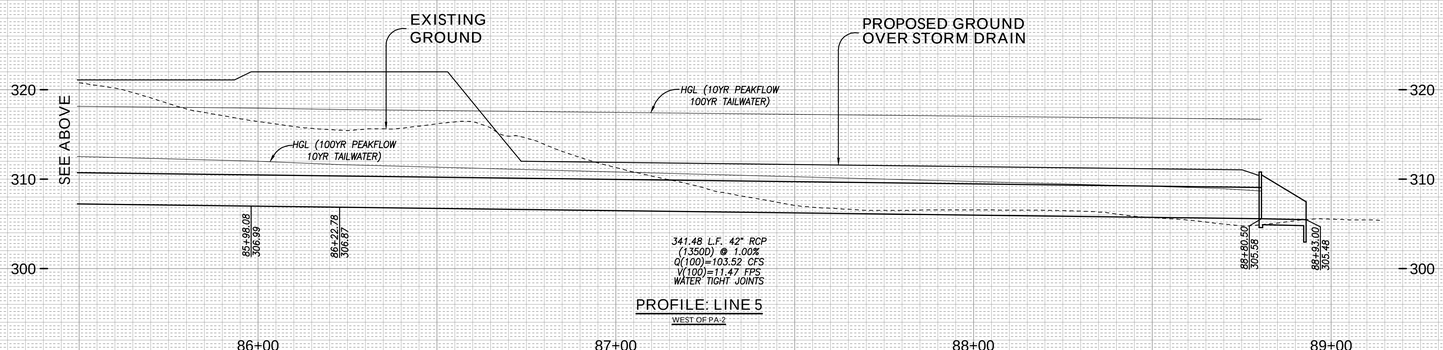


PROFILE: LINE 4



PROFILE: LINE 5

WEST OF PA-2



PROFILE: LINE 5

WEST OF PA-2

PROFILE SCALES

HORIZ. : 1"=20'

VERT. : 1"=8'

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING 9707 Waples Street
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SURVEYING PH(858)558-4500 FX(858)558-1414

PRELIMINARY BYPASS STORM DRAIN DESIGN EXHIBITS

CARLTON OAKS

CITY OF SANTEE, CALIFORNIA

R:\1759\Hyd\DR\CAD\SD Profiles.dwg[]Dec-15-2023:18:15

SD LINE #1 25-YR TAILWATER WSEL (25-YR BSI was not available, 50-YR FEMA WSEL was used instead and is being referred to as the "25-YR TAILWATER WSEL"):

HEC-RAS NODE DOWNSTREAM = 250, ELEVATION = 304.98'
HEC-RAS NODE UPSTREAM = 260, ELEVATION = 307.19'
DISTANCE BETWEEN HEC-RAS NODES = 1031'
DISCTANCE FROM DOWNSTREAM NODE = 250'
25-YR WSEL = 305.52'
`

SD LINE #1 100-YR TAILWATER WSEL:

HEC-RAS NODE DOWNSTREAM = 250, ELEVATION = 311.00'
HEC-RAS NODE UPSTREAM = 260, ELEVATION = 312.61'
DISTANCE BETWEEN HEC-RAS NODES = 1031'
DISCTANCE FROM DOWNSTREAM NODE = 250'
100-YR WSEL = 311.39'

SD LINE #2 100-YR TAILWATER WSEL:

HEC-RAS NODE DOWNSTREAM = 270, ELEVATION = 314.99'
HEC-RAS NODE UPSTREAM = 280, ELEVATION = 316.44'
DISTANCE BETWEEN HEC-RAS NODES = 1021'
DISCTANCE FROM DOWNSTREAM NODE = 233'
100-YR WSEL = 315.32'

SD LINE #3 100-YR TAILWATER WSEL:

HEC-RAS NODE DOWNSTREAM = 270, ELEVATION = 314.99'
HEC-RAS NODE UPSTREAM = 280, ELEVATION = 316.44'
DISTANCE BETWEEN HEC-RAS NODES = 1021'
DISCTANCE FROM DOWNSTREAM NODE = 623'
100-YR WSEL = 315.87'

SD LINE #4 100-YR TAILWATER WSEL:

HEC-RAS NODE = 280, ELEVATION = 316.44'
100-YR WSEL = 316.44'

SD LINE #5 10-YR TAILWATER WSEL:

HEC-RAS NODE DOWNSTREAM = 280, ELEVATION = 307.68'
HEC-RAS NODE UPSTREAM = 285, ELEVATION = 308.88'
DISTANCE BETWEEN HEC-RAS NODES = 446'
DISCTANCE FROM DOWNSTREAM NODE = 688'
10-YR WSEL = 308.49'

SD LINE #5 100-YR TAILWATER WSEL:

HEC-RAS NODE DOWNSTREAM = 280, ELEVATION = 316.44'
HEC-RAS NODE UPSTREAM = 285, ELEVATION = 316.83'
DISTANCE BETWEEN HEC-RAS NODES = 446'
DISCTANCE FROM DOWNSTREAM NODE = 688'
100-YR WSEL = 316.70'

50-Year FEMA (used as 25-Year tailwater as a conservative approach for SD Line-1)

HEC-RAS Plan: Plan 01 River: San Diego River Reach: Reach 1 Profile: PF 5

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	220	PF 5	19000.00	288.80	300.76	294.29	300.84	0.000468	2.02	8671.03	1604.48	0.12
Reach 1	230	PF 5	19000.00	289.80	301.03	296.06	301.19	0.001218	3.17	5991.57	1261.34	0.20
Reach 1	239	PF 5	19000.00	290.70	301.65	297.86	301.94	0.002182	4.20	4413.12	1121.95	0.26
Reach 1	242	PF 5	19000.00	291.70	302.17	297.28	302.55	0.002718	4.92	3858.19	456.59	0.30
Reach 1	243		Bridge									
Reach 1	244	PF 5	19000.00	292.20	302.68	297.44	303.00	0.002194	4.53	4194.57	680.98	0.27
Reach 1	245	PF 5	19000.00	291.03	303.25	299.03	303.49	0.005356	3.99	4866.45	747.85	0.26
Line 1 Reach 1	250	PF 5	19000.00	294.72	304.98		305.24	0.001451	4.15	4712.45	726.26	0.27
Reach 1	260	PF 5	19000.00	295.59	307.19		307.69	0.004230	5.68	3391.52	606.68	0.41
Reach 1	270	PF 5	17000.00	297.09	309.72	305.41	310.01	0.001495	4.31	3975.48	597.35	0.29
Reach 1	280	PF 5	17000.00	298.83	311.06		311.15	0.000838	2.46	6923.94	1414.94	0.20
Reach 1	285	PF 5	17000.00	301.64	311.69	308.76	311.83	0.001130	2.97	5720.73	1404.16	0.26
Reach 1	290	PF 5	17000.00	301.71	312.39	309.38	312.52	0.000996	2.92	5813.70	1506.19	0.25
Reach 1	300	PF 5	16311.79	305.19	313.16	310.14	313.33	0.001542	3.31	4952.59	1218.04	0.27
Reach 1	310	PF 5	16311.79	305.25	313.88	310.72	314.38	0.001577	5.72	3129.69	1142.73	0.40
Reach 1	315	PF 5	16311.79	307.53	314.33	313.87	315.45	0.008742	8.73	2020.45	1062.65	0.85
Reach 1	320	PF 5	16311.79	307.20	316.20	312.27	316.46	0.000964	4.08	3998.74	1288.00	0.31
Reach 1	322		Lat Struct									
Reach 1	330	PF 5	16000.00	308.50	316.87	314.60	317.18	0.001522	4.54	3703.58	902.74	0.37
Reach 1	340	PF 5	16000.00	309.90	317.73	314.16	317.92	0.001638	3.43	4667.79	1011.04	0.27
Reach 1	345	PF 5	16000.00	309.80	318.22	314.19	318.40	0.001260	3.38	4732.60	816.11	0.25
Reach 1	355	PF 5	16000.00	311.40	318.63	315.25	318.91	0.001975	4.21	3799.89	911.43	0.31

100-Year BSI Flows

HEC-RAS Plan: Plan 01 River: San Diego River Reach: Reach 1 Profile: PF 3

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	220	PF 3	50000.00	288	307.13	297.37	307.28	0.000362	2.60	17024.01	1773.44	0.12
Reach 1	230	PF 3	50000.00	289.80	307.28	299.08	307.57	0.000870	3.94	12310.10	1545.51	0.18
Reach 1	239	PF 3	50000.00	290.70	307.63	300.56	308.19	0.001760	5.46	8514.67	1224.73	0.26
Reach 1	242	PF 3	50000.00	291.70	308.02	300.88	308.91	0.003408	7.56	6614.34	485.40	0.36
Reach 1	243		Bridge									
Reach 1	244	PF 3	50000.00	292.20	308.81	300.87	309.55	0.002637	6.93	7210.64	964.85	0.32
Reach 1	245	PF 3	50000.00	291.03	309.63	301.75	310.07	0.004117	5.34	9507.84	797.41	0.26
Reach 1	250	PF 3	50000.00	294.72	311.00		311.46	0.001175	5.61	9561.11	908.95	0.27
Reach 1	260	PF 3	50000.00	295.59	312.61		313.47	0.003243	7.54	6861.59	691.27	0.40
Reach 1	270	PF 3	49000.00	297.09	314.99	308.89	315.60	0.001623	6.51	8472.83	1044.80	0.33
Reach 1	280	PF 3	49000.00	298.83	316.44		316.61	0.000611	3.35	14678.53	1474.87	0.19
Reach 1	285	PF 3	49000.00	301.64	316.83	310.92	317.04	0.000603	3.67	13408.43	1520.45	0.22
Reach 1	290	PF 3	49000.00	301.71	317.23	311.58	317.45	0.000646	3.80	12899.38	1601.69	0.23
Reach 1	300	PF 3	46848.73	305.19	317.73	312.34	318.07	0.001342	4.68	10183.53	1504.49	0.27
Reach 1	310	PF 3	46848.73	305.25	318.37	315.08	319.17	0.001864	7.52	7061.91	1490.74	0.46
Reach 1	315	PF 3	46848.73	307.53	318.96	316.91	319.90	0.003084	8.19	6430.67	1493.37	0.57
Reach 1	320	PF 3	46848.73	307.20	320.12	315.71	320.78	0.001438	6.52	7184.77	1758.27	0.40
Reach 1	322		Lat Struct									
Reach 1	330	PF 3	48000.00	308.50	320.99	317.23	321.68	0.001596	6.87	7349.11	1062.59	0.42
Reach 1	340	PF 3	48000.00	309.90	322.04	317.07	322.49	0.001809	5.39	8901.04	1069.10	0.32
Reach 1	345	PF 3	48000.00	309.80	322.68	317.04	323.12	0.001920	5.27	9105.89	1163.00	0.32
Reach 1	355	PF 3	48000.00	311.40	323.21	318.35	323.88	0.002630	6.57	7307.35	1455.01	0.39

Line 1

Line 2 &3

Line 5

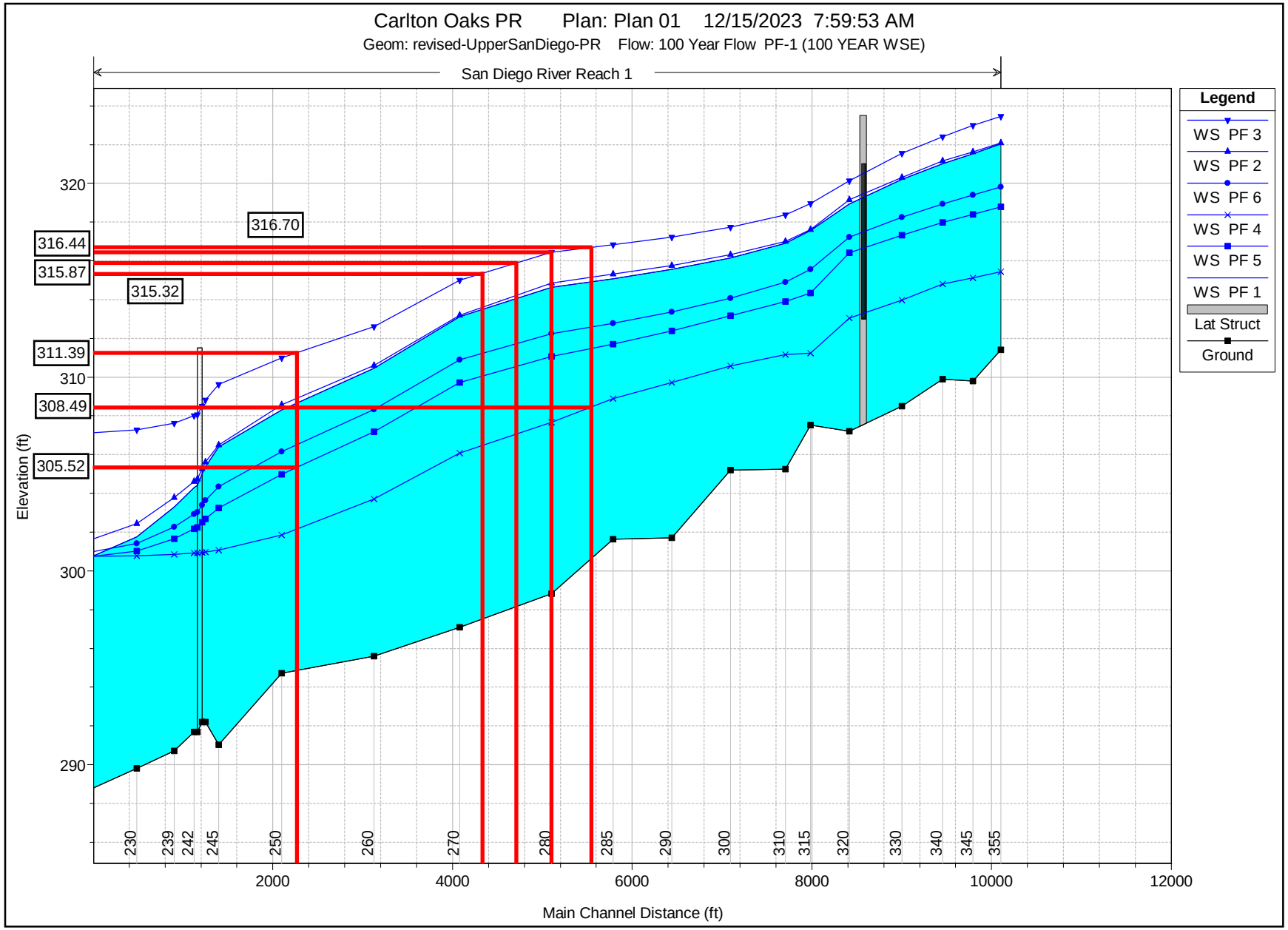
Line 4

10-Year For Line 5

HEC-RAS Plan: Plan 01 River: San Diego River Reach: Reach 1 Profile: PF 4

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	220	PF 4	5500.00	288.80	300.76	292.51	300.77	0.000039	0.58	8671.03	1604.48	0.04
Reach 1	230	PF 4	5500.00	289.80	300.78	294.28	300.80	0.000116	0.96	5754.35	1258.10	0.06
Reach 1	239	PF 4	5500.00	290.70	300.85	295.07	300.88	0.000276	1.40	3887.02	1112.45	0.09
Reach 1	242	PF 4	5500.00	291.70	300.92	294.97	300.96	0.000380	1.67	3289.39	450.42	0.11
Reach 1	243		Bridge									
Reach 1	244	PF 4	5500.00	292.20	300.98	295.29	301.02	0.000369	1.62	3384.82	671.93	0.11
Reach 1	245	PF 4	5500.00	291.03	301.08	297.23	301.12	0.001488	1.67	3351.20	714.34	0.13
Reach 1	250	PF 4	5500.00	294.72	301.86		301.94	0.000919	2.27	2486.74	679.69	0.20
Reach 1	260	PF 4	5500.00	295.59	303.71		303.95	0.006055	3.91	1408.16	548.29	0.43
Reach 1	270	PF 4	5000.00	297.09	306.09	302.86	306.19	0.001164	2.55	1961.24	504.67	0.23
Reach 1	280	PF 4	5000.00	298.83	307.68		307.74	0.002069	2.09	2388.37	1214.66	0.26
Reach 1	285	PF 4	5000.00	301.64	308.88	306.74	308.96	0.001527	2.26	2216.50	1028.49	0.27
Reach 1	290	PF 4	5000.00	301.71	309.73	307.48	309.80	0.001079	2.06	2426.91	1118.59	0.24
Reach 1	300	PF 4	5000.00	305.19	310.56	308.80	310.63	0.001528	2.11	2366.37	1019.84	0.23
Reach 1	310	PF 4	5000.00	305.25	311.15	308.43	311.29	0.000766	3.04	1646.68	423.73	0.26
Reach 1	315	PF 4	5000.00	307.53	311.22	310.97	312.04	0.010647	7.36	697.51	313.65	0.88
Reach 1	320	PF 4	5000.00	307.20	312.79	309.72	312.90	0.000741	2.70	1854.65	673.59	0.25
Reach 1	322		Lat Struct									
Reach 1	330	PF 4	4500.00	308.50	313.47	312.33	313.76	0.003829	4.35	1086.41	603.66	0.52
Reach 1	340	PF 4	4500.00	309.90	314.65	312.47	314.73	0.001308	2.22	2026.18	714.27	0.23
Reach 1	345	PF 4	4500.00	309.80	315.03	311.87	315.09	0.000889	1.95	2313.10	705.70	0.19
Reach 1	355	PF 4	4500.00	311.40	315.38	313.28	315.48	0.001781	2.60	1727.46	645.32	0.27

Line 5


Carlton Oaks PR Plan: Plan 01 12/15/2023 7:59:53 AM
Geom: revised-UpperSanDiego-PR Flow: 100 Year Flow PF-1 (100 YEAR WSE)
San Diego River Reach 1
316.70
316.44
315.87
315.32
311.39
308.49
305.52
Elevation (ft)
320
310
300
290
230
239
242
245
250
260
270
280
285
290
300
310
315
320
330
340
345
355
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)
Legend
WS PF 3
WS PF 2
WS PF 6
WS PF 4
WS PF 5
WS PF 1
Lat Struct
Ground

STORM DRAIN LINE 1
100 YR PEAK FLOWS
25 YR TAILWATER ELEVATION

(25-YR BSI was not available, 50-YR FEMA WSEL was used instead and is being referred to as the "25-YR TAILWATER WSEL")

```
T1 Carlton Oaks                                                          0
T2 Bypass Storm Drain
T3 Line 1
SO  -7784.800 296.160  1                          305.520
R   -7730.280 296.480  1      .013                              .000    .000 0
JX  -7728.280 296.492  3  2   .013    5.660          301.090     90.0         .000
R   -7664.770 296.873  3      .013                              .000    .000 0
WE  -7664.770 296.873  4      .063
R   -7656.770 297.370  4      .013                              .000
WX  -7656.770 297.370  5
R   -7583.830 297.960  5      .013                            46.000    .000 0
R   -7400.430 299.871  5      .013                              .000    .000 0
WE  -7400.430 299.871  6      .063
R   -7392.430 300.200  6      .013                              .000
WX  -7392.430 300.200  7
R   -7098.700 303.170  7      .013                              .000    .000 0
WE  -7098.700 303.170  8      .063
R   -7090.700 303.500  8      .013                              .000  90.000 0
WX  -7090.700 303.500  9
R   -7020.000 304.640  9      .013                              .000    .000 0
WE  -7020.000 304.640 10      .500
SH  -7020.000 304.640  9                          304.640
CD   1  4   1    .000   7.500     .000  .000  .000   .00
CD   2  4   1    .000   1.500     .000  .000  .000   .00
CD   3  4   1    .000   7.500     .000  .000  .000   .00
CD   4  2   0    .000  14.540    8.000  .000  .000   .00
CD   5  4   1    .000   7.000     .000  .000  .000   .00
CD   6  2   0    .000  14.060    8.000  .000  .000   .00
CD   7  4   1    .000   7.000     .000  .000  .000   .00
CD   8  2   0    .000  14.132    8.000  .000  .000   .00
CD   9  4   1    .000   7.000     .000  .000  .000   .00
CD  10  2   0    .000  12.400   16.000  .000  .000   .00
Q           407.030   .0
```

Per table 3-7 of the San Diego County Hydraulic Design Manual:
Kc = 0.063
Given that when Line diameter is 7.5' the cleanout is 8.5' and when line is 7', the cleanout is 8'.
7.5/8.5= 0.88
7.0/8.0= 0.88

Program Package Serial Number: 7111

WATER SURFACE PROFILE LISTING Date:12-15-2023 Time:11:34:29

Carlton Oaks
Bypass Storm Drain
Line 1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-7784.800	296.160	9.360	305.520	412.69	9.34	1.35	306.87	.00	5.26	.00	7.500	.000	.00	1 .0
54.520	.0059					.0029	.16	9.36	.00	4.63	.013	.00	.00	PIPE
-7730.280	296.480	9.197	305.677	412.69	9.34	1.35	307.03	.00	5.26	.00	7.500	.000	.00	1 .0
JUNCT STR	.0060					.0028	.01	9.20	.00		.013	.00	.00	PIPE
-7728.280	296.492	9.265	305.757	407.03	9.21	1.32	307.08	.00	5.23	.00	7.500	.000	.00	1 .0
63.510	.0060					.0028	.18	9.26	.00	4.56	.013	.00	.00	PIPE
-7664.770	296.873	9.062	305.935	407.03	9.21	1.32	307.25	.00	5.23	.00	7.500	.000	.00	1 .0
WALL	ENTRANCE													
-7664.770	296.873	10.040	306.913	407.03	5.07	.40	307.31	.00	4.32	8.00	14.540	8.000	.00	0 .0
6.936	.0621					.0005	.00	10.04	.28	1.62	.013	.00	.00	RECTANG
-7657.834	297.304	9.572	306.876	407.03	5.32	.44	307.32	.00	4.32	8.00	14.540	8.000	.00	0 .0
1.064	.0621					.0005	.00	9.57	.30	1.62	.013	.00	.00	RECTANG
-7656.770	297.370	9.500	306.870	407.03	5.36	.45	307.32	.08	4.32	8.00	14.540	8.000	.00	0 .0
WALL	EXIT													
-7656.770	297.370	9.501	306.871	407.03	10.58	1.74	308.61	.00	5.31	.00	7.000	.000	.00	1 .0
72.940	.0081					.0041	.30	.00	.00	4.35	.013	.00	.00	PIPE
-7583.830	297.960	9.456	307.416	407.03	10.58	1.74	309.15	.00	5.31	.00	7.000	.000	.00	1 .0
183.400	.0104					.0041	.74	9.46	.00	4.01	.013	.00	.00	PIPE

Program Package Serial Number: 7111

WATER SURFACE PROFILE LISTING Date:12-15-2023 Time:11:34:29

Carlton Oaks
Bypass Storm Drain
Line 1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-7400.430	299.871	8.289	308.160	407.03	10.58	1.74	309.90	.00	5.31	.00	7.000	.000	.00	1 .0
WALL	ENTRANCE													
-7400.430	299.871	9.679	309.550	407.03	5.26	.43	309.98	.00	4.32	8.00	14.060	8.000	.00	0 .0
8.000	.0411					.0006	.00	9.68	.30	1.87	.013	.00	.00	RECTANG
-7392.430	300.200	9.321	309.521	407.03	5.46	.46	309.98	.00	4.32	8.00	14.060	8.000	.00	0 .0
WALL	EXIT													
-7392.430	300.200	9.322	309.522	407.03	10.58	1.74	311.26	.00	5.31	.00	7.000	.000	.00	1 .0
293.730	.0101					.0041	1.19	9.32	.00	4.04	.013	.00	.00	PIPE
-7098.700	303.170	7.545	310.715	407.03	10.58	1.74	312.45	.00	5.31	.00	7.000	.000	.00	1 .0
WALL	ENTRANCE													
-7098.700	303.170	8.844	312.014	407.03	5.75	.51	312.53	.00	4.32	8.00	14.132	8.000	.00	0 .0
8.000	.0412					.0007	.01	8.84	.34	1.87	.013	.00	.00	RECTANG
-7090.700	303.500	8.475	311.975	407.03	6.00	.56	312.53	.00	4.32	8.00	14.132	8.000	.00	0 .0
WALL	EXIT													
-7090.700	303.500	8.475	311.975	407.03	10.58	1.74	313.71	.00	5.31	.00	7.000	.000	.00	1 .0
70.700	.0161					.0041	.29	8.48	.00	3.51	.013	.00	.00	PIPE
-7020.000	304.640	7.622	312.262	407.03	10.58	1.74	314.00	.00	5.31	.00	7.000	.000	.00	1 .0
WALL	ENTRANCE													

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch

```
            |          |         |          |          |                |          |        |         |         |        |        |       |
 -7020.000   304.640   10.079   314.719    407.03    2.52     .10   314.82     .00    2.72    16.00   12.400   16.000   .00   0   .0
          -|-        -|-       -|-        -|-        -|-      -|-      -|-        -|-      -|-       -|-       -|-      -|-      -|-     |-
```

STORM DRAIN LINE 1
25 YR PEAK FLOWS
100 YR TAILWATER
ELEVATION

```
T1 Carlton Oaks                                                                0
T2 Bypass Storm Drain
T3 Line 1
SO  -7784.800 296.160  1                          311.390
R   -7730.280 296.480  1      .013                                .000    .000 0
JX  -7728.280 296.492  3  2   .013    4.270          301.090        90.0         .000
R   -7664.770 296.873  3      .013                                .000    .000 0
WE  -7664.770 296.873  4      .063
R   -7656.770 297.370  4      .013                                .000
WX  -7656.770 297.370  5
R   -7583.830 297.960  5      .013                              46.000    .000 0
R   -7400.430 299.871  5      .013                                .000    .000 0
WE  -7400.430 299.871  6      .063
R   -7392.430 300.200  6      .013                                .000
WX  -7392.430 300.200  7
R   -7098.700 303.170  7      .013                                .000    .000 0
WE  -7098.700 303.170  8      .063
R   -7090.700 303.500  8      .013                                .000  90.000 0
WX  -7090.700 303.500  9
R   -7020.000 304.640  9      .013                                .000    .000 0
WE  -7020.000 304.640 10      .500
SH  -7020.000 304.640  9                          304.640
CD   1  4   1    .000   7.500     .000  .000  .000   .00
CD   2  4   1    .000   1.500     .000  .000  .000   .00
CD   3  4   1    .000   7.500     .000  .000  .000   .00
CD   4  2   0    .000  14.540    8.000  .000  .000   .00
CD   5  4   1    .000   7.000     .000  .000  .000   .00
CD   6  2   0    .000  14.060    8.000  .000  .000   .00
CD   7  4   1    .000   7.000     .000  .000  .000   .00
CD   8  2   0    .000  14.132    8.000  .000  .000   .00
CD   9  4   1    .000   7.000     .000  .000  .000   .00
CD  10  2   0    .000  12.400   16.000  .000  .000   .00
Q           262.420   .0
```

Per table 3-7 of the San Diego County Hydraulic Design Manual:
Kc = 0.063
Given that when Line diameter is 7.5' the cleanout is 8.5' and when line is 7', the cleanout is 8'.
7.5/8.5= 0.88
7.0/8.0= 0.88

Carlton Oaks
Bypass Storm Drain
Line 1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-7784.800	296.160	15.230	311.390	266.69	6.04	.57	311.96	.00	4.20	.00	7.500	.000	.00	1 .0
54.520	.0059					.0012	.07	15.23	.00	3.54	.013	.00	.00	PIPE
-7730.280	296.480	14.976	311.456	266.69	6.04	.57	312.02	.00	4.20	.00	7.500	.000	.00	1 .0
JUNCT STR	.0060					.0012	.00	14.98	.00		.013	.00	.00	PIPE
-7728.280	296.492	15.002	311.494	262.42	5.94	.55	312.04	.00	4.16	.00	7.500	.000	.00	1 .0
63.510	.0060					.0012	.07	15.00	.00	3.49	.013	.00	.00	PIPE
-7664.770	296.873	14.695	311.568	262.42	5.94	.55	312.12	.00	4.16	.00	7.500	.000	.00	1 .0
WALL	ENTRANCE													
-7664.770	296.873	15.200	312.073	262.42	2.16	.07	312.15	.00	3.22	8.00	14.540	8.000	.00	0 .0
8.000	.0621					.0001	.00	15.20	.10	1.21	.013	.00	.00	RECTANG
-7656.770	297.370	14.699	312.069	262.42	2.23	.08	312.15	.01	3.22	8.00	14.540	8.000	.00	0 .0
WALL	EXIT													
-7656.770	297.370	14.700	312.070	262.42	6.82	.72	312.79	.00	4.25	.00	7.000	.000	.00	1 .0
72.940	.0081					.0017	.12	.00	.00	3.32	.013	.00	.00	PIPE
-7583.830	297.960	14.336	312.296	262.42	6.82	.72	313.02	.00	4.25	.00	7.000	.000	.00	1 .0
183.400	.0104					.0017	.31	14.34	.00	3.09	.013	.00	.00	PIPE
-7400.430	299.871	12.735	312.606	262.42	6.82	.72	313.33	.00	4.25	.00	7.000	.000	.00	1 .0
WALL	ENTRANCE													

Carlton Oaks
Bypass Storm Drain
Line 1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-7400.430	299.871	13.404	313.275	262.42	2.45	.09	313.37	.00	3.22	8.00	14.060	8.000	.00	0 .0
8.000	.0411					.0001	.00	13.40	.12	1.39	.013	.00	.00	RECTANG
-7392.430	300.200	13.071	313.271	262.42	2.51	.10	313.37	.00	3.22	8.00	14.060	8.000	.00	0 .0
WALL	EXIT													
-7392.430	300.200	13.072	313.272	262.42	6.82	.72	313.99	.00	4.25	.00	7.000	.000	.00	1 .0
293.730	.0101					.0017	.50	13.07	.00	3.12	.013	.00	.00	PIPE
-7098.700	303.170	10.598	313.768	262.42	6.82	.72	314.49	.00	4.25	.00	7.000	.000	.00	1 .0
WALL	ENTRANCE													
-7098.700	303.170	11.224	314.394	262.42	2.92	.13	314.53	.00	3.22	8.00	14.132	8.000	.00	0 .0
8.000	.0412					.0002	.00	11.22	.15	1.39	.013	.00	.00	RECTANG
-7090.700	303.500	10.887	314.387	262.42	3.01	.14	314.53	.00	3.22	8.00	14.132	8.000	.00	0 .0
WALL	EXIT													
-7090.700	303.500	10.888	314.388	262.42	6.82	.72	315.11	.00	4.25	.00	7.000	.000	.00	1 .0
70.700	.0161					.0017	.12	10.89	.00	2.74	.013	.00	.00	PIPE
-7020.000	304.640	9.867	314.507	262.42	6.82	.72	315.23	.00	4.25	.00	7.000	.000	.00	1 .0
WALL	ENTRANCE													
-7020.000	304.640	10.898	315.538	262.42	1.51	.04	315.57	.00	2.03	16.00	12.400	16.000	.00	0 .0

STORM DRAIN LINE 2
100 YR PEAK FLOWS
100 YR TAILWATER
ELEVATION

```
T1 Carlton Oaks                                                          0
T2 Bypass Storm Drain
T3 Line 2
SO  -4345.000 311.420  1                        315.320
R   -4323.300 311.580  1      .013                          00.000    .000 0
R   -4268.090 312.000  1      .013                         -26.000    .000 0
R   -4107.850 313.200  1      .013                          00.000    .000 0
R   -4055.100 313.595  1      .013                          34.000    .000 0
R   -4048.080 313.650  1      .013                             .000    .000 0
WE  -4048.080    .000  2      .100
SH  -4048.080 313.650  1                        313.650
CD   2  2   0    .000   6.000    7.000  .000  .000   .00
CD   1  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
PTS  116 10.000   .000 11.090   .140 12.000   .530 12.620  1.110 12.830  1.790
PTS      12.620  2.480 12.000  3.060 11.090  3.450 10.000  3.580  8.910  3.450
PTS       8.000  3.060  7.380  2.480  7.170  1.790  7.380  1.110  8.000   .530
PTS       8.910   .140
Q            80.190   .0
```

Per table 3-7 of the San Diego County Hydraulic Design Manual:
Kc = 0.1
Given that when Line diameter is 5.67' and the wall is 7'
5.67/7= 0.81

Carlton Oaks
Bypass Storm Drain
Line 2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-4345.000	311.420	3.900	315.320	80.19	5.16	.41	315.73	.00	2.24	.00		1		0 .0
21.700	.0074					.0019	.04	3.90	.00	1.804	.013			IR-COV
-4323.300	311.580	3.781	315.361	80.19	5.16	.41	315.77	.00	2.24	.00		1		0 .0
41.847	.0076					.0019	.08	.00	.00	1.789	.013			IR-COV
-4281.453	311.898	3.580	315.478	80.19	5.16	.41	315.89	3.58	2.24	.00		1		0 .0
13.363	.0076					.0019	.03	3.58	.00	1.789	.013			IR-COV
-4268.090	312.000	3.498	315.498	80.19	5.18	.42	315.92	.00	2.24	1.37		1		0 .0
40.799	.0075					.0017	.07	3.50	.27	1.796	.013			IR-COV
-4227.291	312.306	3.217	315.522	80.19	5.44	.46	315.98	.00	2.24	3.27		1		0 .0
23.813	.0075					.0016	.04	3.22	.45	1.796	.013			IR-COV
-4203.478	312.484	3.031	315.515	80.19	5.70	.50	316.02	.00	2.24	4.06		1		0 .0
18.165	.0075					.0017	.03	3.03	.54	1.796	.013			IR-COV
-4185.313	312.620	2.876	315.496	80.19	5.98	.56	316.05	.00	2.24	4.39		1		0 .0
14.719	.0075					.0018	.03	2.88	.60	1.796	.013			IR-COV
-4170.594	312.730	2.739	315.469	80.19	6.27	.61	316.08	.00	2.24	4.69		1		0 .0
2.927	.0075					.0020	.01	2.74	.67	1.796	.013			IR-COV
-4167.667	312.752	2.711	315.463	80.19	6.34	.62	316.09	.00	2.24	4.75		1		0 .0

HYDRAULIC JUMP

Carlton Oaks
Bypass Storm Drain
Line 2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-4167.667	312.752	1.845	314.597	80.19	9.96	1.54	316.14	.00	2.24	5.63		1		0 .0
59.817	.0075					.0065	.39	1.85	1.47	1.796	.013			IR-COV
-4107.850	313.200	1.900	315.100	80.19	9.59	1.43	316.53	.23	2.24	5.59		1		0 .0
14.280	.0075					.0060	.09	2.13	1.38	1.796	.013			IR-COV
-4093.571	313.307	1.925	315.232	80.19	9.43	1.38	316.61	.23	2.24	5.58		1		0 .0
25.374	.0075					.0055	.14	2.15	1.35	1.796	.013			IR-COV
-4068.197	313.497	2.000	315.497	80.19	8.99	1.26	316.75	.20	2.24	5.53		1		0 .0
13.096	.0075					.0048	.06	2.20	1.25	1.796	.013			IR-COV
-4055.100	313.595	2.079	315.674	80.19	8.57	1.14	316.82	.00	2.24	5.48		1		0 .0
5.267	.0078					.0042	.02	2.08	1.16	1.774	.013			IR-COV
-4049.833	313.636	2.154	315.790	80.19	8.21	1.05	316.84	.00	2.24	5.44		1		0 .0
1.753	.0078					.0038	.01	2.15	1.08	1.774	.013			IR-COV
-4048.080	313.650	2.243	315.893	80.19	7.83	.95	316.84	.00	2.24	5.38		1		0 .0
WALL	ENTRANCE													
-4048.080	313.650	3.325	316.975	80.19	3.45	.18	317.16	.00	1.60	7.00	6.000	7.000	.00	0 .0

STORM DRAIN LINE 3
100 YR PEAK FLOWS
100 YR TAILWATER
ELEVATION

```
T1 Carlton Oaks                                                          0
T2 Bypass Storm Drain
T3 Line 3
SO  -5112.530 306.100  1                          315.870
R   -5019.440 308.290  1      .013                                .000    .000 0
SH  -5017.440 308.290  1                          308.290
CD   1  4   1    .000   1.500     .000  .000  .000   .00

Q            12.780   .0
```

Program Package Serial Number: 7111

WATER SURFACE PROFILE LISTING Date:12-15-2023 Time:11:39:22

Carlton Oaks
Bypass Storm Drain
Line 3

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-5112.530	306.100	9.770	315.870	12.78	7.23	.81	316.68	.00	1.34	.00	1.500	.000	.00	1 .0
93.090	.0235					.0148	1.38	9.77	.00	1.01	.013	.00	.00	PIPE
-5019.440	308.290	8.958	317.248	12.78	7.23	.81	318.06	.00	1.34	.00	1.500	.000	.00	1 .0
2.000	.0235					.0188	1.75	8.96	.00	1.01	.013	.00	.00	PIPE
-5017.440	308.290	8.958	317.248	12.78	7.23	.81	318.06	.00	1.34	.00	1.500	.000	.00	1 .0

STORM DRAIN LINE 4
100 YR PEAK FLOWS
100 YR TAILWATER
ELEVATION

```
T1 Carlton Oaks                                                          0
T2 Bypass Storm Drain
T3 Line 4
SO  -6044.640 305.030  1                          316.440
R   -6010.840 305.370  1      .013                                .000    .000 0
                                          WX  -6008.380 305.395  4

SH  -6008.380 305.395  4                          305.395
CD   2  2   0    .000   6.680    4.000  .000  .000   .00
CD   3  2   0    .000   6.680    4.000  .000  .000   .00
CD   4  4   1    .000   2.250     .000  .000  .000   .00
CD   1  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
PTS  116  2.000   .000  2.610   .080  3.120   .290  3.460   .620  3.580  1.000
PTS       3.460  1.380  3.120  1.710  2.610  1.920  2.000  2.000  1.390  1.920
PTS        .880  1.710   .540  1.380   .420  1.000   .540   .620   .880   .290
PTS       1.390   .080
Q            79.610   .0
```

Program Package Serial Number: 7111

WATER SURFACE PROFILE LISTING Date:12-15-2023 Time:11:40:19

Carlton Oaks
Bypass Storm Drain
Line 4

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-6044.640	305.030	11.410	316.440	79.61	16.46	4.21	320.65	.00	1.96	.00		1		0 .0
33.800	.0101					.0416	1.41	11.41	.00	1.900	.013			IR-COV
-6010.840	305.370	12.476	317.846	79.61	16.46	4.21	322.05	.00	1.96	.00		1		0 .0
2.460	.0101					.0208	125.02	12.48	.00	1.900	.013			IR-COV
-6008.380	305.395	12.476	317.871	79.61	20.02	6.23	324.10	.00	2.24	.00	2.250	.000	.00	1 .0

STORM DRAIN LINE 5
100 YR PEAK FLOWS
10 YR TAILWATER
ELEVATION

```
T1  Carlton Oaks                                                          0
T2  Bypass Storm Drain
T3  Line 5
SO  -8880.500 305.580  1                        308.490
R   -8622.780 306.870  1      .013                        00.000    .000 0
R   -8598.080 306.994  1      .013                       -14.000    .000 0
R   -8539.020 307.290  1      .013                          .000    .000 0
WE  -8539.020 307.290  3      .200
JX  -8535.020 307.540  3  2   .013   22.150          308.290         90.0       28.000
WX  -8535.020 307.540  4
R   -8476.140 308.890  4      .013                        00.000    .000 0
R   -8432.320 309.890  4      .013                       -25.000    .000 0
R   -8379.690 311.170  4      .013                        00.000    .000 0
R   -8273.970 313.530  4      .013                       -25.000    .000 0
WE  -8273.970 313.530  5      .150
JX  -8269.970 314.110  6      .013
WX  -8269.970 314.110  7
R   -8250.020 315.030  7      .013                       -25.000    .000 0
R   -8015.700 325.860  7      .013                        00.000    .000 0
WE  -8015.700 325.860  8      .150
SH  -8015.700 325.860  7                        325.860
CD   1  4   1    .000   3.500     .000  .000  .000   .00
CD   2  4   1    .000   2.500     .000  .000  .000   .00
CD   3  2   0    .000  14.450    5.000  .000  .000   .00
CD   4  4   1    .000   3.500     .000  .000  .000   .00
CD   5  2   0    .000  14.940    4.000  .000  .000   .00
CD   6  2   0    .000  14.940    4.000  .000  .000   .00
CD   7  4   1    .000   3.000     .000  .000  .000   .00
CD   8  2   0    .000   6.000    4.000  .000  .000   .00
Q            81.370   .0
```

Per table 3-7 of the San Diego County Hydraulic Design Manual:
Kc = 0.200 and 0.150
Given that when Line diameter is 3.5' the cleanout is 5' and when line is 3', the cleanout is 4'.
3.5/5= 0.70
3/4= 0.75

Carlton Oaks
Bypass Storm Drain
Line 5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-8880.500	305.580	3.106	308.686	103.52	11.47	2.04	310.73	.00	3.11	2.21	3.500	.000	.00	1 .0
11.606	.0050					.0093	.11	3.11	1.00	3.50	.013	.00	.00	PIPE
-8868.894	305.638	3.342	308.980	103.52	10.94	1.86	310.84	.00	3.11	1.45	3.500	.000	.00	1 .0
21.290	.0050					.0096	.21	3.34	.76	3.50	.013	.00	.00	PIPE
-8847.604	305.745	3.500	309.245	103.52	10.76	1.80	311.04	.00	3.11	.00	3.500	.000	.00	1 .0
224.823	.0050					.0103	2.33	3.50	.00	3.50	.013	.00	.00	PIPE
-8622.780	306.870	4.755	311.625	103.52	10.76	1.80	313.42	.00	3.11	.00	3.500	.000	.00	1 .0
24.700	.0050					.0106	.26	.00	.00	3.50	.013	.00	.00	PIPE
-8598.080	306.994	5.034	312.028	103.52	10.76	1.80	313.83	.00	3.11	.00	3.500	.000	.00	1 .0
59.061	.0050					.0106	.63	5.03	.00	3.50	.013	.00	.00	PIPE
-8539.020	307.290	5.363	312.653	103.52	10.76	1.80	314.45	.00	3.11	.00	3.500	.000	.00	1 .0
WALL ENTRANCE														
-8539.020	307.290	7.374	314.664	103.52	2.81	.12	314.79	.15	2.37	5.00	14.450	5.000	.00	0 .0
JUNCT STR	.0625					.0002	.00	7.52	.18		.013	.00	.00	RECTANG
-8535.020	307.540	7.235	314.775	81.37	2.25	.08	314.85	.00	2.02	5.00	14.450	5.000	.00	0 .0
WALL EXIT														
-8535.020	307.540	7.235	314.775	81.37	8.46	1.11	315.89	.00	2.82	.00	3.500	.000	.00	1 .0
58.880	.0229					.0065	.39	7.24	.00	1.82	.013	.00	.00	PIPE

Carlton Oaks
Bypass Storm Drain
Line 5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-8476.140	308.890	6.270	315.160	81.37	8.46	1.11	316.27	.00	2.82	.00	3.500	.000	.00	1 .0
43.819	.0228					.0065	.29	.00	.00	1.82	.013	.00	.00	PIPE
-8432.320	309.890	5.674	315.564	81.37	8.46	1.11	316.67	.00	2.82	.00	3.500	.000	.00	1 .0
52.630	.0243					.0065	.34	5.67	.00	1.79	.013	.00	.00	PIPE
-8379.690	311.170	4.738	315.908	81.37	8.46	1.11	317.02	.00	2.82	.00	3.500	.000	.00	1 .0
85.106	.0223					.0065	.55	.00	.00	1.83	.013	.00	.00	PIPE
-8294.584	313.070	3.500	316.570	81.37	8.46	1.11	317.68	3.50	2.82	.00	3.500	.000	.00	1 .0
12.574	.0223					.0061	.08	3.50	.00	1.83	.013	.00	.00	PIPE
-8282.010	313.351	3.192	316.543	81.37	8.84	1.21	317.76	.02	2.82	1.98	3.500	.000	.00	1 .0
HYDRAULIC JUMP														
-8282.010	313.351	2.468	315.819	81.37	11.22	1.95	317.77	.05	2.82	3.19	3.500	.000	.00	1 .0
4.044	.0223					.0088	.04	2.52	1.31	1.83	.013	.00	.00	PIPE
-8277.966	313.441	2.559	316.000	81.37	10.79	1.81	317.81	.05	2.82	3.10	3.500	.000	.00	1 .0
2.996	.0223					.0079	.02	2.61	1.22	1.83	.013	.00	.00	PIPE
-8274.970	313.508	2.681	316.188	81.37	10.29	1.64	317.83	.04	2.82	2.96	3.500	.000	.00	1 .0
1.000	.0223					.0071	.01	2.72	1.11	1.83	.013	.00	.00	PIPE
-8273.970	313.530	2.816	316.346	81.37	9.81	1.49	317.84	.03	2.82	2.78	3.500	.000	.00	1 .0
WALL ENTRANCE														

Program Package Serial Number: 7111

WATER SURFACE PROFILE LISTING Date:12-15-2023 Time:11:46: 8

Carlton Oaks
Bypass Storm Drain
Line 5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch

```
-8273.970   313.530    4.895   318.425     81.37    4.16     .27   318.69     .00    2.34     4.00   14.940    4.000   .00   0   .0
JUNCT STR   .1450                                                              4.90     .33            .013      .00   .00  RECTANG
-8269.970   314.110     .972   315.082     81.37   20.93    6.81   321.89    1.19    2.34     4.00   14.940    4.000   .00   0   .0
 WALL  EXIT
-8269.970   314.110    1.650   315.760     81.37   20.43    6.48   322.24     .85    2.78     2.98    3.000     .000   .00   1   .0
   19.950    .0461                                          .0431      .86    2.50    3.12    1.62     .013      .00   .00  PIPE
-8250.020   315.030    1.657   316.687     81.37   20.32    6.41   323.10     .00    2.78     2.98    3.000     .000   .00   1   .0
   32.178    .0462                                          .0422     1.36    1.66    3.09    1.62     .013      .00   .00  PIPE
-8217.842   316.517    1.672   318.189     81.37   20.10    6.27   324.46     .00    2.78     2.98    3.000     .000   .00   1   .0
   71.377    .0462                                          .0392     2.80    1.67    3.04    1.62     .013      .00   .00  PIPE
-8146.464   319.816    1.738   321.554     81.37   19.16    5.70   327.26     .00    2.78     2.96    3.000     .000   .00   1   .0
   38.629    .0462                                          .0346     1.34    1.74    2.82    1.62     .013      .00   .00  PIPE
-8107.835   321.602    1.809   323.410     81.37   18.27    5.18   328.59     .00    2.78     2.94    3.000     .000   .00   1   .0
   25.478    .0462                                          .0306      .78    1.81    2.61    1.62     .013      .00   .00  PIPE
-8082.358   322.779    1.883   324.662     81.37   17.42    4.71   329.37     .00    2.78     2.90    3.000     .000   .00   1   .0
   18.336    .0462                                          .0272      .50    1.88    2.42    1.62     .013      .00   .00  PIPE
-8064.022   323.627    1.962   325.589     81.37   16.61    4.28   329.87     .00    2.78     2.85    3.000     .000   .00   1   .0
   13.810    .0462                                          .0241      .33    1.96    2.23    1.62     .013      .00   .00  PIPE
```


Program Package Serial Number: 7111

WATER SURFACE PROFILE LISTING Date:12-15-2023 Time:11:46: 8

Carlton Oaks
Bypass Storm Drain
Line 5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-8050.212	324.265	2.047	326.312	81.37	15.84	3.89	330.21	.00	2.78	2.79	3.000	.000	.00	1 .0
10.644	.0462					.0215	.23	2.05	2.06	1.62	.013	.00	.00	PIPE
-8039.568	324.757	2.138	326.895	81.37	15.10	3.54	330.44	.00	2.78	2.72	3.000	.000	.00	1 .0

```
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
    8.264    .0462                                          .0192      .16     2.14    1.89    1.62    .013       .00   .00  PIPE
          |         |        |         |         |              |         |       |       |       |       |       |       |      |
 -8031.304   325.139    2.237   327.375     81.37   14.40    3.22   330.59     .00    2.78    2.61    3.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
    6.365    .0462                                          .0172      .11     2.24    1.73    1.62    .013       .00   .00  PIPE
          |         |        |         |         |              |         |       |       |       |       |       |       |      |
 -8024.939   325.433    2.345   327.778     81.37   13.73    2.93   330.70     .00    2.78    2.48    3.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
    4.729    .0462                                          .0156      .07     2.34    1.56    1.62    .013       .00   .00  PIPE
          |         |        |         |         |              |         |       |       |       |       |       |       |      |
 -8020.211   325.651    2.466   328.117     81.37   13.09    2.66   330.78     .00    2.78    2.30    3.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
    3.181    .0462                                          .0142      .05     2.47    1.40    1.62    .013       .00   .00  PIPE
          |         |        |         |         |              |         |       |       |       |       |       |       |      |
 -8017.030   325.799    2.606   328.404     81.37   12.48    2.42   330.82     .00    2.78    2.03    3.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
    1.330    .0462                                          .0132      .02     2.61    1.23    1.62    .013       .00   .00  PIPE
          |         |        |         |         |              |         |       |       |       |       |       |       |      |
 -8015.700   325.860    2.783   328.643     81.37   11.90    2.20   330.84     .00    2.78    1.55    3.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
 WALL  ENTRANCE
          |         |        |         |         |              |         |       |       |       |       |       |       |      |
 -8015.700   325.860    6.758   332.618     81.37    3.01     .14   332.76     .00    2.34    4.00    6.000    4.000   .00   0   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
```

STORM DRAIN LINE 5
10 YR PEAK FLOWS
100 YR TAILWATER
ELEVATION

```
T1  Carlton Oaks                                                          0
T2  Bypass Storm Drain
T3  Line 5
SO  -8880.500 305.580  1                        316.700
R   -8622.780 306.870  1      .013                        00.000    .000 0
R   -8598.080 306.994  1      .013                       -14.000    .000 0
R   -8539.020 307.290  1      .013                          .000    .000 0
WE  -8539.020 307.290  3      .200
JX  -8535.020 307.540  3  2   .013   15.460          308.290         90.0       28.000
WX  -8535.020 307.540  4
R   -8476.140 308.890  4      .013                        00.000    .000 0
R   -8432.320 309.890  4      .013                       -25.000    .000 0
R   -8379.690 311.170  4      .013                        00.000    .000 0
R   -8273.970 313.530  4      .013                       -25.000    .000 0
WE  -8273.970 313.530  5      .150
JX  -8269.970 314.110  6      .013
WX  -8269.970 314.110  7
R   -8250.020 315.030  7      .013                       -25.000    .000 0
R   -8015.700 325.860  7      .013                        00.000    .000 0
WE  -8015.700 325.860  8      .150
SH  -8015.700 325.860  7                        325.860
CD   1  4   1    .000   3.500     .000  .000  .000   .00
CD   2  4   1    .000   2.500     .000  .000  .000   .00
CD   3  2   0    .000  14.450    5.000  .000  .000   .00
CD   4  4   1    .000   3.500     .000  .000  .000   .00
CD   5  2   0    .000  14.940    4.000  .000  .000   .00
CD   6  2   0    .000  14.940    4.000  .000  .000   .00
CD   7  4   1    .000   3.000     .000  .000  .000   .00
CD   8  2   0    .000   6.000    4.000  .000  .000   .00
Q            49.830   .0
```

Per table 3-7 of the San Diego County Hydraulic Design Manual:
Kc = 0.200 and 0.150
Given that when Line diameter is 3.5' the cleanout is 5' and when line is 3', the cleanout is 4'.
3.5/5= 0.70
3/4= 0.75

Carlton Oaks
Bypass Storm Drain
Line 5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-8880.500	305.580	11.120	316.700	65.29	6.79	.72	317.42	.00	2.53	.00	3.500	.000	.00	1 .0
257.720	.0050					.0042	1.09	11.12	.00	2.64	.013	.00	.00	PIPE
-8622.780	306.870	10.915	317.785	65.29	6.79	.72	318.50	.00	2.53	.00	3.500	.000	.00	1 .0
24.700	.0050					.0042	.10	.00	.00	2.64	.013	.00	.00	PIPE
-8598.080	306.994	10.952	317.946	65.29	6.79	.72	318.66	.00	2.53	.00	3.500	.000	.00	1 .0
59.061	.0050					.0042	.25	10.95	.00	2.64	.013	.00	.00	PIPE
-8539.020	307.290	10.904	318.194	65.29	6.79	.72	318.91	.00	2.53	.00	3.500	.000	.00	1 .0
WALL	ENTRANCE													
-8539.020	307.290	11.740	319.030	65.29	1.11	.02	319.05	.02	1.74	5.00	14.450	5.000	.00	0 .0
JUNCT STR	.0625					.0000	.00	11.76	.06		.013	.00	.00	RECTANG
-8535.020	307.540	11.508	319.048	49.83	.87	.01	319.06	.00	1.46	5.00	14.450	5.000	.00	0 .0
WALL	EXIT													
-8535.020	307.540	11.509	319.049	49.83	5.18	.42	319.47	.00	2.21	.00	3.500	.000	.00	1 .0
58.880	.0229					.0025	.14	11.51	.00	1.38	.013	.00	.00	PIPE
-8476.140	308.890	10.303	319.193	49.83	5.18	.42	319.61	.00	2.21	.00	3.500	.000	.00	1 .0
43.819	.0228					.0025	.11	.00	.00	1.38	.013	.00	.00	PIPE
-8432.320	309.890	9.454	319.344	49.83	5.18	.42	319.76	.00	2.21	.00	3.500	.000	.00	1 .0
52.630	.0243					.0025	.13	9.45	.00	1.36	.013	.00	.00	PIPE

Carlton Oaks
Bypass Storm Drain
Line 5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-8379.690	311.170	8.304	319.474	49.83	5.18	.42	319.89	.00	2.21	.00	3.500	.000	.00	1 .0
105.721	.0223					.0025	.26	.00	.00	1.39	.013	.00	.00	PIPE
-8273.970	313.530	6.247	319.777	49.83	5.18	.42	320.19	.00	2.21	.00	3.500	.000	.00	1 .0
WALL	ENTRANCE													
-8273.970	313.530	6.663	320.193	49.83	1.87	.05	320.25	.00	1.69	4.00	14.940	4.000	.00	0 .0
JUNCT STR	.1450					.0002	.00	6.67	.13		.013	.00	.00	RECTANG
-8269.970	314.110	6.073	320.183	49.83	2.05	.07	320.25	.01	1.69	4.00	14.940	4.000	.00	0 .0
WALL	EXIT													
-8269.970	314.110	6.073	320.183	49.83	7.05	.77	320.95	.00	2.30	.00	3.000	.000	.00	1 .0
19.950	.0461					.0056	.11	.00	.00	1.22	.013	.00	.00	PIPE
-8250.020	315.030	5.346	320.376	49.83	7.05	.77	321.15	.00	2.30	.00	3.000	.000	.00	1 .0
30.792	.0462					.0056	.17	5.35	.00	1.22	.013	.00	.00	PIPE
-8219.228	316.453	4.093	320.547	49.83	7.05	.77	321.32	.00	2.30	.00	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
-8219.228	316.453	1.244	317.697	49.83	17.99	5.03	322.72	.00	2.30	2.96	3.000	.000	.00	1 .0
55.330	.0462					.0417	2.31	1.24	3.28	1.22	.013	.00	.00	PIPE
-8163.898	319.010	1.268	320.278	49.83	17.54	4.78	325.06	.00	2.30	2.96	3.000	.000	.00	1 .0
46.111	.0462					.0378	1.74	1.27	3.16	1.22	.013	.00	.00	PIPE

Program Package Serial Number: 7111

WATER SURFACE PROFILE LISTING Date:12-15-2023 Time:11:56:36

Carlton Oaks
Bypass Storm Drain
Line 5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch

-8117.787	321.142	1.314	322.456	49.83	16.73	4.34	326.80	.00	2.30	2.98	3.000	.000	.00	1 .0
26.637	.0462					.0332	.88	1.31	2.95	1.22	.013	.00	.00	PIPE
-8091.150	322.373	1.363	323.736	49.83	15.95	3.95	327.69	.00	2.30	2.99	3.000	.000	.00	1 .0
18.115	.0462					.0292	.53	1.36	2.75	1.22	.013	.00	.00	PIPE
-8073.035	323.210	1.414	324.624	49.83	15.21	3.59	328.21	.00	2.30	3.00	3.000	.000	.00	1 .0
13.301	.0462					.0257	.34	1.41	2.56	1.22	.013	.00	.00	PIPE
-8059.733	323.825	1.468	325.292	49.83	14.50	3.26	328.56	.00	2.30	3.00	3.000	.000	.00	1 .0
10.204	.0462					.0226	.23	1.47	2.39	1.22	.013	.00	.00	PIPE
-8049.529	324.297	1.523	325.820	49.83	13.82	2.97	328.79	.00	2.30	3.00	3.000	.000	.00	1 .0
8.027	.0462					.0199	.16	1.52	2.22	1.22	.013	.00	.00	PIPE
-8041.502	324.667	1.582	326.250	49.83	13.18	2.70	328.95	.00	2.30	3.00	3.000	.000	.00	1 .0
6.406	.0462					.0176	.11	1.58	2.07	1.22	.013	.00	.00	PIPE
-8035.097	324.964	1.644	326.607	49.83	12.57	2.45	329.06	.00	2.30	2.99	3.000	.000	.00	1 .0
5.142	.0462					.0155	.08	1.64	1.92	1.22	.013	.00	.00	PIPE
-8029.955	325.201	1.709	326.910	49.83	11.98	2.23	329.14	.00	2.30	2.97	3.000	.000	.00	1 .0
4.125	.0462					.0137	.06	1.71	1.78	1.22	.013	.00	.00	PIPE
-8025.829	325.392	1.777	327.169	49.83	11.42	2.03	329.20	.00	2.30	2.95	3.000	.000	.00	1 .0
3.274	.0462					.0121	.04	1.78	1.66	1.22	.013	.00	.00	PIPE

Carlton Oaks
Bypass Storm Drain
Line 5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-8022.555	325.543	1.850	327.393	49.83	10.89	1.84	329.24	.00	2.30	2.92	3.000	.000	.00	1 .0
2.547	.0462					.0107	.03	1.85	1.53	1.22	.013	.00	.00	PIPE
-8020.008	325.661	1.927	327.588	49.83	10.39	1.67	329.26	.00	2.30	2.88	3.000	.000	.00	1 .0

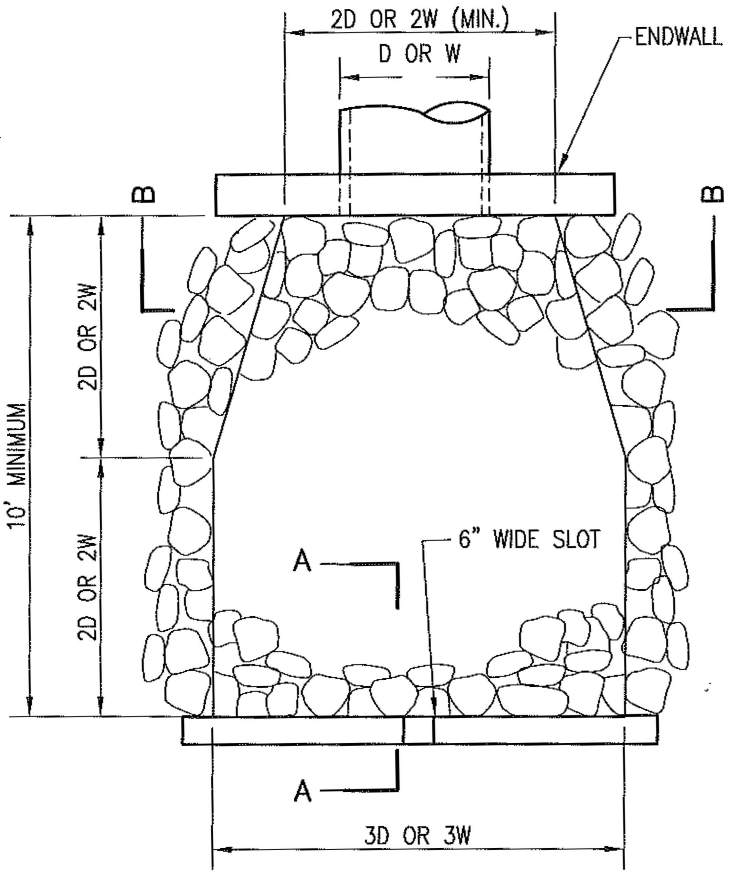
1.910	.0462				.0095	.02	1.93	1.42	1.22	.013	.00	.00	PIPE	
-8018.098	325.749	2.009	327.758	49.83	9.90	1.52	329.28	.00	2.30	2.82	3.000	.000	.00	1 .0
1.333	.0462				.0085	.01	2.01	1.31	1.22	.013	.00	.00	PIPE	
-8016.765	325.811	2.097	327.908	49.83	9.44	1.38	329.29	.00	2.30	2.75	3.000	.000	.00	1 .0
.795	.0462				.0076	.01	2.10	1.20	1.22	.013	.00	.00	PIPE	
-8015.969	325.848	2.192	328.040	49.83	9.00	1.26	329.30	.00	2.30	2.66	3.000	.000	.00	1 .0
.269	.0462				.0068	.00	2.19	1.10	1.22	.013	.00	.00	PIPE	
-8015.700	325.860	2.297	328.157	49.83	8.58	1.14	329.30	.00	2.30	2.54	3.000	.000	.00	1 .0
WALL	ENTRANCE													
-8015.700	325.860	3.912	329.772	49.83	3.18	.16	329.93	.00	1.69	4.00	6.000	4.000	.00	0 .0

TABLE 7-1 (BELOW) PER JULY 2005
SAN DIEGO COUNTY DRAINAGE DESIGN MANUAL

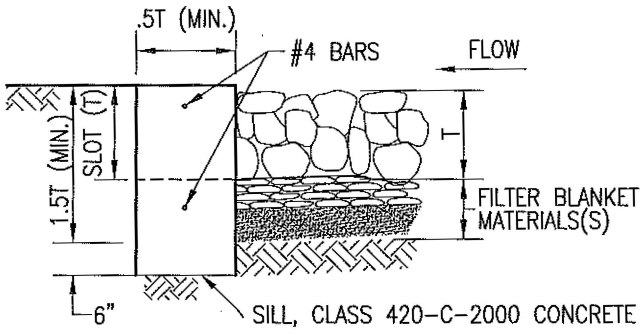
DESIGN VELOCITY (FT/SEC) *	ROCK CLASS	RIP-RAP THICKNESS "T" (MIN)
6-10	NO. 2 BACKING	1.1 FT
10-12	1/4 TON	2.7 FT
12-14	1/2 TON	3.5 FT
14-16	1 TON	4.4 FT
16-18	2 TON	5.4 FT

* OVER 20 FT/SEC REQUIRES SPECIAL DESIGN

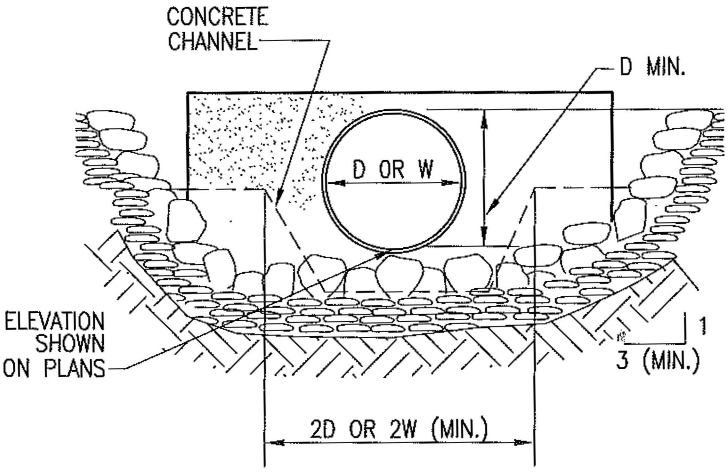
D = PIPE DIAMETER ø
W = BOTTOM WIDTH OF CHANNEL



PLAN



SECTION A-A



SECTION B-B

NOTES

1. PLANS SHALL SPECIFY:
   (A) ROCK CLASS AND RIP-RAP THICKNESS (T). T SHALL BE AT LEAST 1.5 TIMES THE NOMINAL EQUIVALENT DIAMETER OF STONE (d_{50}) OF THE SPECIFIED RIP-RAP.
   (B) FILTER BLANKET MATERIAL, NUMBER OF LAYERS AND THICKNESS.
2. RIP-RAP SHALL BE EITHER QUARRY STONE OR BROKEN CONCRETE (IF SHOWN ON PLANS). COBBLES ARE NOT ACCEPTABLE.
3. RIP-RAP SHALL BE PLACED OVER FILTER BLANKET MATERIAL, WHICH MAY BE EITHER GRANULAR MATERIAL OR NON-WOVEN GEOTEXTILE FILTER FABRIC; MATERIAL AT WEIGHT SPECIFIED IN PLANS OR SPECIFICATIONS.
4. SEE TABLE 200-1.7 IN THE SAN DIEGO REGIONAL SUPPLEMENT TO GREENBOOK FOR SELECTION OF FILTER BLANKET.
5. RIP-RAP ENERGY DISSIPATERS SHALL BE DESIGNATED AS EITHER TYPE 1 OR TYPE 2. TYPE 1 SHALL BE WITH CONCRETE SILL; TYPE 2 SHALL BE WITHOUT SILL.

Revision	By	Approved	Date
ORIGINAL		Kercheval	12/75
Add Rip Rap Table		S. Brady	04/06
Edited		T. Stanton	02/09
Edited	S.S.	T. Regello	03/11
Edited	T.R.	T. Regello	10/15

SAN DIEGO REGIONAL STANDARD DRAWING

RIP RAP ENERGY DISSIPATER

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

T Stanton 12/17/2015
Chairperson R.C.E. 19246 Date

DRAWING NUMBER **D-40**

HEC-RAS Results
Proposed Conditions
Model
With PF 3 (BSI-100
Year flow)
PF 4 (10-Year Flow)
PF 5 (50-Year Flow)

Refer to the Flood Study (CLOMR) for Carlton Oaks County Club and Resort prepared by Hunsaker and Associates SD, and dated May 2025 for more information regarding the HEC-RAS model

HEC-RAS Plan: Plan 01 River: San Diego River Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	220	PF 3	50000.00	288.80	307.13	297.37	307.28	0.000362	2.60	17024.01	1773.44	0.12
Reach 1	220	PF 4	5500.00	288.80	300.76	292.51	300.77	0.000039	0.58	8671.03	1604.48	0.04
Reach 1	220	PF 5	19000.00	288.80	300.76	294.29	300.84	0.000468	2.02	8671.03	1604.48	0.12
Reach 1	230	PF 3	50000.00	289.80	307.28	299.08	307.57	0.000870	3.94	12310.10	1545.51	0.18
Reach 1	230	PF 4	5500.00	289.80	300.78	294.28	300.80	0.000116	0.96	5754.35	1258.10	0.06
Reach 1	230	PF 5	19000.00	289.80	301.03	296.06	301.19	0.001218	3.17	5991.57	1261.34	0.20
Reach 1	239	PF 3	50000.00	290.70	307.63	300.56	308.19	0.001760	5.46	8514.67	1224.73	0.26
Reach 1	239	PF 4	5500.00	290.70	300.85	295.07	300.88	0.000276	1.40	3887.02	1112.45	0.09
Reach 1	239	PF 5	19000.00	290.70	301.65	297.86	301.94	0.002182	4.20	4413.12	1121.95	0.26
Reach 1	242	PF 3	50000.00	291.70	308.02	300.88	308.91	0.003408	7.56	6614.34	485.40	0.36
Reach 1	242	PF 4	5500.00	291.70	300.92	294.97	300.96	0.000380	1.67	3289.39	450.42	0.11
Reach 1	242	PF 5	19000.00	291.70	302.17	297.28	302.55	0.002718	4.92	3858.19	456.59	0.30
Reach 1	243		Bridge									
Reach 1	244	PF 3	50000.00	292.20	308.81	300.87	309.55	0.002637	6.93	7210.64	979.16	0.32
Reach 1	244	PF 4	5500.00	292.20	300.98	295.29	301.02	0.000369	1.62	3384.82	637.21	0.11
Reach 1	244	PF 5	19000.00	292.20	302.68	297.44	303.00	0.002194	4.53	4194.57	667.17	0.27
Reach 1	245	PF 3	50000.00	291.03	309.39	301.69	309.97	0.002720	4.84	9334.05	786.71	0.24
Reach 1	245	PF 4	5500.00	291.03	301.06	297.22	301.11	0.000997	1.55	3340.22	715.68	0.12
Reach 1	245	PF 5	19000.00	291.03	303.13	299.02	303.42	0.003654	3.71	4786.11	738.43	0.25
Reach 1	250	PF 3	50000.00	294.72	310.77		311.25	0.001335	5.51	9406.76	904.47	0.27
Reach 1	250	PF 4	5500.00	294.72	301.76		301.84	0.001089	2.25	2474.31	678.69	0.20
Reach 1	250	PF 5	19000.00	294.72	304.81		305.08	0.001700	4.11	4637.00	724.79	0.27
Reach 1	260	PF 3	50000.00	295.59	312.66		313.54	0.003806	7.62	6770.48	692.41	0.40
Reach 1	260	PF 4	5500.00	295.59	303.91		304.15	0.006500	3.93	1401.41	519.10	0.42
Reach 1	260	PF 5	19000.00	295.59	307.40		307.90	0.004811	5.68	3391.28	608.34	0.41
Reach 1	270	PF 3	49000.00	297.09	315.51	309.65	316.08	0.001951	6.34	8662.34	1062.34	0.32
Reach 1	270	PF 4	5000.00	297.09	306.78	303.25	306.88	0.001521	2.57	1951.58	517.69	0.23
Reach 1	270	PF 5	17000.00	297.09	310.40	306.19	310.68	0.001870	4.30	4011.27	635.97	0.29
Reach 1	280	PF 3	49000.00	298.83	316.99		317.15	0.000611	3.21	15317.99	1477.15	0.17
Reach 1	280	PF 4	5000.00	298.83	308.27		308.32	0.001299	1.70	2942.32	1294.04	0.20
Reach 1	280	PF 5	17000.00	298.83	311.72		311.79	0.000692	2.21	7681.20	1421.97	0.17
Reach 1	285	PF 3	49000.00	301.64	317.43	310.95	317.61	0.000712	3.45	14288.21	1522.44	0.20
Reach 1	285	PF 4	5000.00	301.64	309.22	306.74	309.28	0.001500	1.97	2532.34	1067.27	0.23
Reach 1	285	PF 5	17000.00	301.64	312.29	308.79	312.40	0.001104	2.60	6546.33	1460.05	0.22
Reach 1	290	PF 3	49000.00	301.71	317.92	311.89	318.12	0.000835	3.63	13490.48	1603.88	0.21
Reach 1	290	PF 4	5000.00	301.71	310.23	308.34	310.30	0.001625	1.98	2520.64	1236.55	0.24
Reach 1	290	PF 5	17000.00	301.71	313.03	309.87	313.14	0.001177	2.70	6292.97	1510.12	0.23
Reach 1	300	PF 3	46414.34	305.57	318.56	312.42	318.84	0.001410	4.26	11072.05	1620.93	0.24
Reach 1	300	PF 4	4990.29	305.57	311.15	308.61	311.20	0.001194	1.77	2825.88	1065.24	0.18
Reach 1	300	PF 5	16148.56	305.57	313.88	310.22	314.01	0.001479	2.90	5602.02	1257.42	0.22
Reach 1	310	PF 3	46414.34	305.25	319.16	315.31	319.85	0.001522	7.01	7574.74	1572.67	0.42
Reach 1	310	PF 4	4990.29	305.25	311.66	308.58	311.81	0.000767	3.02	1653.83	488.21	0.26
Reach 1	310	PF 5	16148.56	305.25	314.62	310.97	315.02	0.001580	5.16	3502.57	1285.06	0.39
Reach 1	315	PF 3	46414.34	307.53	319.63	316.91	320.39	0.002094	7.35	7118.83	1445.80	0.48
Reach 1	315	PF 4	4990.29	307.53	311.84	311.23	312.42	0.006564	6.20	825.87	364.58	0.70
Reach 1	315	PF 5	16148.56	307.53	315.18	313.88	315.85	0.005154	6.78	2633.74	1189.07	0.67
Reach 1	320	PF 3	46414.34	307.20	320.37	316.74	321.21	0.001709	7.35	6314.77	1757.69	0.48
Reach 1	320	PF 4	4990.29	307.20	312.99	309.99	313.13	0.000680	2.99	1666.45	566.23	0.26
Reach 1	320	PF 5	16148.56	307.20	316.40	312.48	316.77	0.001145	4.92	3279.72	1186.26	0.38
Reach 1	322		Lat Struct									
Reach 1	330	PF 3	48000.00	308.50	321.50	317.23	322.11	0.001317	6.46	7819.46	1112.78	0.39
Reach 1	330	PF 4	4500.00	308.50	313.64	312.33	313.88	0.003185	3.99	1183.03	638.74	0.48
Reach 1	330	PF 5	16000.00	308.50	317.22	314.60	317.48	0.001199	4.22	3993.71	910.80	0.34
Reach 1	340	PF 3	48000.00	309.90	322.38	317.07	322.80	0.001601	5.19	9244.17	1075.64	0.30
Reach 1	340	PF 4	4500.00	309.90	314.69	312.47	314.76	0.001261	2.19	2051.55	716.67	0.22
Reach 1	340	PF 5	16000.00	309.90	317.92	314.16	318.09	0.001446	3.30	4848.90	1013.29	0.26

HEC-RAS Plan: Plan 01 River: San Diego River Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	345	PF 3	48000.00	309.80	322.96	317.04	323.36	0.001747	5.10	9407.32	1179.13	0.31
Reach 1	345	PF 4	4500.00	309.80	315.06	311.87	315.11	0.000868	1.93	2331.36	706.97	0.19
Reach 1	345	PF 5	16000.00	309.80	318.36	314.19	318.53	0.001175	3.30	4845.90	826.91	0.24
Reach 1	355	PF 3	48000.00	311.40	323.43	318.35	324.06	0.002430	6.41	7483.10	1461.32	0.37
Reach 1	355	PF 4	4500.00	311.40	315.39	313.28	315.50	0.001751	2.59	1737.97	647.15	0.26
Reach 1	355	PF 5	16000.00	311.40	318.74	315.25	319.01	0.001863	4.13	3873.00	919.47	0.30

Exhibit C

FIRM Panel 06073C1634G

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). This information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2009.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to those new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

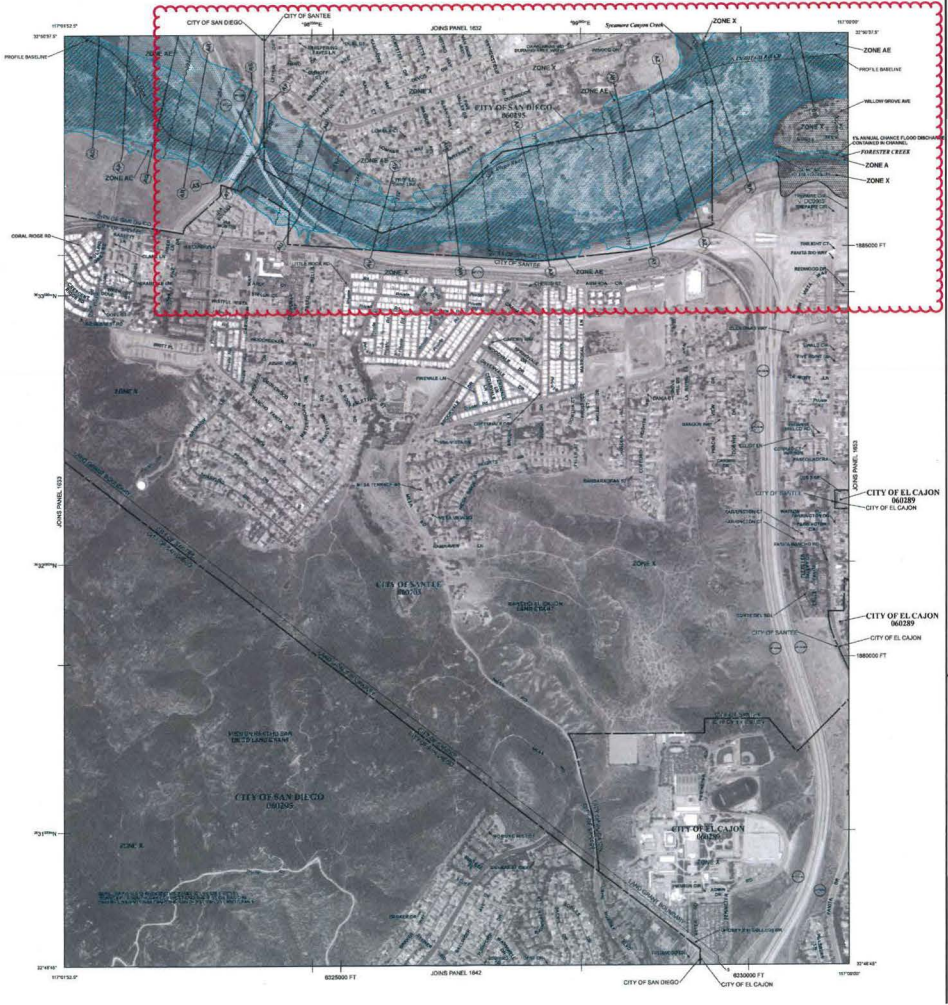
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the FEMA Map Service Center at 1-877-FEMA MAP (1-877-336-2627) for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.fema.gov/.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

The "profile base lines" depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the 'profile base line', in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are typically located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
A — Cross section line
A — Transect line
97°07'30", 32°52'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western hemisphere
1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 FT — 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 19, 1992

EFFECTIVE DATE OF REVISION(S) TO THIS PANEL
May 16, 2012 – to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update base elevations to North American Vertical Datum of 1988

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1634G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1634 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL CAJON, CITY OF	060710	1634	G
SANTEE, CITY OF	060711	1634	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for this panel.

MAP NUMBER
06073C1634G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

Exhibit D

Aerial Photo of the Property

Carlton Oaks Golf Course

Sycamore Creek

Carlton Oaks Bridge

San Diego River

Existing Hotel / Resort

West Hills Pkwy Bridge

North Channel

Earth Berm

South Channel

Forester Creek

Carlton Oaks Golf Course

Mast Blvd

Sycamore Landfill Rd

Kreiner Way

Oakbourne Rd

Medina Dr

St Andrews Dr

Siwanoy Ct

Knollwood Way

Santee Recreational Lakes

Stoyer Dr

Dunbarton Rd

Ruffin Rd

Granda Dr

E Heaney Dr

Woodruff Way

Calle Del Verde

Carlton Hills Blvd

Amino Dr

Leica Dr

Kaschube Way

Dempster Dr

Nalin Ct

Prafull Ct

Alano Way

Carlton Oaks Dr

Dunwoodie Rd

Inverness Rd

Lomker Way

W Hills Pkwy

Willowgrove Ave

Gorge Ave

Via Montisi

Mission Gorge Rd

52

125

Harpine Dr

Rancho Fanita Dr

Arly Ct

Stella Ct

Crossway Ct

Paseo Bello

Rock Rd

Marroka Ln

Glen Vista Way

Redwood

Via De Victoria

Google Earth

© 2020 Google

© 2020 INEGI

2000 ft

N

Exhibit E

BSI Report Excerpts

BSI Consultants, Inc.

SAN DIEGO RIVER

FLOOD STUDY

HEC 2 RUNS USING

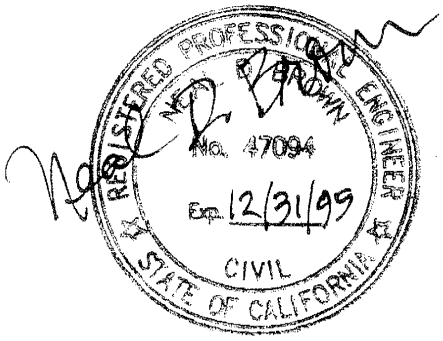
SANTEE DISCHARGE RATES

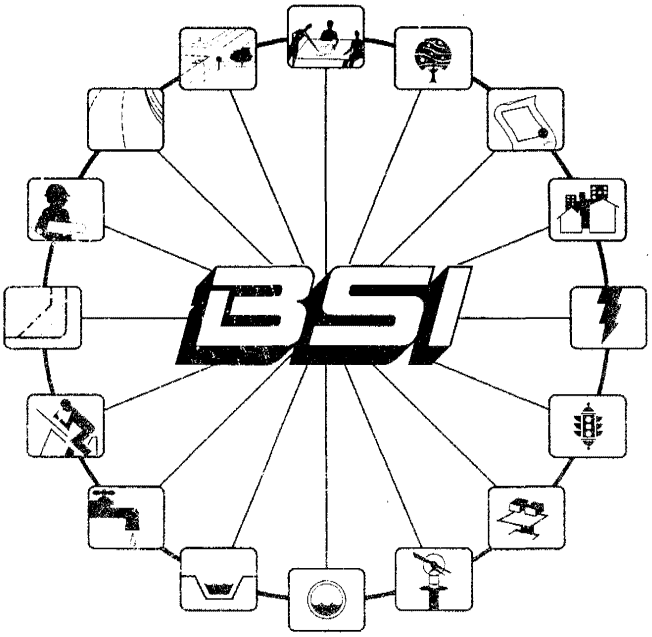
City of Santee

July, 1992

TABLE OF CONTENTS

Santee Runs





BSI Consultants, Inc.

CITY OF SANTEE

PUBLIC WORKS DEPARTMENT

PRELIMINARY

PROCEDURE FOR DESIGN OF STORM DRAINS OUTLETTING IN THE SAN DIEGO RIVER

MARCH 22,1991

PRELIMINARY
CITY OF SANTEE
PROCEDURE FOR
DESIGN OF STORM DRAINS OUTLETTING INTO THE SAN DIEGO RIVER
MARCH 22, 1991

PURPOSE

Stormdrains that outlet into the San Diego River are affected by the depth and velocity of flows in the River at the point of connection. Normally, stormdrains are designed for a 100 year storm. Because of widely different times of concentration for river flows and side channel flows, the river and side channel will peak at different times. Stormdrains should be studied for the peak 100 year flow in the drain and also for the flow when the river is at peak depth. The stormdrain should be designed for the most critical of the two conditions.

HYDROLOGY STUDIES

Hydrologic studies shall be in accordance to procedures described in the City of Santee Public Works Standards Manual. The City's Isopluvial map shall be used to determine the precipitation for the 100 year frequency 6 hour design storm. Intensity calculations shall be based on the formula: $I = 7.44\ P_6 DA^{(-0.645)}$

100 YEAR PEAK STORM IN SIDE CHANNEL

Hydraulic calculations using the 100 year peak side channel storm flow shall be based on the depth and velocity of flow in the San Diego River based on a 10 year river flow plus two feet. The peak (10 year) discharges in the river, (based on Ordinance No. 204) at various locations are listed below. Flows at connections between these locations shall use the flow for the upper location.

Mile Station	Location	10 Year Peak Discharge (Cubic feet per second)
15.3	Mission Dam	5,500
13.2	0.7 Mile down stream from Sycamore Creek	5,000
12.5	Forester Creek Confluence	4,500
11.4	0.2 Miles upstream from Cuyamaca Street	3,800
10.9	Cottonwood Avenue	3,500
9.5	East City Limits	3,500

100 YEAR PEAK STORM IN SAN DIEGO RIVER

Hydrology calculations for the side channel shall be adjusted before calculating the hydraulic grade line for the condition when the San Diego River is at design flow. The outlet flow shall be adjusted based on the ratio of the rainfall intensites as determined by time of concentration. This ratio shall be used to adjust all upstream pipe flows before making pipe hydraulic calculations. The downstream hydraulic gradeline shall be based on the 100 year peak discharge in the river (based on Ordinance No. 204). The San Diego River 100 year flow, time of concentration and intensity for a 6 hour precipitation of 2.5 inches is as follows:

Mile Station	Location	100 Year Discharge (Cubic Feet/second)	Time of concent (Minutes)	Intensity (in/hr)
15.3	Mission Dam	50,000	78.0	1.12
14.28	West Hills Dr.	49,000	77.0	1.13
13.07	Fanita Parkway	49,000	76.0	1.14
12.42	Carlton Hills Blvd	48,000	76.0	1.14
11.59	Cuyamaca St.	46,000	75.0	1.15
10.76	Magnolia Ave.	45,000	75.0	1.15
9.49	East City Limits	44.000	74.0	1.16

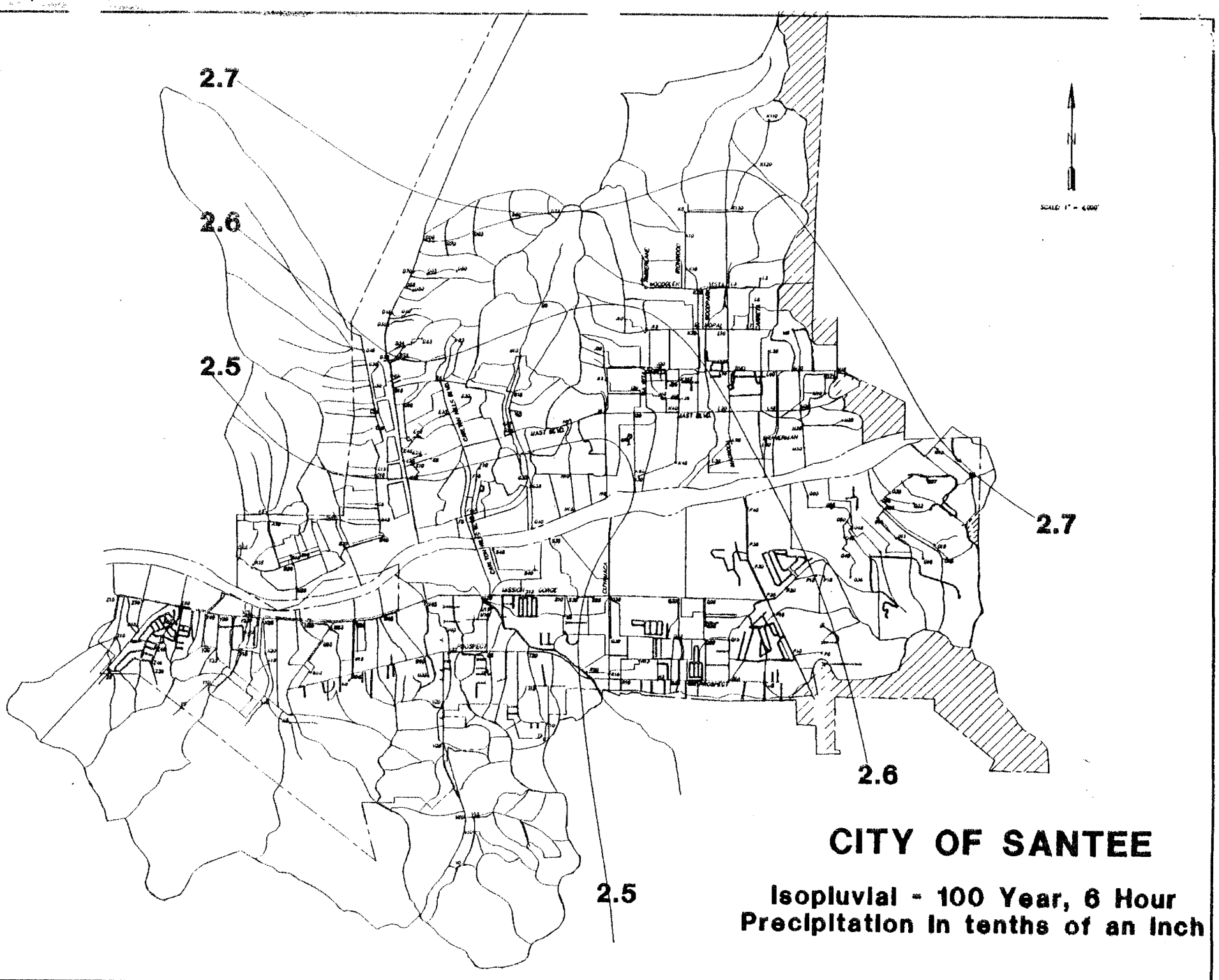
HYDRAULICS OF FLOW IN SAN DIEGO RIVER

The depth of flow and velocity for the design discharge shall be based on river conditions existing at the time of connection. If modifications of river conditions are planned for construction at the same time as the side channel connections, those modifications shall be considered in the hydraulic calculations. Future river improvements that have not been constructed shall not be considered in the hydraulic calculations.

The Corps of Engineers HEC2 program or other method approved in writing by the City Engineer shall be used to determine the river conditions. Results of prior HEC2 studies available at the Public Works Department may be used.

JAH:acs

ATTACHMENTS:
- 100 Yr. 6 hour Isopluvial Map
- 100 Yr. Intensity Chart, $P_6 = 2.5$
- 100 Yr. Intensity Chart, $P_6 = 2.6$
- 100 Yr. Intensity Chart, $P_6 = 2.7$



CITY OF SANTEE

Isopluvial - 100 Year, 6 Hour Precipitation in tenths of an Inch

SAN DIEGO COUNTY FLOOD CONTROL
100 YEAR INTENSITY CHART

P6 = 2.50 I=7.44*P6*T^(-0.645)

TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)
		30.0	2.07	60.0	1.33	120.0	0.85	180.0	0.65
6.0	5.86	11.0	3.96	16.0	3.11	21.0	2.61	74.0	1.16
6.1	5.79	11.1	3.94	16.1	3.10	21.1	2.60	74.1	1.16
6.2	5.73	11.2	3.92	16.2	3.09	21.2	2.59	74.2	1.16
6.3	5.67	11.3	3.89	16.3	3.07	21.3	2.59	74.3	1.16
6.4	5.62	11.4	3.87	16.4	3.06	21.4	2.58	74.4	1.15
6.5	5.56	11.5	3.85	16.5	3.05	21.5	2.57	74.5	1.15
6.6	5.51	11.6	3.83	16.6	3.04	21.6	2.56	74.6	1.15
6.7	5.45	11.7	3.81	16.7	3.03	21.7	2.56	74.7	1.15
6.8	5.40	11.8	3.79	16.8	3.01	21.8	2.55	74.8	1.15
6.9	5.35	11.9	3.77	16.9	3.00	21.9	2.54	74.9	1.15
7.0	5.30	12.0	3.74	17.0	2.99	22.0	2.53	75.0	1.15
7.1	5.25	12.1	3.72	17.1	2.98	22.1	2.53	75.1	1.15
7.2	5.21	12.2	3.71	17.2	2.97	22.2	2.52	75.2	1.15
7.3	5.16	12.3	3.69	17.3	2.96	22.3	2.51	75.3	1.15
7.4	5.12	12.4	3.67	17.4	2.95	22.4	2.50	75.4	1.14
7.5	5.07	12.5	3.65	17.5	2.94	22.5	2.50	75.5	1.14
7.6	5.03	12.6	3.63	17.6	2.93	22.6	2.49	75.6	1.14
7.7	4.99	12.7	3.61	17.7	2.91	22.7	2.48	75.7	1.14
7.8	4.94	12.8	3.59	17.8	2.90	22.8	2.48	75.8	1.14
7.9	4.90	12.9	3.57	17.9	2.89	22.9	2.47	75.9	1.14
8.0	4.86	13.0	3.56	18.0	2.88	23.0	2.46	76.0	1.14
8.1	4.83	13.1	3.54	18.1	2.87	23.1	2.45	76.1	1.14
8.2	4.79	13.2	3.52	18.2	2.86	23.2	2.45	76.2	1.14
8.3	4.75	13.3	3.50	18.3	2.85	23.3	2.44	76.3	1.14
8.4	4.71	13.4	3.49	18.4	2.84	23.4	2.43	76.4	1.13
8.5	4.68	13.5	3.47	18.5	2.83	23.5	2.43	76.5	1.13
8.6	4.64	13.6	3.45	18.6	2.82	23.6	2.42	76.6	1.13
8.7	4.61	13.7	3.44	18.7	2.81	23.7	2.41	76.7	1.13
8.8	4.57	13.8	3.42	18.8	2.80	23.8	2.41	76.8	1.13
8.9	4.54	13.9	3.41	18.9	2.79	23.9	2.40	76.9	1.13
9.0	4.51	14.0	3.39	19.0	2.78	24.0	2.39	77.0	1.13
9.1	4.48	14.1	3.37	19.1	2.77	24.1	2.39	77.1	1.13
9.2	4.44	14.2	3.36	19.2	2.77	24.2	2.38	77.2	1.13
9.3	4.41	14.3	3.34	19.3	2.76	24.3	2.38	77.3	1.13
9.4	4.38	14.4	3.33	19.4	2.75	24.4	2.37	77.4	1.13
9.5	4.35	14.5	3.31	19.5	2.74	24.5	2.36	77.5	1.12
9.6	4.32	14.6	3.30	19.6	2.73	24.6	2.36	77.6	1.12
9.7	4.30	14.7	3.29	19.7	2.72	24.7	2.35	77.7	1.12
9.8	4.27	14.8	3.27	19.8	2.71	24.8	2.34	77.8	1.12
9.9	4.24	14.9	3.26	19.9	2.70	24.9	2.34	77.9	1.12
10.0	4.21	15.0	3.24	20.0	2.69	25.0	2.33	78.0	1.12
10.1	4.19	15.1	3.23	20.1	2.69	25.1	2.33	78.1	1.12
10.2	4.16	15.2	3.22	20.2	2.68	25.2	2.32	78.2	1.12
10.3	4.13	15.3	3.20	20.3	2.67	25.3	2.31	78.3	1.12
10.4	4.11	15.4	3.19	20.4	2.66	25.4	2.31	78.4	1.12
10.5	4.08	15.5	3.18	20.5	2.65	25.5	2.30	78.5	1.12
10.6	4.06	15.6	3.16	20.6	2.64	25.6	2.30	78.6	1.11
10.7	4.03	15.7	3.15	20.7	2.63	25.7	2.29	78.7	1.11
10.8	4.01	15.8	3.14	20.8	2.63	25.8	2.29	78.8	1.11
10.9	3.98	15.9	3.12	20.9	2.62	25.9	2.28	78.9	1.11

SAN DIEGO COUNTY FLOOD CONTROL
100 YEAR INTENSITY CHART

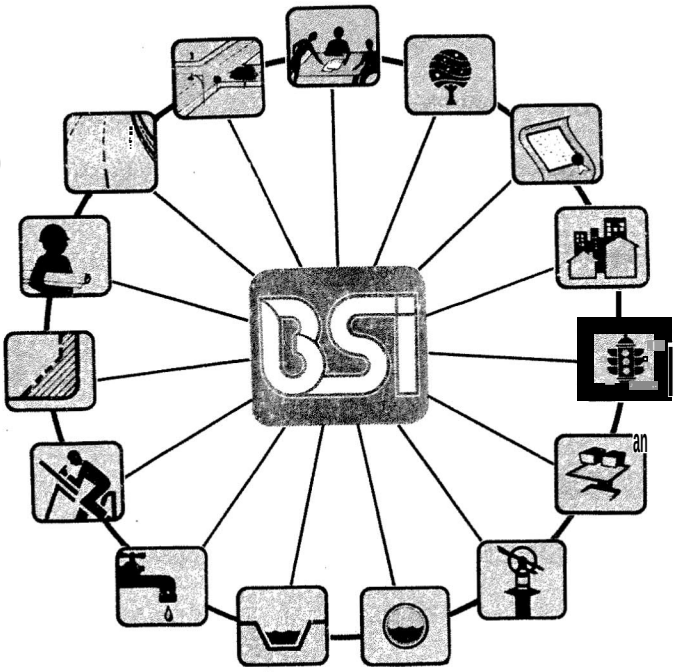
P6 = 2.60 $I=7.44*P6*T^{(-0.645)}$

TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)
		30.0	2.16	60.0	1.38	120.0	0.88	180.0	0.68
6.0	6.09	11.0	4.12	16.0	3.24	21.0	2.71	74.0	1.20
6.1	6.03	11.1	4.10	16.1	3.22	21.1	2.71	74.1	1.20
6.2	5.96	11.2	4.07	16.2	3.21	21.2	2.70	74.2	1.20
6.3	5.90	11.3	4.05	16.3	3.20	21.3	2.69	74.3	1.20
6.4	5.84	11.4	4.03	16.4	3.18	21.4	2.68	74.4	1.20
6.5	5.78	11.5	4.00	16.5	3.17	21.5	2.67	74.5	1.20
6.6	5.73	11.6	3.98	16.6	3.16	21.6	2.67	74.6	1.20
6.7	5.67	11.7	3.96	16.7	3.15	21.7	2.66	74.7	1.20
6.8	5.62	11.8	3.94	16.8	3.13	21.8	2.65	74.8	1.20
6.9	5.57	11.9	3.92	16.9	3.12	21.9	2.64	74.9	1.20
7.0	5.51	12.0	3.89	17.0	3.11	22.0	2.63	75.0	1.19
7.1	5.46	12.1	3.87	17.1	3.10	22.1	2.63	75.1	1.19
7.2	5.41	12.2	3.85	17.2	3.09	22.2	2.62	75.2	1.19
7.3	5.37	12.3	3.83	17.3	3.08	22.3	2.61	75.3	1.19
7.4	5.32	12.4	3.81	17.4	3.06	22.4	2.60	75.4	1.19
7.5	5.27	12.5	3.79	17.5	3.05	22.5	2.60	75.5	1.19
7.6	5.23	12.6	3.77	17.6	3.04	22.6	2.59	75.6	1.19
7.7	5.19	12.7	3.75	17.7	3.03	22.7	2.58	75.7	1.19
7.8	5.14	12.8	3.74	17.8	3.02	22.8	2.57	75.8	1.19
7.9	5.10	12.9	3.72	17.9	3.01	22.9	2.57	75.9	1.19
8.0	5.06	13.0	3.70	18.0	3.00	23.0	2.56	76.0	1.18
8.1	5.02	13.1	3.68	18.1	2.99	23.1	2.55	76.1	1.18
8.2	4.98	13.2	3.66	18.2	2.98	23.2	2.55	76.2	1.18
8.3	4.94	13.3	3.64	18.3	2.97	23.3	2.54	76.3	1.18
8.4	4.90	13.4	3.63	18.4	2.96	23.4	2.53	76.4	1.18
8.5	4.86	13.5	3.61	18.5	2.95	23.5	2.52	76.5	1.18
8.6	4.83	13.6	3.59	18.6	2.94	23.6	2.52	76.6	1.18
8.7	4.79	13.7	3.58	18.7	2.93	23.7	2.51	76.7	1.18
8.8	4.76	13.8	3.56	18.8	2.92	23.8	2.50	76.8	1.18
8.9	4.72	13.9	3.54	18.9	2.91	23.9	2.50	76.9	1.18
9.0	4.69	14.0	3.53	19.0	2.90	24.0	2.49	77.0	1.17
9.1	4.66	14.1	3.51	19.1	2.89	24.1	2.48	77.1	1.17
9.2	4.62	14.2	3.49	19.2	2.88	24.2	2.48	77.2	1.17
9.3	4.59	14.3	3.48	19.3	2.87	24.3	2.47	77.3	1.17
9.4	4.56	14.4	3.46	19.4	2.86	24.4	2.46	77.4	1.17
9.5	4.53	14.5	3.45	19.5	2.85	24.5	2.46	77.5	1.17
9.6	4.50	14.6	3.43	19.6	2.84	24.6	2.45	77.6	1.17
9.7	4.47	14.7	3.42	19.7	2.83	24.7	2.44	77.7	1.17
9.8	4.44	14.8	3.40	19.8	2.82	24.8	2.44	77.8	1.17
9.9	4.41	14.9	3.39	19.9	2.81	24.9	2.43	77.9	1.17
10.0	4.38	15.0	3.37	20.0	2.80	25.0	2.43	78.0	1.16
10.1	4.35	15.1	3.36	20.1	2.79	25.1	2.42	78.1	1.16
10.2	4.33	15.2	3.34	20.2	2.78	25.2	2.41	78.2	1.16
10.3	4.30	15.3	3.33	20.3	2.77	25.3	2.41	78.3	1.16
10.4	4.27	15.4	3.32	20.4	2.77	25.4	2.40	78.4	1.16
10.5	4.25	15.5	3.30	20.5	2.76	25.5	2.40	78.5	1.16
10.6	4.22	15.6	3.29	20.6	2.75	25.6	2.39	78.6	1.16
10.7	4.19	15.7	3.27	20.7	2.74	25.7	2.38	78.7	1.16
10.8	4.17	15.8	3.26	20.8	2.73	25.8	2.38	78.8	1.16
10.9	4.14	15.9	3.25	20.9	2.72	25.9	2.37	78.9	1.16

SAN DIEGO COUNTY FLOOD CONTROL
100 YEAR INTENSITY CHART

P6 = 2.70 $I=7.44*P6*T^{(-0.645)}$

TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)	TIME (MIN)	I (in/hr)
		30.0	2.24	60.0	1.43	120.0	0.92	180.0	0.71
6.0	6.32	11.0	4.28	16.0	3.36	21.0	2.82	74.0	1.25
6.1	6.26	11.1	4.25	16.1	3.35	21.1	2.81	74.1	1.25
6.2	6.19	11.2	4.23	16.2	3.33	21.2	2.80	74.2	1.25
6.3	6.13	11.3	4.20	16.3	3.32	21.3	2.79	74.3	1.25
6.4	6.07	11.4	4.18	16.4	3.31	21.4	2.78	74.4	1.25
6.5	6.01	11.5	4.16	16.5	3.29	21.5	2.78	74.5	1.25
6.6	5.95	11.6	4.13	16.6	3.28	21.6	2.77	74.6	1.24
6.7	5.89	11.7	4.11	16.7	3.27	21.7	2.76	74.7	1.24
6.8	5.83	11.8	4.09	16.8	3.26	21.8	2.75	74.8	1.24
6.9	5.78	11.9	4.07	16.9	3.24	21.9	2.74	74.9	1.24
7.0	5.73	12.0	4.04	17.0	3.23	22.0	2.74	75.0	1.24
7.1	5.67	12.1	4.02	17.1	3.22	22.1	2.73	75.1	1.24
7.2	5.62	12.2	4.00	17.2	3.21	22.2	2.72	75.2	1.24
7.3	5.57	12.3	3.98	17.3	3.19	22.3	2.71	75.3	1.24
7.4	5.52	12.4	3.96	17.4	3.18	22.4	2.70	75.4	1.24
7.5	5.48	12.5	3.94	17.5	3.17	22.5	2.70	75.5	1.23
7.6	5.43	12.6	3.92	17.6	3.16	22.6	2.69	75.6	1.23
7.7	5.38	12.7	3.90	17.7	3.15	22.7	2.68	75.7	1.23
7.8	5.34	12.8	3.88	17.8	3.14	22.8	2.67	75.8	1.23
7.9	5.30	12.9	3.86	17.9	3.12	22.9	2.67	75.9	1.23
8.0	5.25	13.0	3.84	18.0	3.11	23.0	2.66	76.0	1.23
8.1	5.21	13.1	3.82	18.1	3.10	23.1	2.65	76.1	1.23
8.2	5.17	13.2	3.80	18.2	3.09	23.2	2.64	76.2	1.23
8.3	5.13	13.3	3.78	18.3	3.08	23.3	2.64	76.3	1.23
8.4	5.09	13.4	3.77	18.4	3.07	23.4	2.63	76.4	1.23
8.5	5.05	13.5	3.75	18.5	3.06	23.5	2.62	76.5	1.22
8.6	5.01	13.6	3.73	18.6	3.05	23.6	2.61	76.6	1.22
8.7	4.98	13.7	3.71	18.7	3.04	23.7	2.61	76.7	1.22
8.8	4.94	13.8	3.70	18.8	3.03	23.8	2.60	76.8	1.22
8.9	4.90	13.9	3.68	18.9	3.02	23.9	2.59	76.9	1.22
9.0	4.87	14.0	3.66	19.0	3.01	24.0	2.59	77.0	1.22
9.1	4.83	14.1	3.64	19.1	3.00	24.1	2.58	77.1	1.22
9.2	4.80	14.2	3.63	19.2	2.99	24.2	2.57	77.2	1.22
9.3	4.77	14.3	3.61	19.3	2.98	24.3	2.57	77.3	1.22
9.4	4.73	14.4	3.60	19.4	2.97	24.4	2.56	77.4	1.22
9.5	4.70	14.5	3.58	19.5	2.96	24.5	2.55	77.5	1.21
9.6	4.67	14.6	3.56	19.6	2.95	24.6	2.55	77.6	1.21
9.7	4.64	14.7	3.55	19.7	2.94	24.7	2.54	77.7	1.21
9.8	4.61	14.8	3.53	19.8	2.93	24.8	2.53	77.8	1.21
9.9	4.58	14.9	3.52	19.9	2.92	24.9	2.53	77.9	1.21
10.0	4.55	15.0	3.50	20.0	2.91	25.0	2.52	78.0	1.21
10.1	4.52	15.1	3.49	20.1	2.90	25.1	2.51	78.1	1.21
10.2	4.49	15.2	3.47	20.2	2.89	25.2	2.51	78.2	1.21
10.3	4.46	15.3	3.46	20.3	2.88	25.3	2.50	78.3	1.21
10.4	4.44	15.4	3.44	20.4	2.87	25.4	2.49	78.4	1.21
10.5	4.41	15.5	3.43	20.5	2.86	25.5	2.49	78.5	1.20
10.6	4.38	15.6	3.41	20.6	2.85	25.6	2.48	78.6	1.20
10.7	4.35	15.7	3.40	20.7	2.85	25.7	2.47	78.7	1.20
10.8	4.33	15.8	3.39	20.8	2.84	25.8	2.47	78.8	1.20
10.9	4.30	15.9	3.37	20.9	2.83	25.9	2.46	78.9	1.20



PROJECT REPORT

City of Santee
Citywide Drainage Study

Presented to'

City of Santee

February 1990

CONSULTANTS, INC.

APPENDIX IV

DETAILED PRINTOUT

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

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

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

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                          Especially prepared for:

                              BSI CONSULTANTS

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**********DESCRIPTION OF RESULTS*****************************************
* CITY OF SANTEE                                                         *
* 100-YEAR RUNOFF                                                        *
* BASIN A                                                SEPTEMBER 1989  *
**************************************************************************

--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------

  1985 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.500

  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .90

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                    Advanced Engineering Software [AES]
                              SERIAL No. I0723I
                    VER. 3.4A     RELEASE DATE: 4/22/86

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**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  SOIL CLASSIFICATION IS "D"
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
    NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
```

```
     WITH 10-MINUTES ADDED =  11.93(MINUTES)
     INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
     UPSTREAM ELEVATION =    825.00
     DOWNSTREAM ELEVATION =    615.00
     ELEVATION DIFFERENCE =    210.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.760
   SUBAREA RUNOFF(CFS) =     16.92
   TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     16.92

****************************************************************************
  FLOW PROCESS FROM NODE     2.00 TO NODE     3.00 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =    615.00
  DOWNSTREAM NODE ELEVATION =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2000.00
  CHANNEL BASE(FEET) =      .00   "Z" FACTOR =   2.000
  MANNINGS FACTOR =  .040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     16.92
  FLOW VELOCITY(FEET/SEC) =   5.96   FLOW DEPTH(FEET) =   1.19
  TRAVEL TIME(MIN.) =   5.59   TC(MIN.) =  17.52

****************************************************************************
  FLOW PROCESS FROM NODE     2.00 TO NODE     3.00 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.934
  SOIL CLASSIFICATION IS "D"
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SUBAREA AREA(ACRES) =   71.00   SUBAREA RUNOFF(CFS) =   93.74
  TOTAL AREA(ACRES) =   81.00   TOTAL RUNOFF(CFS) =  110.66
  TC(MIN) =  17.52

****************************************************************************
  FLOW PROCESS FROM NODE     3.00 TO NODE     4.00 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =    490.00
  DOWNSTREAM NODE ELEVATION =    420.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00
  CHANNEL BASE(FEET) =      .00   "Z" FACTOR =   2.000
  MANNINGS FACTOR =  .040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    110.66
  FLOW VELOCITY(FEET/SEC) =   8.72   FLOW DEPTH(FEET) =   2.52
  TRAVEL TIME(MIN.) =   2.87   TC(MIN.) =  20.39
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     3.00 TO NODE     4.00 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.661
 SOIL CLASSIFICATION IS "D"
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SUBAREA AREA(ACRES) =   53.00   SUBAREA RUNOFF(CFS) =   63.45
 TOTAL AREA(ACRES) =  134.00   TOTAL RUNOFF(CFS) =  174.11
 TC(MIN) =  20.39

****************************************************************************
 FLOW PROCESS FROM NODE     4.00 TO NODE     5.00 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =    420.00
 DOWNSTREAM NODE ELEVATION =    374.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1700.00
 CHANNEL BASE(FEET) =      .00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .040   MAXIMUM DEPTH(FEET) =  10.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    174.11
 FLOW VELOCITY(FEET/SEC) =   7.99   FLOW DEPTH(FEET) =   3.30
 TRAVEL TIME(MIN.) =   3.55   TC(MIN.) =  23.93

****************************************************************************
 FLOW PROCESS FROM NODE     4.00 TO NODE     5.00 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.399
 SOIL CLASSIFICATION IS "D"
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SUBAREA AREA(ACRES) =   43.00   SUBAREA RUNOFF(CFS) =   46.42
 TOTAL AREA(ACRES) =  177.00   TOTAL RUNOFF(CFS) =  220.54
 TC(MIN) =  23.93

****************************************************************************
 FLOW PROCESS FROM NODE     5.00 TO NODE     5.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.93
 RAINFALL INTENSITY (INCH./HOUR) =   2.40
 TOTAL STREAM AREA (ACRES) =  177.00
 TOTAL STREAM RUNOFF(CFS) AT CONFLUENCE =    220.54

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

```
 FLOW PROCESS FROM NODE     6.00 TO NODE     7.00 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SOIL CLASSIFICATION IS "D"
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
   NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
   WITH 10-MINUTES ADDED =  12.46(MINUTES)
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
   UPSTREAM ELEVATION =    883.00
   DOWNSTREAM ELEVATION =    560.00
   ELEVATION DIFFERENCE =    323.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.654
 SUBAREA RUNOFF(CFS) =     16.44
 TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     16.44

****************************************************************************
 FLOW PROCESS FROM NODE     7.00 TO NODE     8.00 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =    560.00
 DOWNSTREAM NODE ELEVATION =    430.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00
 CHANNEL BASE(FEET) =     .00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .040   MAXIMUM DEPTH(FEET) =  10.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     16.44
 FLOW VELOCITY(FEET/SEC) =   6.63   FLOW DEPTH(FEET) =   1.11
 TRAVEL TIME(MIN.) =   3.77   TC(MIN.) =  16.23

****************************************************************************
 FLOW PROCESS FROM NODE     7.00 TO NODE     8.00 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.082
 SOIL CLASSIFICATION IS "D"
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   55.47
 TOTAL AREA(ACRES) =   50.00   TOTAL RUNOFF(CFS) =   71.92
 TC(MIN) =  16.23

****************************************************************************
 FLOW PROCESS FROM NODE     8.00 TO NODE     5.00 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =    430.00
 DOWNSTREAM NODE ELEVATION =    374.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00
```

```
 CHANNEL BASE(FEET) =      .00   "Z" FACTOR =     2.000
 MANNINGS FACTOR =  .040   MAXIMUM DEPTH(FE    =  10.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     71.97
 FLOW VELOCITY(FEET/SEC) =   7.13   FLOW D    (FEET) =   2.25
 TRAVEL TIME(MIN.) =   3.51   TC(MIN.) =     24

****************************************     ********************************
 FLOW PROCESS FROM NODE     8.00 TO NODE     5.00 IS CODE =   8
----------------------------------------     --------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE P     FLOW<<<<<
========================================     ================================
  100 YEAR RAINFALL INTENSITY(INCH/HOU      2.717
 SOIL CLASSIFICATION IS "D"
 RURAL DEVELOPMENT RUNOFF COEFFICIENT     4500
 SUBAREA AREA(ACRES) =   38.00   SUBA     RUNOFF(CFS) =   46.45
 TOTAL AREA(ACRES) =   88.00   TOTAL     OFF(CFS) =  118.37
 TC(MIN) =  19.74

************************************     ************************************
 FLOW PROCESS FROM NODE     5.00 T     DE     5.00 IS CODE =   1
------------------------------------     ------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREA     CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUI     STREAM VALUES<<<<<
==================================     ====================================
 CONFLUENCE VALUES USED FOR INDI     ENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES)     19.74
 RAINFALL INTENSITY (INCH./HOUR      2.72
 TOTAL STREAM AREA (ACRES) =     50
 TOTAL STREAM RUNOFF(CFS) AT C     UENCE =    118.37

 CONFLUENCE INFORMATION:
 STREAM   RUNOFF      TIME        NSITY
 NUMBER    (CFS)     (MI  )     H/HOUR)
------------------------------------------------------------------------
   1      220.54     23  3       2.399
   2      118.37     19  4       2.717

 RAINFALL-INTENSITY-RATIO     LUENCE FORMULA USED FOR 2 STREAMS
 VARIOUS CONFLUENCED RUNO     ALUES ARE AS FOLLOWS:
     325.08   313.14
 COMPUTED CONFLUENCE EST     ES ARE AS FOLLOWS:
 RUNOFF(CFS) =    325.0     IME(MINUTES) =   23.933
 TOTAL AREA(ACRES) =     .00

**********************     ********************************************
 FLOW PROCESS FROM NO     5.00 TO NODE    10.00 IS CODE =   3
----------------------     --------------------------------------------
 >>>>>COMPUTE PIPEFL     AVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTE     IMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
====================     ============================================
 DEPTH OF FLOW IN     INCH PIPE IS  45.8 INCHES
 PIPEFLOW VELOCITY     /SEC.) =  20.2
```

```
   UPSTREAM NODE ELEVATION =    374.00
   DOWNSTREAM NODE ELEVATION =    369.00
   FLOWLENGTH(FEET) =    250.00   MANNINGS N =   .013
   ESTIMATED PIPE DIAMETER(INCH) =   60.00    NUMBER OF PIPES =    1
   PIPEFLOW THRU SUBAREA(CFS) =    325.08
   TRAVEL TIME(MIN.) =     .21    TC(MIN.) =   24.14


 ****************************************************************************
   FLOW PROCESS FROM NODE      5.00 TO NODE     10.00 IS CODE =    8
 ----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.386
   SOIL CLASSIFICATION IS "D"
   SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
   SUBAREA AREA(ACRES) =    21.12   SUBAREA RUNOFF(CFS) =    27.71
   TOTAL AREA(ACRES) =   286.12   TOTAL RUNOFF(CFS) =   352.79
   TC(MIN) =   24.14


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE =    3
 ----------------------------------------------------------------------------
   >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ============================================================================
   DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.6 INCHES
   PIPEFLOW VELOCITY(FEET/SEC.) =  21.5
   UPSTREAM NODE ELEVATION =    369.00
   DOWNSTREAM NODE ELEVATION =    326.00
   FLOWLENGTH(FEET) =  1900.00   MANNINGS N =   .013
   ESTIMATED PIPE DIAMETER(INCH) =   60.00    NUMBER OF PIPES =    1
   PIPEFLOW THRU SUBAREA(CFS) =    352.79
   TRAVEL TIME(MIN.) =    1.47    TC(MIN.) =   25.61


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE =    8
 ----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.297
   SOIL CLASSIFICATION IS "D"
   SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
   SUBAREA AREA(ACRES) =    41.62   SUBAREA RUNOFF(CFS) =    52.57
   TOTAL AREA(ACRES) =   327.74   TOTAL RUNOFF(CFS) =   405.36
   TC(MIN) =   25.61


 ****************************************************************************
   FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =    7
 ----------------------------------------------------------------------------
   >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
 ============================================================================
```

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 23.60 RAIN INTENSITY(INCH/HOUR) = 2.42
TOTAL AREA(ACRES) = 12.86 TOTAL RUNOFF(CFS) = 17.12

==========

END OF RATIONAL METHOD ANALYSIS

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

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

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

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                          Especially prepared for:

                              BSI CONSULTANTS

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**********DESCRIPTION OF RESULTS*****************************************
* CITY OF SANTEE                                                        *
* 100-YEAR RUNOFF                                                       *
* BASIN B                                                SEPTEMBER 1989 *
**************************************************************************

--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------

  1985 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.500

  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .90

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

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                    VER. 3.4A     RELEASE DATE: 4/22/86

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**************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE     10.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.96   RAIN INTENSITY(INCH/HOUR) =  2.79
  TOTAL AREA(ACRES) =      9.15   TOTAL RUNOFF(CFS) =     14.03
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    10.00 TO NODE    15.00 IS CODE =   6
--------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM ELEVATION =    355.00   DOWNSTREAM ELEVATION =    343.00
 STREET LENGTH(FEET) =   370.00   CURB HEIGTH(INCHES) = 6.
 STREET HALFWIDTH(FEET) = 15.00   STREET CROSSFALL(DECIMAL) = .0200
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   24.73
       STREET FLOWDEPTH(FEET) =   .42
       HALFSTREET FLOODWIDTH(FEET) =   14.58
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.51
       PRODUCT OF DEPTH&VELOCITY =    2.30
 STREETFLOW TRAVELTIME(MIN) =   1.12   TC(MIN) =  20.08

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.687
 SOIL CLASSIFICATION IS "D"
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SUBAREA AREA(ACRES) =   14.47   SUBAREA RUNOFF(CFS) =   21.38
 SUMMED AREA(ACRES) =   23.62   TOTAL RUNOFF(CFS) =    35.41
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .46   HALFSTREET FLOODWIDTH(FEET) = 15.00
 FLOW VELOCITY(FEET/SEC.) =  6.31   DEPTH*VELOCITY =   2.87


**************************************************************************
 FLOW PROCESS FROM NODE    15.00 TO NODE    20.00 IS CODE =   3
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.4
 UPSTREAM NODE ELEVATION =   343.00
 DOWNSTREAM NODE ELEVATION =   340.00
 FLOWLENGTH(FEET) =   270.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    35.41
 TRAVEL TIME(MIN.) =    .48    TC(MIN.) =  20.56


**************************************************************************
 FLOW PROCESS FROM NODE    15.00 TO NODE    20.00 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.646
 SOIL CLASSIFICATION IS "D"
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SUBAREA AREA(ACRES) =    7.82   SUBAREA RUNOFF(CFS) =   11.38
 TOTAL AREA(ACRES) =   31.44   TOTAL RUNOFF(CFS) =   46.80
 TC(MIN) =  20.56
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     25.00 IS CODE =    3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  13.5
  UPSTREAM NODE ELEVATION =    340.00
  DOWNSTREAM NODE ELEVATION =    320.00
  FLOWLENGTH(FEET) =    850.00    MANNINGS N =   .013
  ESTIMATED PIPE DIAMETER(INCH) =  30.00     NUMBER OF PIPES =    1
  PIPEFLOW THRU SUBAREA(CFS) =     46.80
  TRAVEL TIME(MIN.) =    1.05     TC(MIN.) =  21.61

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     25.00 IS CODE =    8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.562
  SOIL CLASSIFICATION IS "D"
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
  SUBAREA AREA(ACRES) =    23.00   SUBAREA RUNOFF(CFS) =    32.42
  TOTAL AREA(ACRES) =    54.44   TOTAL RUNOFF(CFS) =    79.21
  TC(MIN) =  21.61

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =    2
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  SOIL CLASSIFICATION IS "D"
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
    NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
    WITH 10-MINUTES ADDED =  13.38(MINUTES)
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    850.00
    UPSTREAM ELEVATION =     502.00
    DOWNSTREAM ELEVATION =     415.00
    ELEVATION DIFFERENCE =      87.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.490
  SUBAREA RUNOFF(CFS) =      15.71
  TOTAL AREA(ACRES) =     10.00   TOTAL RUNOFF(CFS) =     15.71

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     30.00 IS CODE =    5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
 UPSTREAM NODE ELEVATION =     415.00
 DOWNSTREAM NODE ELEVATION =     365.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1350.00
 CHANNEL BASE(FEET) =      .00    "Z" FACTOR =    2.000
 MANNINGS FACTOR =  .040    MAXIMUM DEPTH(FEET) =  10.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      15.71
 FLOW VELOCITY(FEET/SEC) =    4.87    FLOW DEPTH(FEET) =    1.27
 TRAVEL TIME(MIN.) =    4.62    TC(MIN.) =  18.00


****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     30.00 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.883
 SOIL CLASSIFICATION IS "D"
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SUBAREA AREA(ACRES) =    31.97    SUBAREA RUNOFF(CFS) =    41.48
 TOTAL AREA(ACRES) =    41.97    TOTAL RUNOFF(CFS) =    57.18
 TC(MIN) =  18.00


****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =    5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =     365.00
 DOWNSTREAM NODE ELEVATION =     330.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1250.00
 CHANNEL BASE(FEET) =      .00    "Z" FACTOR =    2.000
 MANNINGS FACTOR =  .040    MAXIMUM DEPTH(FEET) =  10.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      57.18
 FLOW VELOCITY(FEET/SEC) =    6.08    FLOW DEPTH(FEET) =    2.17
 TRAVEL TIME(MIN.) =    3.42    TC(MIN.) =  21.43


****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.577
 SOIL CLASSIFICATION IS "D"
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SUBAREA AREA(ACRES) =    16.10    SUBAREA RUNOFF(CFS) =    22.82
 TOTAL AREA(ACRES) =    58.07    TOTAL RUNOFF(CFS) =    80.00
 TC(MIN) =  21.43


****************************************************************************
 FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =    7
----------------------------------------------------------------------------
```

```
   >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
================================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.94   RAIN INTENSITY(INCH/HOUR) =  2.79
  TOTAL AREA(ACRES) =     9.10   TOTAL RUNOFF(CFS) =     13.96


****************************************************************************
  FLOW PROCESS FROM NODE    39.00 TO NODE    40.00 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  UPSTREAM ELEVATION =    363.00   DOWNSTREAM ELEVATION =    328.00
  STREET LENGTH(FEET) =   650.00   CURB HEIGTH(INCHES) = 6.
  STREET HALFWIDTH(FEET) = 15.00   STREET CROSSFALL(DECIMAL) = .0200
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
        **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   19.03
        STREET FLOWDEPTH(FEET) =   .37
        HALFSTREET FLOODWIDTH(FEET) =   12.05
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.06
        PRODUCT OF DEPTH&VELOCITY =    2.23
  STREETFLOW TRAVELTIME(MIN) =   1.79   TC(MIN) =  20.73

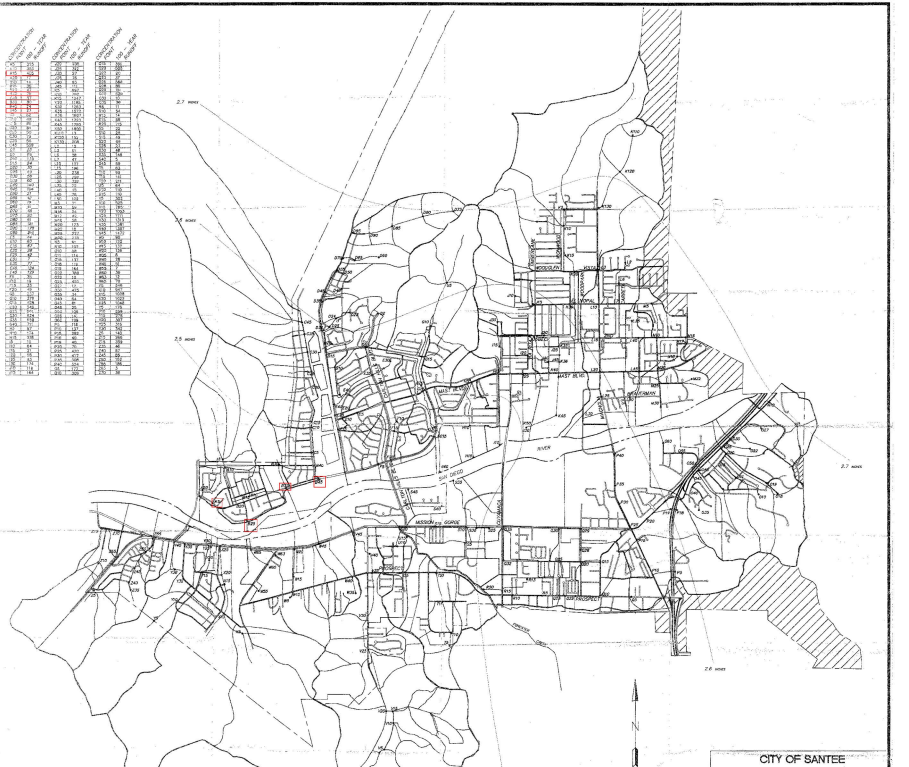
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.632
  SOIL CLASSIFICATION IS "D"
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
  SUBAREA AREA(ACRES) =    7.00   SUBAREA RUNOFF(CFS) =   10.13
  SUMMED AREA(ACRES) =   16.10   TOTAL RUNOFF(CFS) =    24.09
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .40   HALFSTREET FLOODWIDTH(FEET) = 13.73
  FLOW VELOCITY(FEET/SEC.) =  6.01   DEPTH*VELOCITY =   2.41


****************************************************************************
  FLOW PROCESS FROM NODE    43.00 TO NODE    44.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
================================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  25.66   RAIN INTENSITY(INCH/HOUR) =  2.29
  TOTAL AREA(ACRES) =     9.00   TOTAL RUNOFF(CFS) =     11.35


****************************************************************************
  FLOW PROCESS FROM NODE    44.00 TO NODE    45.00 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  UPSTREAM ELEVATION =    345.00   DOWNSTREAM ELEVATION =    320.00
  STREET LENGTH(FEET) =   800.00   CURB HEIGTH(INCHES) = 6.
  STREET HALFWIDTH(FEET) = 15.00   STREET CROSSFALL(DECIMAL) = .0200
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
        **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   17.02
        STREET FLOWDEPTH(FEET) =   .38
        HALFSTREET FLOODWIDTH(FEET) =   12.89
```

```
        AVERAGE FLOW VELOCITY(FEET/SEC.) =     4.78
        PRODUCT OF DEPTH&VELOCITY =     1.84
 STREETFLOW TRAVELTIME(MIN) =    2.79   TC(MIN) =   28.45

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.146
 SOIL CLASSIFICATION IS "D"
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SUBAREA AREA(ACRES) =     9.60   SUBAREA RUNOFF(CFS) =    11.33
 SUMMED AREA(ACRES) =    18.60   TOTAL RUNOFF(CFS) =     22.68
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =   .42   HALFSTREET FLOODWIDTH(FEET) = 14.58
 FLOW VELOCITY(FEET/SEC.) =  5.06   DEPTH*VELOCITY =    2.11
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```



CITY OF SANTEE
HYDROLOGY MASTER PLAN
HYDROLOGY MAP

BSI CONSULTANTS, INC.
Consultants to Governmental Agencies
10680 West Bernardo Drive · San Diego, CA 92127
(619) 451-6038

JANUARY 1990 | PLATE 2

APPENDIX V

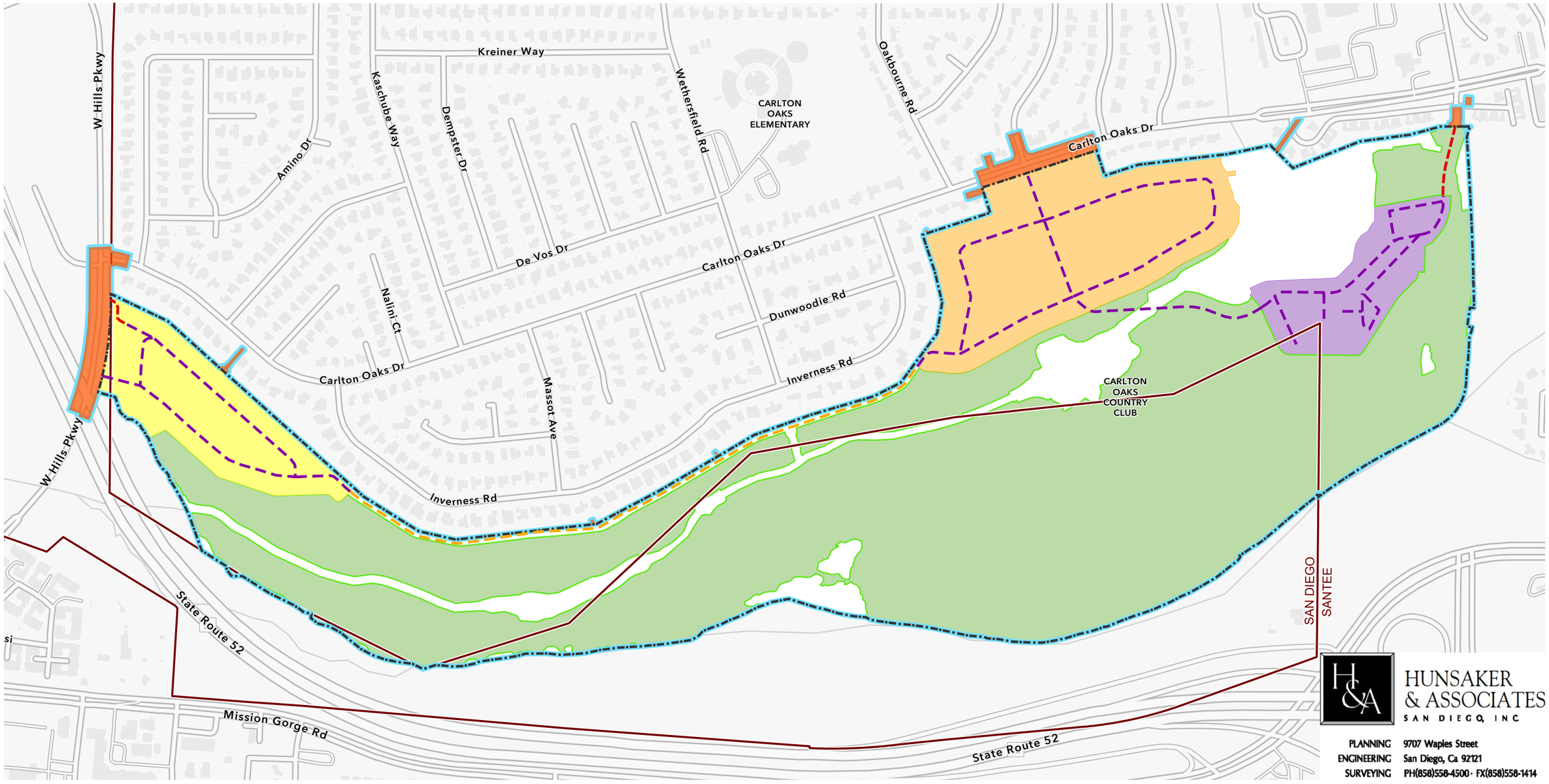
SUPPORTING DATA

USER SPECIFIED DATA

	NODE	AREA (ACREAS)	LENGTH (FT)	UPSTREAM ELEVATION	DOWNSTREAM ELEVATION	C	P6 (IN)	TC (MIN)	I (IN/HR)	Q (CFS)
A	19-20	12.86	1300	375	330	0.55	2.5	23.60	2.42	17.12
B	5-10	9.15	1000	400	355	0.55	2.5	18.96	2.79	14.03
B	38-39	9.10	750	385	363	0.55	2.5	18.94	2.79	13.96
B	43-44	9.00	1300	380	345	0.55	2.5	25.66	2.29	11.35
D	1- 2	11.48	1200	790	550	0.55	2.6	13.61	3.59	22.67
D	16-17	2.90	300	470	440	0.55	2.6	7.96	5.08	8.10
D	21-22	6.73	500	613	535	0.55	2.6	8.86	4.74	17.53
D	26-27	7.93	950	475	435	0.55	2.6	18.90	2.91	12.67
D	31-32	4.80	500	515	445	0.55	2.6	9.18	4.63	12.22
D	36-37	4.10	600	740	650	0.55	2.6	9.83	4.43	9.99
E	1- 2	5.00	800	435	415	0.55	2.6	20.63	2.75	7.55
E	16-17	4.00	550	405	385	0.55	2.6	15.10	3.36	7.39
E	26-30	3.00	400	477	455	0.55	2.6	11.22	4.07	6.71
F	1- 2	7.70	850	388	367	0.55	2.5	21.35	2.58	10.92
F	6- 7	6.94	980	414	394	0.55	2.5	24.85	2.34	8.94
K	250-35	CONFLUENCE FROM BASIN J								
K	450-36	CONFLUENCE FROM BASIN J								
L	4- 5	6.22	970	530	469	0.55	2.7	16.70	3.27	11.18
L	31-35	12.12	950	485	420	0.55	2.7	16.07	3.35	22.33
M	1- 5	9.91	750	501	431	0.55	2.7	12.88	3.86	21.06
O	11-12	6.50	970	1045	725	0.55	2.7	9.61	4.67	16.68
Q	1- 2	9.50	900	418	390	0.95	2.6	5.55	6.40	57.80
Q	21-22	11.42	1000	366	358	0.7	2.6	24.53	2.46	19.63
Q	26-27	5.72	800	376	355	0.95	2.6	5.53	6.42	34.88
Q	31-32	9.80	800	354	351	0.55	2.6	38.83	1.83	9.84
R	11-12	3.00	300	356	355	0.55	2.6	24.80	2.44	4.02
S	1- 5	8.96	1100	347	342	0.85	2.6	19.41	2.86	21.76
S	21-25	8.04	1000	345	336	0.85	2.6	14.74	3.41	23.31
S	36-40	4.09	750	331	325	0.55	2.6	29.21	2.19	4.94
U	1 -2	4.69	700	530	425	0.55	2.5	10.62	4.05	10.45
V	1- 2	8.00	700	770	700	0.55	2.5	12.16	3.71	16.34
W	50-55	4.11	700	380	353	0.55	2.5	16.70	3.03	6.84
W	61-62	4.33	830	357	328	0.55	2.5	18.80	2.80	6.68
Z	60-65	1.65	500	432	400	0.55	2.5	11.86	3.77	3.42

Exhibit F

Site Plan and off-Site Improvements Exhibit



HUNSAKER & ASSOCIATES
SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 · FX(858)558-1414

- Project Site
- Off-Site Improvements
- CEQA Study Area
- City of Santee/San Diego Municipal Boundary
- Residential North
- Residential West
- Golf Course Redesign
- Hotel and Clubhouse
- Emergency Vehicle Access Only
- Private Utility Maintenance Road
- Residential / Resort Circulation Roadway

EXHIBIT-F

SITE PLAN AND OFFSITE IMPROVEMNETS

CARLTON OAKS COUNTRY CLUB AND RESORT

Source: Site Plan-Hunsaker & Associates (2024) & Graphic-ICF (2024)

N

0 225 450 Feet

1:5,400

Appendix

Existing & Proposed Hydrology maps

Map Pocket #1

Existing Drainage Exhibit

RUMSON DR.
KREINER WAY
WEST HILLS PKWY.
LETTICA DR.
CADURETTE DR.
PRAFUL CT.
CARLTON OAKS DR.
VAN ANDEL WAY
WETHERSFIELD RD.
OAKBOURNE RD.
BURNING TREE WAY
KNOLLWOOD WAY
PEBBLE BEACH DR.
SYCAMORE CREEK
FANITA PKWY.
CALLE DEL VERDE
SAN DIEGO RIVER
INWOOD DR.
DUNWOODIE DR.
INVERNESS RD.
MASSOT AV.
CITY OF SANTEE
CITY OF SAN DIEGO
FREEWAY 52 - WEST OVERPASS
FREEWAY 52 - EAST OVERPASS

0.22 ACRES
129
130
42"
216 B35 Q_{100} = 80.00 CFS. A= 58.07AC. T_c = 21.43MIN.
0.13 ACRES
2.08 ACRES
263
261
262
250
0.22 ACRES
251
0.16 ACRES
301
302
3.33 ACRES
303
11.10 ACRES
264
216
0.12 ACRES
124
125
131
12.47 ACRES
3.69 ACRES
126
27"
18"
14.50 ACRES
2.66 ACRES
132
143
10.71 ACRES
4.81 ACRES
0.11 ACRES
315
316
317
0.18 ACRES
38
39
72"
18
19
0.13 ACRES
19 A15 Q_{100} = 405.36 CFS. A= 327.74AC. T_c = 25.61MIN.
4.90 ACRES
40 Q_{100} = 612.97 CFS. A= 523.11AC. T_c = 27.80MIN.
40
7.07 ACRES
20
103
47" x 71"
0.97 ACRES
127
1.05 ACRES
1.43 ACRES
112 B25 Q_{100} = 79.21CFS. A= 54.44AC. T_c = 21.61MIN.
112

LEGEND

- CITY BOUNDARY
- SUBDIVISION BOUNDARY
- CEQA STUDY BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- HYDROLOGIC SOIL TYPE BPUNDARY
- XX.XX ACRES — AREA
- X — HYDROLOGIC SOIL TYPE
- XXX — NODE NUMBER

200 0 200 400 600
SCALE 1" = 200'

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
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ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

EXISTING CONDITIONS HYDROLOGY MAP

CARLTON OAKS

CITY OF SANTEE, CALIFORNIA

MAP 1 OF 6

W.O.# 2167-0228

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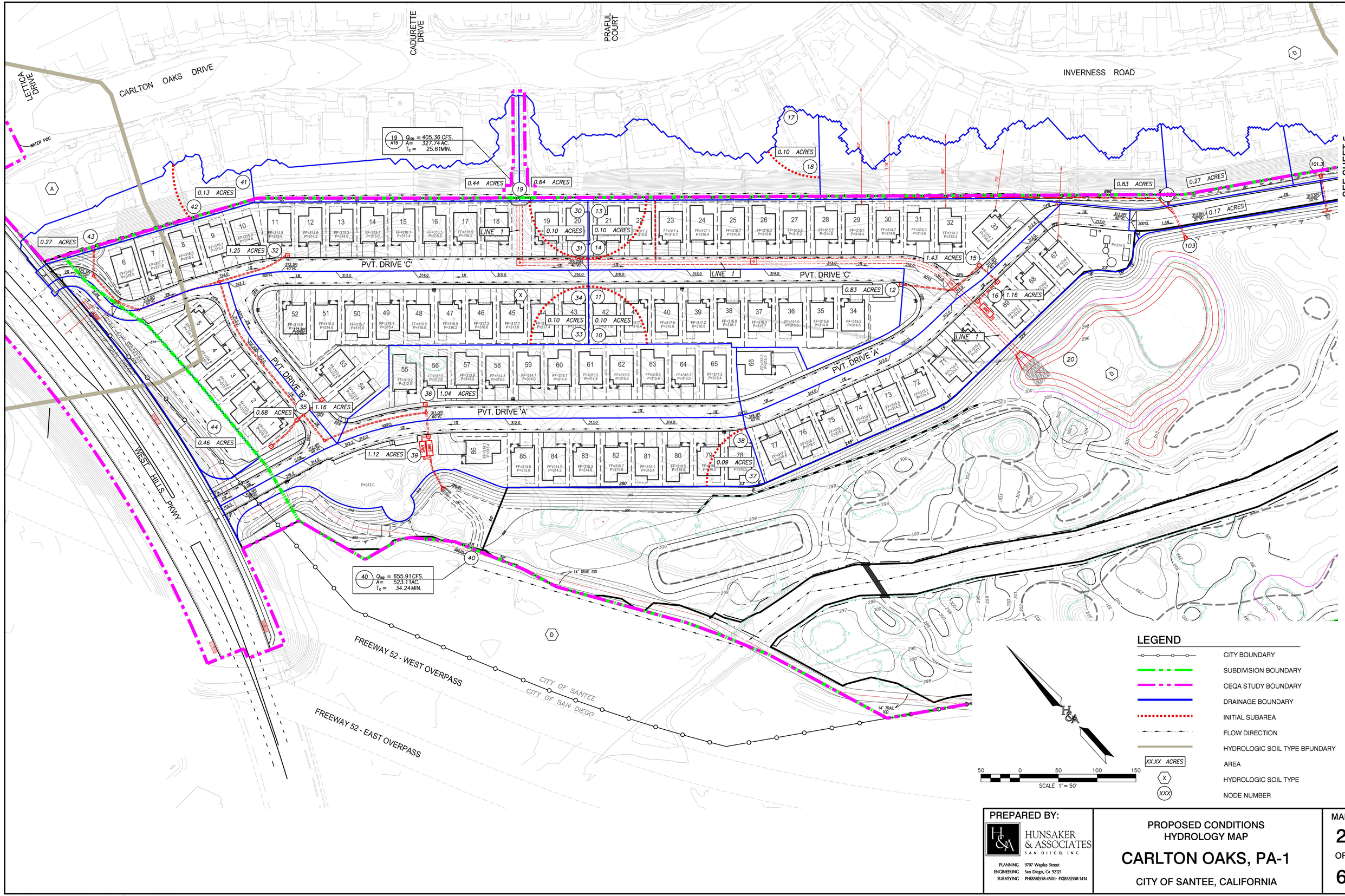
Map Pocket #2

PA-1 proposed Drainage Exhibit



LEGEND

- CITY BOUNDARY
- SUBDIVISION BOUNDARY
- CEQA STUDY BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- HYDROLOGIC SOIL TYPE BPUNDARY
- XX.XX ACRES — AREA
- X — HYDROLOGIC SOIL TYPE
- XXX — NODE NUMBER

50 0 50 100 150
SCALE 1" = 50'

PREPARED BY:

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ENGINEERING San Diego, Ca 92121
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PROPOSED CONDITIONS HYDROLOGY MAP

CARLTON OAKS, PA-1

CITY OF SANTEE, CALIFORNIA

MAP 2 OF 6

W.O.# 2167-0228

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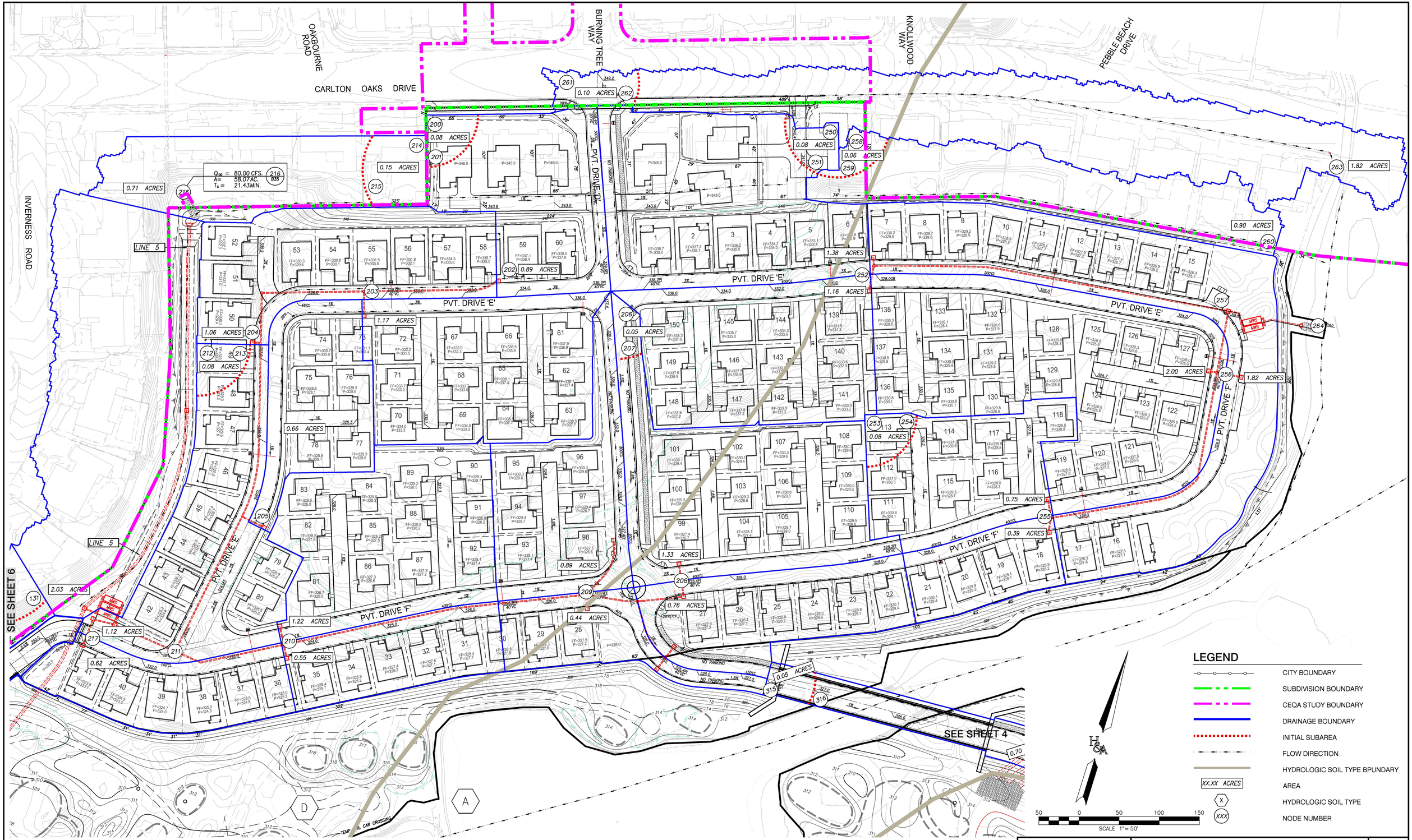
Map Pocket #3

PA-2 proposed Drainage Exhibit



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ENGINEERING
SURVEYING

9707 Waples Street
San Diego, Ca 92121
PH(858)558-4500 FX(858)558-1414

PROPOSED CONDITIONS
HYDROLOGY MAP

CARLTON OAKS, PA-2

CITY OF SANTEE, CALIFORNIA

MAP 3 OF 6

W.O.# 2157-0228

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Map Pocket #4

PA-3 proposed Drainage Exhibit

SEE SHEET 3

SEE BELOW

SEE ABOVE

LEGEND

- CITY BOUNDARY
- SUBDIVISION BOUNDARY
- CEQA STUDY BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- HYDROLOGIC SOIL TYPE BPUNDARY
- XX.XX ACRES — AREA
- X — HYDROLOGIC SOIL TYPE
- XXX — NODE NUMBER

SCALE 1" = 50'

FANITA PARKWAY

CALLE DEL VERDE

CITY OF SAN DIEGO
CITY OF SANTEE

PREPARED BY:

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SURVEYING PH(858)558-4500 · FX(858)558-1414

PROPOSED CONDITIONS
HYDROLOGY MAP

CARLTON OAKS, PA-3

CITY OF SANTEE, CALIFORNIA

MAP 4 OF 6

W.O.# 2167-0028

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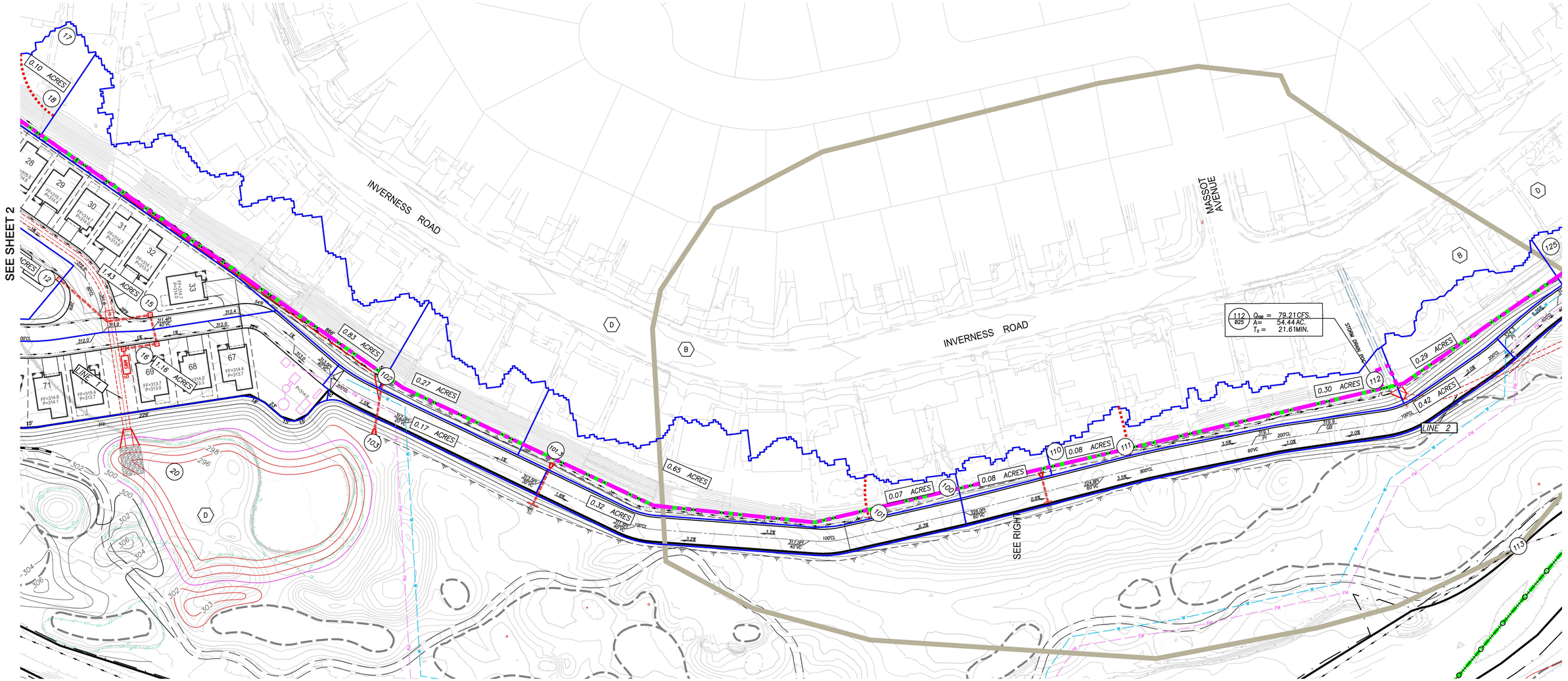
Map Pocket #4

Access Road proposed Drainage Exhibit



LEGEND

- CITY BOUNDARY
- SUBDIVISION BOUNDARY
- CEQA STUDY BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- HYDROLOGIC SOIL TYPE BPUNDARY
- XX.XX ACRES — AREA
- X — HYDROLOGIC SOIL TYPE
- XXX — NODE NUMBER

50 0 50 100 150
SCALE 1"= 50'

PREPARED BY:

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PROPOSED CONDITIONS
HYDROLOGY MAP

CARLTON OAKS
ACCESS ROAD

CITY OF SANTEE, CALIFORNIA

MAP 5 OF 6

W.O.# 2167-0228

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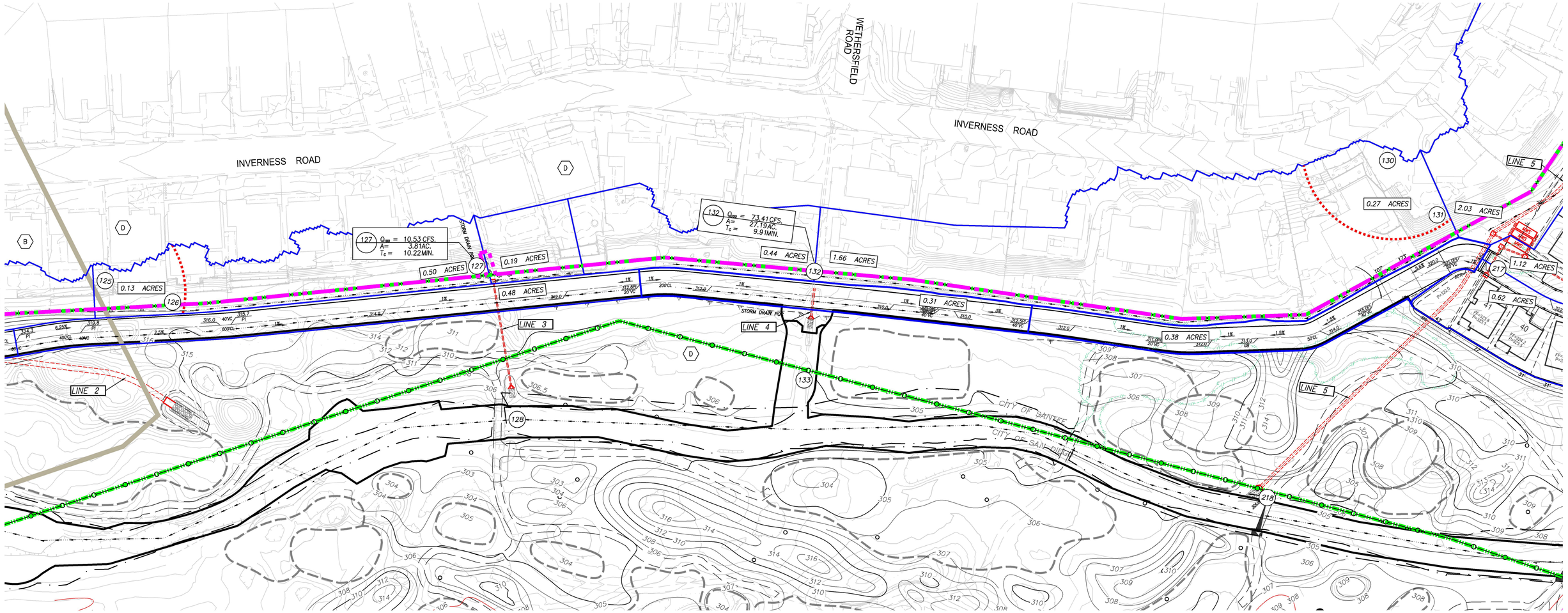
Map Pocket #5

Access Road proposed Drainage Exhibit



LEGEND

- CITY BOUNDARY
- SUBDIVISION BOUNDARY
- CEQA STUDY BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- HYDROLOGIC SOIL TYPE BPUNDARY
- XX.XX ACRES — AREA
- X — HYDROLOGIC SOIL TYPE
- XXX — NODE NUMBER

50 0 50 100 150

SCALE 1"= 50'

PREPARED BY:

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PROPOSED CONDITIONS
HYDROLOGY MAP

CARLTON OAKS
ACCESS ROAD

CITY OF SANTEE, CALIFORNIA

MAP 6 OF 6

W.O.# 2167-0228

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Map Pocket #7

References

CARLTON OAKS UNIT NO. 5

SEWER LATERAL TABLE

LOT No.	INV. ELEV @ MAIN	DROP TO MAIN	LENGTH	INV. EL. @ P.L.	CB. ELEV. SEWER	DEPTH @ P.L.	CB. EL. ELEV. WATER	REMARKS
187	340.0	0.3'	42'	341.6	346.9	5.5'	347.1	
188	332.6		26'	334.7	340.0	5.5	340.2	
189	329.7		26'	332.5	337.8	5.5	338.0	
190	327.7		26'	330.9	336.2	5.5	336.0	
191	324.9		26'	328.7	334.0	5.5	334.3	
192	324.7		73	326.4	331.7	5.5	331.7	
193	324.8		60	326.3	331.1	5.0	331.1	
194	324.9		60	326.4	330.9	4.7	331.0	
195	324.8		33	325.8	331.1	5.5	330.9	
196	324.7		26	326.6	331.9	5.5	332.1	
197	324.9		26	328.7	334.0	5.5	334.2	
198	329.0		26	331.9	337.2	5.5	337.5	
199	332.8		26	335.0	340.3	5.5	340.5	
200	334.8		26	336.5	341.8	5.5	342.0	
201	336.6		42	337.4	342.7	5.2	342.9	
202	338.6		42	339.9	340.2	4.7	340.4	
203	328.3		28	331.1	336.4	5.5	336.6	
204	326.5		28	329.4	334.7	5.5	334.9	
205	324.9		28	327.8	333.1	5.5	333.3	
206	323.1		28	325.9	331.2	5.5	331.4	
207	321.0		28	324.2	329.5	5.5	329.7	
208	319.0		28	322.7	328.0	5.5	328.2	
209	317.0		28	321.1	326.4	5.5	326.6	
210	315.1		28	318.6	323.9	5.5	324.2	
211	314.2		28	316.6	321.9	5.5	322.1	
212	311.6		30	314.8	320.1	5.5	320.0	
213	311.4		30	314.6	319.9	5.5	319.9	
214	312.6		30	315.3	320.6	5.5	320.6	
215	313.3		30	316.0	321.3	5.5	321.3	
216	314.1		30	316.7	322.0	5.5	322.0	
217	314.8		30	317.4	322.7	5.5	322.7	
218	315.5		30	317.7	323.0	5.5	323.0	
219	315.9		30	317.3	322.6	5.5	322.6	
220	314.5		30	316.4	321.7	5.5	321.7	
221	313.4		30	315.5	320.8	5.5	320.8	
222	312.5		30	314.8	320.1	5.5	320.1	
223	312.4		30	314.4	319.7	5.5	319.7	
224	311.9		30	313.8	319.1	5.5	319.1	
225	311.5		30	313.5	318.8	5.5	318.8	
226	311.2		30	313.0	318.3	5.5	318.3	
227	311.8		30	314.0	319.3	5.5	319.3	
228	312.6		30	314.9	320.2	5.5	320.2	
229	313.5		30	315.6	320.9	5.5	321.0	
230	314.4		30	316.3	321.6	5.5	321.7	
231	314.9		30	317.0	322.3	5.5	322.3	
232	315.9		30	317.4	322.7	5.5	322.7	
233	315.3		30	317.7	323.0	5.5	323.0	
234	314.6		30	317.2	322.5	5.5	322.5	
235	313.8		30	316.5	321.8	5.5	321.8	
236	313.1		30	315.8	321.1	5.5	321.1	
237	312.4		30	315.1	320.4	5.5	320.4	
238	311.4		30	314.5	319.8	5.5	319.8	
239	311.6		30	314.8	320.1	5.5	320.1	
240	311.8		30	315.1	320.4	5.5	320.4	
241	312.1		30	315.6	320.9	5.5	320.9	
242	312.3		30	315.8	321.1	5.5	321.1	
243	312.6		30	316.2	321.5	5.5	321.5	
244	312.8		30	316.6	321.9	5.5	321.9	
245	313.1		30	317.0	322.3	5.5	322.3	
246	313.6		30	317.4	322.7	5.5	322.7	
247	313.6		30	317.8	323.1	5.5	323.1	
248	313.8		30	318.1	323.4	5.5	323.4	
249	314.0		30	318.5	323.8	5.5	323.8	
250	314.8		30	318.9	324.2	5.5	324.2	
251	314.6		30	319.2	324.5	5.5	324.5	
252	314.9		30	319.7	325.0	5.5	325.0	
253	315.1	0.3'	30	320.0	325.3	5.5	325.3	
254	315.3	0.3'	30	320.3	325.6	5.5'	325.6	
255	315.5		30	320.5	326.0	5.5	326.0	
256	315.8		30	321.1	326.4	5.5	326.4	
257	316.1		30	321.5	326.8	5.5	326.8	
258	316.2		30	321.7	327.0	5.5	327.0	
259	316.5		30	322.1	327.4	5.5	327.4	
260	316.7		30	322.5	327.8	5.5	322.5	
261	316.8		30	324.0	329.3	5.5	329.8	
262	321.0		42	325.4	330.7		330.9	
263	324.3		42	328.3	333.6		333.8	
264	325.9		42	329.6	334.9		335.1	
265	328.8		42	331.9	337.2		337.7	
266	330.8		42	334.0	339.3		339.5	
267	334.6		42	336.3	341.6		341.6	
268	334.4		42	336.4	341.7		341.7	
269	334.0		42	336.1	341.4		341.4	
270	333.6		42	335.6	340.9		340.9	
271	333.4		42	335.3	340.6		340.6	
272	333.2		42	335.0	340.3		340.3	
273	332.9		42	334.6	339.9		339.9	
274	332.7		42	334.2	339.5		339.5	
275	326.8		28	329.7	335.0		335.2	
276	325.0		28	327.9	333.2		333.5	
277	322.8		28	325.6	330.9		331.1	
278	320.0		28	323.5	328.8		329.0	
279	317.3		28	322.0	327.3		327.7	
280	321.7		26	324.1	329.4		329.2	
281	324.9		26	327.0	332.3		332.1	
282	326.0		38	328.4	333.7		333.1	
283	326.0		40	328.5	333.8		334.0	
284	326.0		50	328.8	334.1		334.1	
285	325.8		70	328.6	333.9		333.9	
286	325.2		66	327.9	333.2		333.2	
287	320.5		26	323.4	328.7		328.7	
288	321.3		26	323.9	328.2		329.2	
289	323.0		40	325.3	330.6		330.6	
290	323.2		72	326.0	331.3		331.3	
291	323.3		67	326.2	331.6		331.6	
292	323.4		50	326.2	331.5		331.5	
293	323.3		35	325.9	331.2		331.2	
294	323.2		33	325.9	331.2		331.2	
295	323.1		26	325.4	330.7		330.7	
296	322.6		26	324.8	330.1		330.1	
297	321.9		26	324.3	329.6		329.6	
298	321.5		26	324.0	329.3		329.3	
299	321.0		26	323.7	329.0		329.0	
300	320.3		26	323.3	328.6		328.6	
301	319.5		26	322.9	328.2		328.3	
302	318.8		26	322.6	327.9		327.9	
303	317.9		26	322.2	327.6		327.6	
304	316.8		26	320.9	326.2		326.2	
305	312.0		30	315.5	320.8		320.8	
306	312.3		30	315.9	321.2		321.2	
307	312.6		30	316.3	321.6		321.6	
308	312.8		30	316.6	321.9		321.9	
309	313.0		30	317.0	322.3		322.3	
310	313.2		30	317.3	322.6		322.6	
311	313.5		30	317.7	323.0		323.0	
312	313.9		30	318.4	323.7		323.7	
313	314.3		30	318.9	324.2		324.2	
314	314.5		30	319.2	324.5		324.5	
315	314.7		30	319.5	324.8		324.8	
316	315.0		30	319.9	325.2		325.2	
317	315.3		30	320.4	325.7		325.7	
318	315.5		30	320.7	326.0		326.0	
319	315.8		30	321.1	326.4		326.4	
320	316.2	0.3	30	321.7	327.0	5.5	327.0	

NOTICE

1. ALL ELECTRICAL & GAS SERVICES WITHIN THIS SUBDIVISION ARE UNDER GROUND INSTALLATIONS. FOR LOCATION OF ELECTRICAL CABLES & GAS PIPING & APPURTENANCES CONTACT: SAN DIEGO GAS & ELECTRIC CO.
2. ALL TELEPHONE SERVICES WITHIN THIS SUBDIVISION ARE UNDERGROUND INSTALLATIONS. FOR LOCATION OF CABLES & APPURTENANCES CONTACT: PACIFIC TELEPHONE CO.

GENERAL NOTES

1. ALL UNDERGROUND UTILITIES & LATERALS TO BE INSTALLED BEFORE CONSTR. OF CURBS, OR CONCRETE CROSSGUTTERS, OR SURFACING OF STREETS.
2. EACH LOT WILL BE SERVED BY A 4" DIAMETER SEWER LATERAL. LOCATION OF SEWER LATERAL WILL BE DETERMINED IN FIELD BY ENGINEER OF WORK. "AS CONSTRUCTED" SEWER LATERALS LOCATION SHALL BE SHOWN ON THESE PLANS. ORIGINAL PLANS & SEWER LATERAL DATA TABLE TO BE COMPLETED PRIOR TO ACCEPTANCE BY THE SANTEE COUNTY WATER DISTRICT.
3. EACH LOT SHALL RECEIVE A 1" COPPER WATER LATERAL. THE LOCATION SHALL BE DETERMINED BY THE ENGINEER OF WORK & SHALL BE CONSTRUCTED PERPENDICULAR TO THE CENTER LINE OF THE STREET "AS CONSTRUCTED LOCATIONS SHALL BE SHOWN ON THESE PLANS AND BE SUBMITTED TO THE SANTEE COUNTY WATER DISTRICT FOR APPROVAL PRIOR TO NOTICE OF COMPLETION
4. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING & MAINTAINING ALL EXISTING UNDERGROUND UTILITIES DURING CONSTRUCTION.
5. ALL WATER MAINS SHALL BE CLASS 150 & HAVE A MINIMUM COVER OF 36"
6. THE LETTER "S" SHALL BE STAMPED AT ALL SEWER LATERAL LOCATIONS. (IN THE CURB).
7. ALL MANHOLE COVERS & GATE WELL COVERS SHALL BE ADJUSTED TO FINISH GRADE. NEW OR EXISTING.
8. WATER MAIN TRENCH GRADES ARE TO BE 4" BELOW BOTTOM OF PIPE GRADES.
9. CONTRACTOR SHALL UNCOVER LOCATION OF CONNECTIONS PRIOR TO BEGINNING INSTALLATION TO ENSURE CONFORMANCE WITH LINES & GRADES SHOWN ON PLANS. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE DISTRICT ENGINEER PRIOR TO PROCEEDING.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RELOCATION OF ANY EXISTING WATER SERVICE APPURTENANCES.
11. THE CONSTRUCTION OF ONE PCC STANDARD DRIVEWAY PER LOT, LOCATION TO BE DETERMINED IN THE FIELD BY THE ENGINEER OF WORK. PCC SURFACING OF DRIVEWAY TO EXTEND FROM CURB TO PROPERTY LINE. USE STANDARD DWG'S. 207-1, 305-1, 306-1
12. A PERMIT SHALL BE ACQUIRED FROM THE COUNTY ROAD DEPARTMENT FOR ANY EXCAVATION WITHIN THE EXISTING RIGHT OF WAY.

ACCESS GATES

CHAIN LINK FENCE FOR EXISTING SEWER M.H.'S AS AGREED UPON. TYPICAL FOR ENTIRE SOUTHERLY BOUNDARY. 12' CHAIN LINK ACCESS GATES PER CITY OF SAN DIEGO STD. DWG. M-5 LOCATIONS SHOWN ON KEY MAP THIS SHEET. EXACT LOCATIONS TO BE DETERMINED IN FIELD BY S.C.W.D. INSPECTOR.

SEWER & WATER WORK TO BE DONE

THE WATER & SEWER MAIN CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH THESE PLANS & THE STANDARD SPECIFICATIONS FOR SEWER & WATER CONSTRUCTION OF THE SANTEE COUNTY WATER DISTRICT ADOPTED NOVEMBER 21ST 1966. RESOLUTION No. 1047.

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE IN ACCORDANCE WITH THESE PLANS: THE CURRENT SAN DIEGO COUNTY ENGINEERING DEPARTMENT STANDARD SPECIFICATIONS, AND SPECIAL PROVISIONS FOR SUBDIVISION STREETS AND STANDARD REFERENCE DRAWINGS.

THE CONSTRUCTION OF VITRIFIED CLAY PIPE SEWER MAINS SHOWN THUS: _____

THE CONSTRUCTION OF 4" VITRIFIED CLAY PIPE SEWER LATERALS SHOWN THUS: _____ ②

THE CONSTRUCTION OF CONCRETE MANHOLES SHOWN THUS: _____

THE CONSTRUCTION OF STANDARD V.C.P. CLEANOUT SHOWN THUS: _____

THE CONSTRUCTION OF CLASS 150 ASBESTOS CEMENT WATER MAINS SHOWN THUS: _____

THE CONSTRUCTION OF 1" COPPER WATER LATERALS SHOWN THUS: _____ W

THE CONSTRUCTION OF 6" FIRE HYDRANTS AND APPURTENANCES COMPLETE SHOWN THUS GV F.H.

THE CONSTRUCTION OF CAST IRON GATE VALVES AND STD. VALVE BOXES WITH CAST IRON COVERS

THE CONSTRUCTION OF BLOWOFF SHOWN THUS: _____

THE GRADING OF STREETS SHOWN THUS: _____

THE PREPARATION OF SUBGRADE AND PAVING OF STREETS SHOWN THUS: _____

THE CONSTRUCTION OF 6" TYPE "E" CURB & GUTTER SHOWN THUS: 200-3

THE CONSTRUCTION OF CONCRETE SIDEWALK SHOWN THUS: 212-1

THE CONSTRUCTION OF STANDARD CONC. DRIVEWAY SHOWN THUS: 207-1/305-1/306-1

THE INSTALLATION OF ELECTROLIERS SHOWN THUS: EXHIBIT B

THE INSTALLATION OF STREET NAME SIGN SHOWN THUS: 301

THE CONSTRUCTION OF TYPE CS GUARD FENCES SHOWN THUS: 218

THE CONSTRUCTION OF X-GUTTER WITH RETURN SEGMENTS 205-1

THE INSTALLATION OF STREET MONUMENTS 218 & 219

THE CONSTRUCTION OF TYPE "A-2" CURB INLET 100-2

THE CONSTRUCTION OF STORM DRAIN PIPE

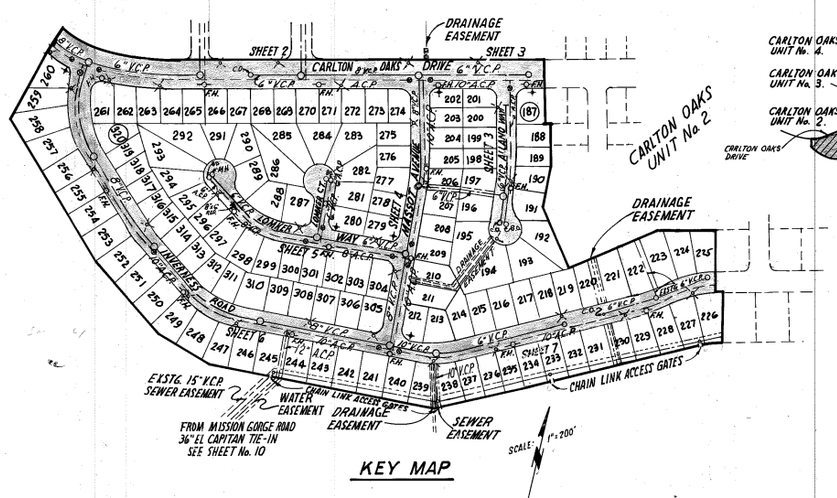
THE CONSTRUCTION OF CURB INLET TYPE "K" 104-2

THE CONSTRUCTION OF DROP INLET TYPE "I" 106-1

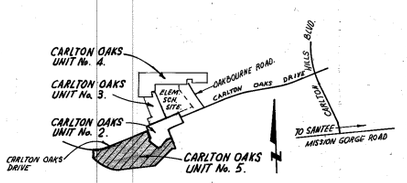
THE CONSTRUCTION OF HEADWALL WING TYPE

THE CONSTRUCTION OF HEADWALL SINGLE TYPE 126-1

THE CONSTRUCTION OF CLEANOUT 102-1, 103-1

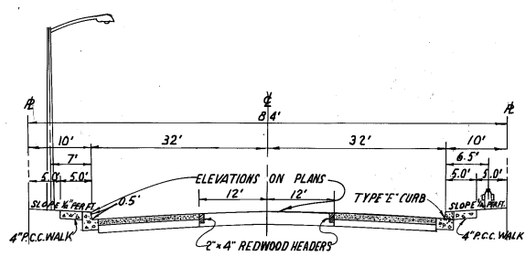


KEY MAP



VICINITY MAP

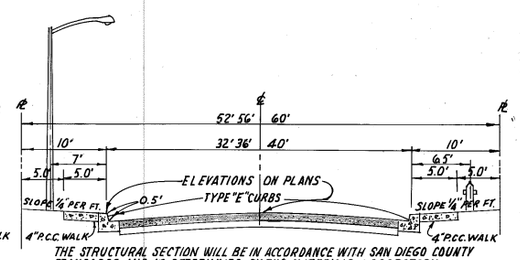
NO SCALE



THE STRUCTURAL SECTION WILL BE IN ACCORDANCE WITH SAN DIEGO COUNTY STANDARDS AND AS DETERMINED BY THE MATERIALS LABORATORY.

CARLTON OAKS DRIVE SECTION

NO SCALE



THE STRUCTURAL SECTION WILL BE IN ACCORDANCE WITH SAN DIEGO COUNTY STANDARDS AND AS DETERMINED BY THE MATERIALS LABORATORY.

TYPICAL STREET SECTION

NO SCALE

AS-BUILT
Arthur B. Shuttleff Aug 25 1972

PREPARED BY
PRECISION INC.
2030 STATE STREET,
SAN DIEGO, CALIF.
239-3871

PRIVATE CONTRACT

APPROVAL FOR WATER AND SEWER
SANTEE COUNTY WATER DISTRICT

APPROVED BY: _____ ASSIST. MANAGER. ENGINEER

DATE: 6-22-71

COUNTY APPROVED CHANGES

No.	Description	Approved by	Date
	As Built	[illegible]	9-26-73

BENCH MARK

Description: 2" BRASS PLUG IN STAIRWAY LANDING

Location: N.E. CORNER SANTEE SEWAGE TREATMENT PLANT CONTROL BUILDING

Record From: T.M. 2060 SHEET No. 2

Elevation: 324.74 Datum: U.S.G.S.

SHEET 1 | COUNTY OF SAN DIEGO ENGINEERING DEPARTMENT | 10 SHEETS

PLANS FOR IMPROVEMENTS IN AND ADJOINING CARLTON OAKS UNIT No. 5

Recommended for Approval: J.C. Williams, Subdivision Engineer

Approved: R.J. Massman, Asst. County Engineer

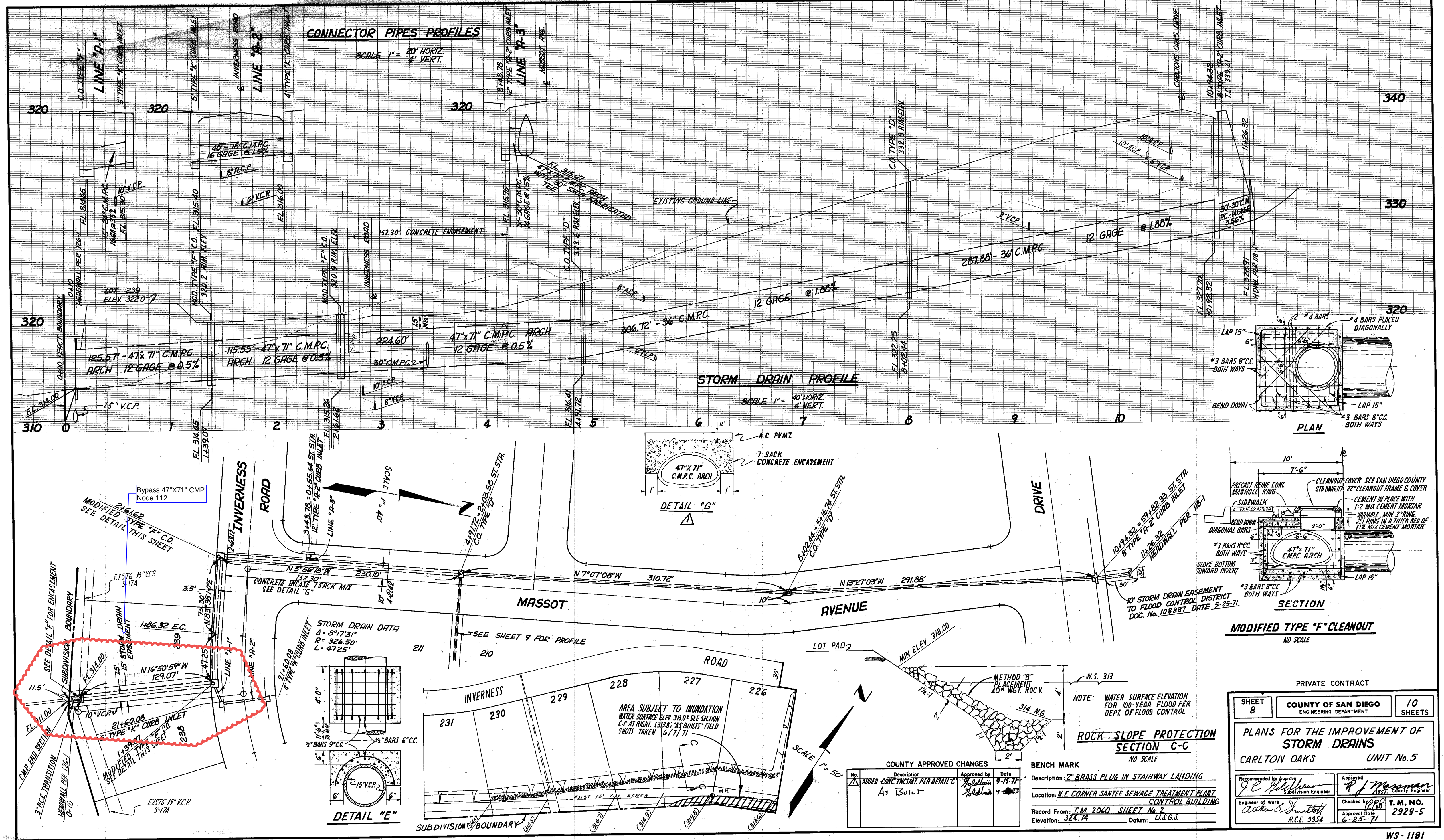
Engineer of Work: Arthur B. Shuttleff, RCE 9954

Checked by: [illegible]

Approval Date: 6-25-74

T. M. NO. 2929-5

WS-1174


CONNECTOR PIPES PROFILES
SCALE 1" = 20' HORIZ. 4' VERT.
LINE "A-1"
LINE "A-2"
LINE "A-3"
C.O. TYPE "F"
5' TYPE "K" CURB INLET
4' TYPE "K" CURB INLET
INVERNESS ROAD
MASSOT AVE.
CARLTON OAKS DRIVE
40' - 18" C.M.P.C. 16 GAGE @ 1.5%
8" A.C.P.
6" V.C.P.
10" V.C.P.
15" V.C.P.
EXISTING GROUND LINE
152.30' CONCRETE ENCASEMENT
LOT 239 ELEV. 322.0
125.57' - 47" x 71" C.M.P.C. ARCH 12 GAGE @ 0.5%
115.55' - 47" x 71" C.M.P.C. ARCH 12 GAGE @ 0.5%
224.60' 47" x 71" C.M.P.C. ARCH 12 GAGE @ 0.5%
306.72' - 36" C.M.P.C. 12 GAGE @ 1.88%
287.88' - 36" C.M.P.C. 12 GAGE @ 1.88%
STORM DRAIN PROFILE
SCALE 1" = 40' HORIZ. 4' VERT.
C.O. TYPE "D" 323.6 RIM ELEV.
C.O. TYPE "D" 332.9 RIM ELEV.
A.C. PVMT.
7 SACK CONCRETE ENCASEMENT
47" X 71" C.M.P.C. ARCH
DETAIL "G"
MODIFIED TYPE "F" CLEANOUT
NO SCALE
PLAN
SECTION
Bypass 47"X71" CMP Node 112
MASSOT AVENUE
INVERNESS ROAD
DRIVE
N 5°56'18"W 230.10'
N 7°07'08"W 310.72'
N 13°27'03"W 291.88'
N 16°50'59"W 129.07'
STORM DRAIN DATA Δ = 8°17'31" R = 326.50' L = 47.25'
SEE SHEET 9 FOR PROFILE
10' STORM DRAIN EASEMENT TO FLOOD CONTROL DISTRICT DOC. No. 108887 DATE 5-25-71
DETAIL "E"
AREA SUBJECT TO INUNDATION
ROCK SLOPE PROTECTION SECTION C-C
NO SCALE
NOTE: WATER SURFACE ELEVATION FOR 100-YEAR FLOOD PER DEPT. OF FLOOD CONTROL
COUNTY APPROVED CHANGES
ADDED CONC. ENCSMT. PER DETAIL G
As Built
BENCH MARK
Description: 2" BRASS PLUG IN STAIRWAY LANDING
Location: N.E. CORNER SANTEE SEWAGE TREATMENT PLANT CONTROL BUILDING
Record From: T.M. 2060 SHEET No. 2
Elevation: 324.14 Datum: U.S.G.S.
PRIVATE CONTRACT
SHEET 8
COUNTY OF SAN DIEGO ENGINEERING DEPARTMENT
10 SHEETS
PLANS FOR THE IMPROVEMENT OF STORM DRAINS
CARLTON OAKS UNIT No. 5
R.C.E. 9954
T.M. NO. 2929-5
Approval Date 6-25-71
WS - 1181
OCT 4 1973
MICROFILMED

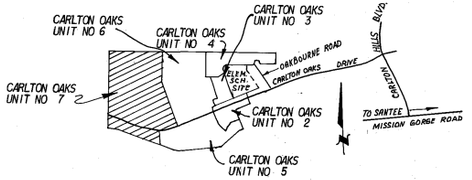
CARLTON OAKS
UNIT NO. 7

SEWER LATERAL TABLE

LOT NO.	INV. ELEV @ MAIN	DROP TO MAIN	LENGTH	INV. EL @ PROP. LINE	CURB ELEV. SEWER	DEPTH @ P.L.	CURB ELEV. WATER	REMARKS
511	331.1	0.3	26	334.3	339.6	5.5	339.6	
512	331.6			334.6	339.9		339.9	
513	332.3			335.0	340.3		340.3	
514	332.9			335.4	340.7		340.6	
515	333.6			335.7	341.0		341.0	
516	334.2			336.1	341.4		341.4	
517	334.6			336.5	341.8		341.7	
518	335.0		26	336.8	342.1		342.1	
519	335.2		30	337.1	342.4		341.3	
520	335.2		42	337.2	342.5		342.5	
521	335.2		58	337.3	342.7		342.8	
522	335.2		67	337.5	342.8		342.9	
523	335.1		67	337.1	342.4		342.4	
524	334.6		26	336.5	341.8		341.7	
525	334.1			336.1	341.4		341.4	
526	333.6			335.7	341.0		341.0	
527	332.9			335.4	340.7		340.6	
528	332.3			335.0	340.3		340.3	
529	331.7			334.7	340.0		339.8	
530	331.0		26	334.1	339.4		339.6	
531	322.7		42	326.7	332.0		331.9	T.M.2929-5
532	319.3			324.4	329.7		329.3	T.M.2929-5
533	317.2			323.4	328.7		328.6	T.M.2929-5
534	317.5			322.7	328.0		328.1	
535	321.8			323.8	334.1		333.8	T.M.2929-5
536	317.8			325.4	327.7		327.8	
537	319.9		26	322.4	327.7		327.6	
538	321.1			323.6	328.9		326.7	
539	322.2			324.5	329.8		329.7	
540	323.2			325.4	330.7		330.6	
541	324.3		26	326.5	331.8		331.5	
542	325.6		43	327.7	333.0		333.2	
543	326.2		69	328.5	333.8		334.0	
544	326.2		35	328.5	333.8		333.8	
545	326.4		26	328.0	333.3		333.2	
546	325.0			327.0	332.3		332.2	
547	325.0			326.1	331.4		331.3	
548	322.9			325.1	330.5		330.5	
549	321.8			324.2	329.5		329.6	
550	320.7			323.2	328.5		328.4	
551	319.6		26	322.2	327.5		327.5	
552	321.1		28	322.8	328.2		328.0	
553	322.4			324.3	329.6		329.5	
554	323.8			325.6	330.9		330.7	
555	325.2			326.9	332.2		332.1	
556	326.4			328.1	333.4		333.3	
557	327.7			329.3	334.6		334.5	
558	328.9			330.6	335.9		335.8	
559	330.1			331.8	337.1		337.0	
560	331.3			333.0	338.3		338.1	
561	332.7			334.4	339.7		339.6	
562	334.3			335.9	341.2		341.0	
563	336.1			337.6	342.9		343.0	
564	337.4			338.9	344.2		345.2	
565	338.2			339.7	345.0		345.2	
566	338.2			339.8	345.1		345.1	
567	337.1			338.9	344.2		344.0	
568	335.8			337.6	342.9		342.8	
569	334.8			336.5	341.8		341.8	
570	333.7			335.3	340.6		340.5	
571	332.7			334.3	339.6		339.8	
572	331.0			332.6	337.9		338.0	
573	330.2			331.7	337.0		337.1	
574	328.9			330.4	335.7		335.7	
575	327.6			329.1	334.4		334.5	
576	326.4			327.9	333.2		333.3	
577	325.2			326.7	332.0		332.0	
578	323.9			325.4	330.7		330.7	
579	322.4			324.1	329.4		329.4	
580	321.2		28	322.9	328.2		328.3	
581	320.1		42	326.3	329.6		329.6	
582	320.2			325.1	330.4		330.3	
583	320.5			325.3	330.6		330.6	
584	320.7		42	325.1	330.4		330.4	
585	320.7		30	324.3	329.6		329.5	
586	323.0		30	324.8	330.1		329.9	
587	323.5		30	325.4	330.7		330.8	
588	327.5		48	329.3	334.6		334.6	
589	327.5		51	329.8	335.1		335.1	
590	327.5		50	330.1	335.4		335.4	
591	327.5		50	330.0	335.3		329.1	
592	327.5		50	329.9	335.2		335.3	
593	327.5		46	329.1	334.4		334.3	
594	327.4		30	329.3	334.6		334.7	
595	327.8			329.7	335.0		335.0	
596	328.1			330.2	335.5		335.4	
597	328.5			331.3	336.6		336.5	
598	331.3			331.1	338.9		338.2	
599	334.0		30	335.7	341.0		340.7	
600	342.0		48	343.6	348.9		348.5	
601	342.1		50	344.4	349.7		349.6	
602	342.1		50	344.8	350.1		350.1	
603	342.1		50	344.8	350.1		350.1	
604	342.1		48	344.5	349.8		349.8	
605	341.8		42	344.1	349.4		350.8	
606	346.0		30	349.8	355.1		354.8	
607	347.7		30	351.5	356.8		356.6	
608	349.6			352.5	357.8		357.8	
609	351.4			353.4	358.7		358.5	
610	353.7			355.4	360.7		360.4	
611	356.2			358.2	363.5		363.2	
612	358.7			361.2	366.5		366.0	
613	361.0		30	363.7	369.0	5.5	369.2	
614	364.0		38	365.1	369.5	4.6	369.4	
615	363.9		30	366.8	369.8	5.2	369.8	
616	364.0			364.9	370.2	5.5	370.1	
617	366.3			365.3	370.6		370.6	
618	366.8			366.2	371.5		371.6	
619	365.0			368.1	373.4		373.1	
620	365.3			370.7	376.0		375.5	
621	366.4			373.9	379.2		378.8	
622	367.2			376.3	381.7		381.3	
623	368.2			378.1	383.4		383.2	
624	368.9			378.5	383.8		383.6	
625	369.9			377.9	383.2		383.0	
626	370.5			375.8	381.1		380.8	
627	370.8		30	373.3	378.6	5.5	378.5	
628	370.9		36	372.0	375.8	4.0	375.1	
629	370.7		30	372.5	378.8	5.5	378.9	
630	370.5	0.3	30	376.3	381.6	5.5	381.2	
631	369.8	0.3	30	378.1	383.4	5.5	383.1	
632	369.0			378.4	383.7		383.7	
633	368.1			377.7	383.0		383.0	
634	367.1			375.7	381.0		380.9	
635	366.3			373.4	378.7		378.5	
636	365.4			370.7	376.0		376.0	
637	365.0			367.9	373.2		373.0	
638	364.8			364.8	371.3		371.3	
639	364.6			365.6	370.9		370.9	
640	364.3			365.2	370.5	5.5	370.5	
641	364.1		30	365.0	370.2	5.4	370.2	
642	355.7		30	357.1	362.4	5.5	362.5	
643	355.0			356.7	362.0		361.7	
644	356.0			358.2	363.5		363.3	
645	357.1			359.2	364.5		364.5	
646	358.0		30	359.4	364.7		364.7	
647	356.6		43	358.4	363.7		363.8	
648	355.8		30	357.3	362.6		362.4	
649	354.3			355.7	361.0		360.8	
650	352.6			354.1	359.4		359.3	
651	351.0			352.6	357.9		357.8	
652	349.3		30	351.1	356.4		356.2	
653	347.8		55	349.5	354.8		354.4	
654	347.0		65	348.6	353.9	5.5	353.6	
655	346.3		52	347.5	352.8	5.3	352.8	
656	345.7		36	347.4	352.7	5.5	352.6	
657	345.4		30	346.6	351.9		351.8	
658	342.7			344.6	349.9		349.8	
659	340.7			342.3	347.6		347.2	
660	338.5			339.9	345.2		345.0	
661	335.9			337.1	342.4		342.1	
662	333.5			334.5	339.8		339.5	
663	330.9			331.9	337.2		336.9	
664	328.6			329.8	335.1		335.0	
665	327.0			328.3	333.6		333.4	
666	325.9			327.2	332.5		332.4	
667	324.8			326.4	331.7		331.7	
668	323.6			325.6	330.9		330.8	
669	322.8		30	324.6	329.9		329.8	
670	321.4		42	324.0	329.3		329.3	
671	321.1			324.5	329.8		329.7	
672	320.9			324.9	330.2		330.2	
673	320.7			325.2	330.5		330.5	
674	320.3			325.3	330.6		330.6	
675	320.0			324.1	329.4		329.5	
676	319.8			323.3	328.6		328.5	
677	319.5			322.5	327.8		327.7	
678	319.3			321.7	327.0		326.9	
679	319.0			320.9	326.2		326.1	
680	318.7			320.9	326.2		326.3	
681	318.5			321.3	326.6		326.7	
682	318.2			321.7	327.0		327.2	
683	318.0			322.0	327.3		327.2	
684	317.8			322.4	327.7		327.6	
685	317.6		42	322.6	327.9		327.8	
686	325.7		30	327.1	332.4		332.3	
687	326.8			328.0	333.3		333.3	
688	328.0			329.5	334.8		334.7	
689	330.6			331.9	337.2		336.9	
690	332.7			334.0	339.3		339.2	
691	335.4			337.0	342.3		342.0	
692	337.7			339.3	344.6		344.4	
693	340.1			342.0	347.3		346.9	
694	342.2			344.3	349.6		349.3	
695	344.0			346.2	351.5		351.3	
696	345.5		30	347.5	352.8		352.4	
697	352.0		30	353.6	358.9		359.2	
698	348.5		32	350.9	356.2		356.2	
699	348.5		28	348.8	353.6		353.0	
700	343.6			345.5	350.8		350.2	
701	340.6			342.1	347.4		347.0	
702	337.8			338.7	344.0		343.5	
703	335.9			337.2	343.0		341.0	
704	332.5			336.1	339.4		339.3	
705	330.0			332.4	337.7		337.5	
706	329.1			331.1	336.4		336.2	
707	327.6			329.3	334.6		334.3	
708	327.4		28	329.1	334.4		334.2	
709	327.6		30	329.5	334.8		334.7	
710	328.2			330.3	335.6		335.5	
711	329.6			332.0	337.3		337.1	
712	332.5			334.2	339.5		339.2	
713	336.7			338.5	343.8		343.5	
714	340.0			341.5	346.8		346.5	
715	343.3			346.1	351.4		351.0	
716	345.4			348.8	354.1		353.8	
717	347.3			351.6	356.9		356.1	
718	350.8		30	352.8	358.1		360.0	
719	355.0			356.6	362.1		361.8	
720	356.0			358.5	363.8		363.6	
721	357.2			359.4	364.7		364.6	
722	358.1		30	359.3	364.6		364.7	
723	356.6		38	358.3	363.6		364.0	
724	355.5		30	356.7	362.0		362.0	
725	346.3		26	346.2	351.5		351.3	
726	345.8		26	347.6	352.9		352.7	
727	347.5		26	349.2	354.5		354.2	
728	348.0		28	350.0	355.3		355.5	
729	348.0		35	350.2	355.5		355.5	
730	348.0		60	350.5	355.8		355.8	
731	348.0		65	350.5	355.8		355.8	
732	347.5		66	349.9	355.2		354.7	
733	345.8		26	347.7	353.0		352.8	
734	344.2		26	346.1	351.4		351.1	
735	334.9		28	335.9	341.2		340.7	
736	332.4		28	334.0	339.3		338.8	
737	329.6	0.3	28	331.8	337.1	5.5	337.4	

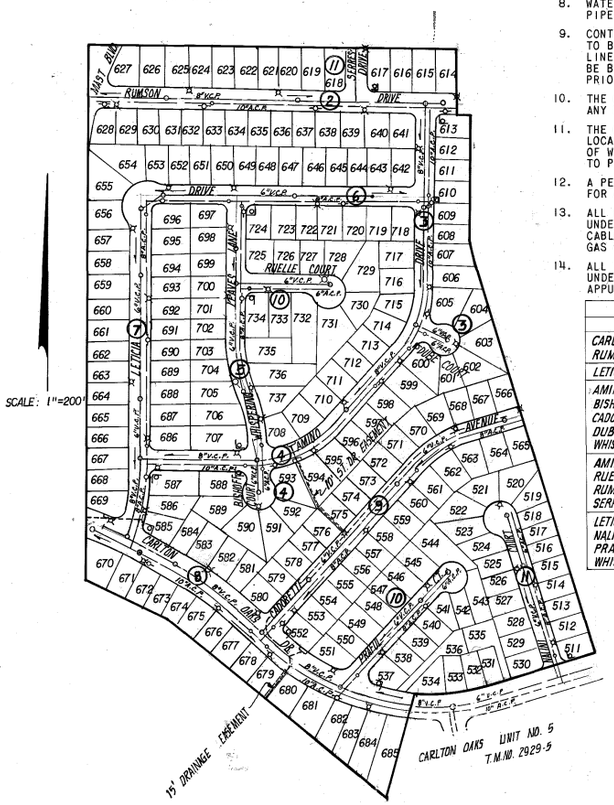
VICINITY MAP

NOT TO SCALE



KEY MAP

SCALE: 1"=200'



GENERAL NOTES

1. ALL UNDERGROUND UTILITIES & LATERALS TO BE INSTALLED BEFORE CONSTRUCTION OF CURBS, OR CONCRETE CROSSGUTTERS, OR SURFACING OF STREETS.
2. EACH LOT WILL BE SERVED BY A 4" DIAMETER SEWER LATERAL. LOCATION OF SEWER LATERAL WILL BE DETERMINED IN FIELD BY ENGINEER OF WORK. "AS CONSTRUCTED" SEWER LATERALS LOCATION SHALL BE SHOWN ON THESE PLANS. ORIGINAL PLANS & SEWER LATERAL DATA TABLE TO BE COMPLETED PRIOR TO ACCEPTANCE BY THE SANTEE COUNTY WATER DISTRICT.
3. EACH LOT SHALL RECEIVE A 1" COPPER WATER LATERAL. THE LOCATION SHALL BE DETERMINED BY THE ENGINEER OF WORK & SHALL BE CONSTRUCTED PERPENDICULAR TO THE CENTER LINE OF THE STREET. "AS CONSTRUCTED" LOCATIONS SHALL BE SHOWN ON THESE PLANS AND BE SUBMITTED TO THE SANTEE COUNTY WATER DISTRICT FOR APPROVAL PRIOR TO NOTICE OF COMPLETION.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING & MAINTAINING ALL EXISTING UNDERGROUND UTILITIES DURING CONSTRUCTION.
5. ALL WATER MAINS SHALL BE CLASS 150 & HAVE A MINIMUM COVER OF 36".
6. THE LETTER "S" SHALL BE STAMPED AT ALL SEWER LATERAL LOCATIONS (IN THE CURB).
7. ALL MANHOLE COVERS & GATE WELL COVERS SHALL BE ADJUSTED TO FINISH GRADE, NEW OR EXISTING.
8. WATER MAIN TRENCH GRADES ARE TO BE 4" BELOW BOTTOM OF PIPE GRADES.
9. CONTRACTOR SHALL UNCOVER LOCATION OF CONNECTIONS PRIOR TO BEGINNING INSTALLATION TO ENSURE CONFORMANCE WITH LINES & GRADES SHOWN ON PLANS. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE DISTRICT ENGINEER PRIOR TO PROCEEDING.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RELOCATION OF ANY EXISTING WATER SERVICE APPURTENANCES.
11. THE CONSTRUCTION OF ONE PCC STANDARD DRIVEWAY PER LOT, LOCATION TO BE DETERMINED IN THE FIELD BY THE ENGINEER OF WORK. PCC SURFACING OF DRIVEWAY TO EXTEND FROM CURB TO PROPERTY LINE. USE STANDARD DWGS. 207-3, 305-2, 306-1
12. A PERMIT SHALL BE ACQUIRED FROM THE COUNTY ROAD DEPARTMENT FOR ANY EXCAVATION WITH THE EXISTING RIGHT OF WAY.
13. ALL ELECTRICAL & GAS SERVICES WITHIN THIS SUBDIVISION ARE UNDERGROUND INSTALLATIONS. FOR LOCATION OF ELECTRICAL CABLES & GAS PIPING & APPURTENANCES CONTACT: SAN DIEGO GAS & ELECTRIC CO.
14. ALL TELEPHONE SERVICES WITHIN THIS SUBDIVISION ARE UNDERGROUND INSTALLATIONS. FOR LOCATION OF CABLES & APPURTENANCES CONTACT: PACIFIC TELEPHONE CO.

PAVING SCHEDULE

2" A.C. OVER CLASS 3 A.B. (THICKNESS AS NOTED)

CARLTON OAKS DRIVE RUMSON DRIVE (WEST OF LOT 622)	2" ON 8"
LETICIA DRIVE (WEST OF WHISPERING LEAVES LANE)	2" ON 7"
AMINO DRIVE (SOUTH OF LOT 610) BISHOP COURT CADORETTE AVENUE DUBE COURT WHISPERING LEAVES LANE (SOUTH OF LOT 736)	2" ON 6"
AMINO DRIVE (NORTH OF LOT 609) RUELLE COURT RUMSON DRIVE (EAST OF LOT 623) SERRES DRIVE	2" ON 5"
LETICIA DRIVE (EAST OF WHISPERING LEAVES LANE) NALINI COURT PRAFUL COURT WHISPERING LEAVES LANE (NORTH OF LOT 736)	2" ON 4"

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE IN ACCORDANCE WITH THESE PLANS: THE CURRENT SAN DIEGO COUNTY ENGINEERING DEPARTMENT STANDARD SPECIFICATIONS, AND SPECIAL PROVISIONS FOR SUBDIVISION STREETS AND STANDARD REFERENCE DRAWINGS.

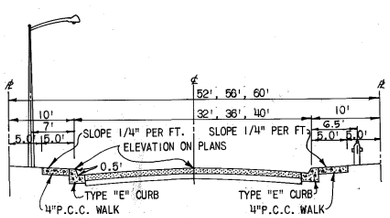
THE CONSTRUCTION OF VITRIFIED CLAY PIPE SEWER MAINS SHOWN THUS _____
THE CONSTRUCTION OF 4" VITRIFIED CLAY PIPE SEWER LATERALS SHOWN THUS _____
THE CONSTRUCTION OF CONCRETE MANHOLES SHOWN THUS _____
THE CONSTRUCTION OF STANDARD V.C.P. CLEANOUT SHOWN THUS _____
THE CONSTRUCTION OF CLASS 150 ASBESTOS CEMENT WATER MAINS SHOWN THUS _____
THE CONSTRUCTION OF 1" COPPER WATER LATERALS SHOWN THUS _____
THE CONSTRUCTION OF 6" FIRE HYDRANTS AND APPURTENANCES COMPLETE SHOWN THUS _____
THE CONSTRUCTION OF GATE VALVE ASSEMBLY SHOWN THUS _____
THE CONSTRUCTION OF BLOWOFF SHOWN THUS _____
THE GRADING OF STREETS SHOWN THUS _____
THE PREPARATION OF SUBGRADE AND PAVING OF STREETS SHOWN THUS _____
THE CONSTRUCTION OF 6" TYPE "E" CURB & GUTTER _____ 200-3 _____
THE CONSTRUCTION OF CONCRETE SIDEWALK SHOWN THUS _____ 212-2 _____
THE CONSTRUCTION OF STANDARD CONC. DRIVEWAY SHOWN THUS 207-3, 305-2, 306-1
THE INSTALLATION OF ELECTROLIERS SHOWN THUS _____ EXHIBIT B _____
THE INSTALLATION OF STREET NAME SIGN SHOWN THUS _____ 301-2 _____
THE CONSTRUCTION OF TYPE CS GUARD FENCES SHOWN THUS _____ 214 _____
THE CONSTRUCTION OF X-GUTTER WITH RETURN SEGMENTS _____ 205-1 _____
THE INSTALLATION OF STREET MONUMENTS _____ 218, 219 _____
THE CONSTRUCTION OF TYPE B-2 CURB INLET _____ 101-2, 111-3, 224-1
THE CONSTRUCTION OF STORM DRAIN PIPE _____ 220-1 _____
THE CONSTRUCTION OF HEADWALL _____ 126-1 _____
THE CONSTRUCTION OF CONCRETE LUG _____ 110 _____
THE CONSTRUCTION OF TYPE "K" INLET _____ 104-2, 223-1 _____
THE CONSTRUCTION OF TYPE A-2 INLET _____ 100-2, 131 _____
THE CONSTRUCTION OF CLEANOUT _____ 102-1, 117-1 _____
THE CONSTRUCTION OF CUTOFF WALLS _____ 203-1 _____

THE CONSTRUCTION OF IMPACT TYPE ENERGY DISSAPATOR _____

SEWER AND WATER WORK TO BE DONE

THE WATER & SEWER MAIN CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH THESE PLANS & THE STANDARD SPECIFICATIONS FOR SEWER & WATER CONSTRUCTION OF THE SANTEE COUNTY WATER DISTRICT ADOPTED NOVEMBER 21, 1966, RESOLUTION No. 1047

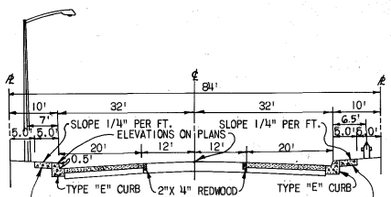
AS-BUILTS 7/17/73
Arthur B. Shurtleff
ARTHUR B. SHURTLEFF R.C.E. 9954



THE STRUCTURAL SECTION WILL BE IN ACCORDANCE WITH SAN DIEGO COUNTY STANDARDS AND AS DETERMINED BY THE MATERIALS LABORATORY.

TYPICAL STREET SECTION

NOT TO SCALE



THE STRUCTURAL SECTION WILL BE IN ACCORDANCE WITH SAN DIEGO COUNTY STANDARDS AND AS DETERMINED BY THE MATERIALS LABORATORY.

CARLTON OAKS DRIVE SECTION

NOT TO SCALE

PRIVATE CONTRACT L-6192

SEWER AGENCY

APPROVED BY M. Gale Ruffini
ASST. MANAGER-ENGINEER
DATE 2-29-72 16595 R.C.E.

WATER AGENCY

APPROVED BY M. Gale Ruffini
ASST. MANAGER-ENGINEER
DATE 2-29-72 16595 R.C.E.

COUNTY APPROVED CHANGES

No.	Description	Approved by	Date
1	STRUCTURAL SECTIONS AS BUILT	Holtman Holtman	3-20-74 8-20-74

BENCH MARK

Description: 2" BRASS PLUG IN STAIRWAY LANDING
Location: N.E. CORNER SANTEE SEWAGE TREATMENT PLANT CONTROL BUILDING
Record From: T.M. 2060 SHEET NO. 2
Elev: 324.74 Datum: U.S.G.S.

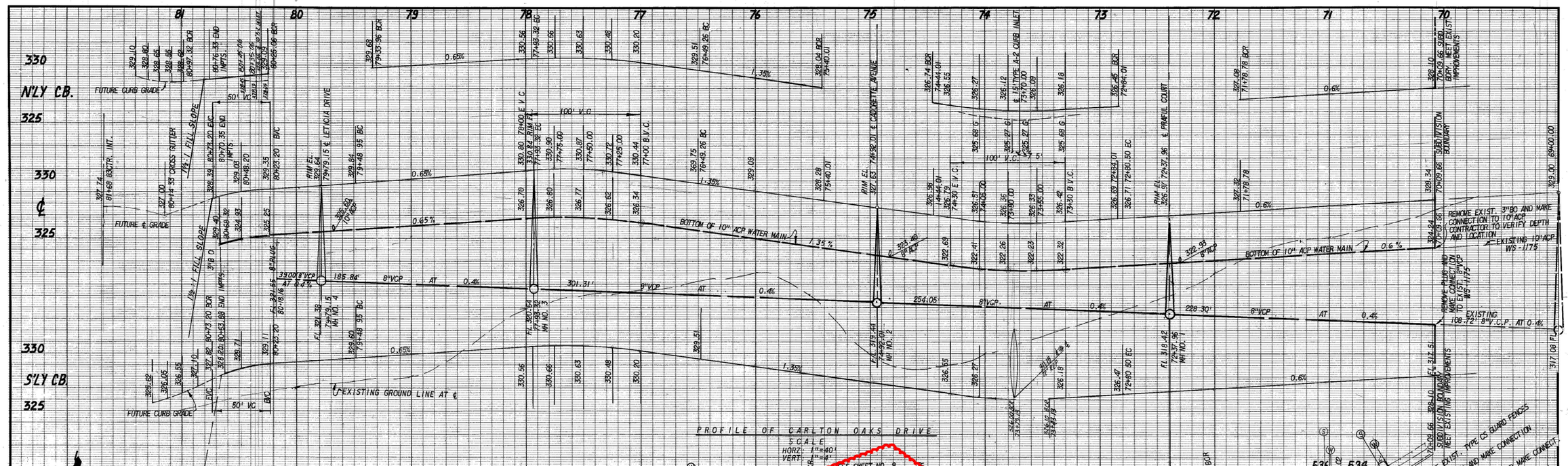
SHEET 1 | COUNTY OF SAN DIEGO ENGINEER DEPARTMENT | 15 SHEETS

PLANS FOR THE IMPROVEMENT OF

CARLTON OAKS UNIT NO 7

Recommended for Approval: J. C. Holtzman, Subdivision Engineer
Approved: R. J. Massman, Asst. County Engineer
Engineer of work: Arthur B. Shurtleff, R.C.E. 9954
Checked by: [illegible] 3019-7
Approval date: 5-10-72 T.M.

FILE NO. WS-1250



PRIVATE CONTRACT

SHEET 8	COUNTY OF SAN DIEGO ENGINEERING DEPARTMENT	15 SHEETS

PLANS FOR THE IMPROVEMENT OF
CARLTON OAKS DRIVE
CARLTON OAKS UNIT NO 7

Recommended for Approval: Subdivision Engineer	Approved: Board of Supervisors 1587 County Engineer
Engineer of Work: Arthur S. Schmitt R.C.E. 9954	Checked 12/28 T. M. NO. 3019-7
	Approval Date 5-10-72

COUNTY APPROVED CHANGES

No.	Description	Approved by	Date
1	AS-BUILTS SEWER & WATER LATERALS As Built	J.M. Williams J.M. Williams	8-20-74 8-20-74

BENCH MARK

Description: 2" BRASS PLUG IN STAIRWAY LANDING
Location: N.E. CORNER SANTEE SEWAGE TREATMENT PLANT CONTROL BUILDING
Record From: T.M. 2060 SHEET NO. 2
Elevation: 324.74 Datum: U.S.G.S.

WS-1257

WS-247

293

PROFILE: CARLTON OAKS DRIVE
Scales: Hor. 1"=50'
Vert. 1"=5'

CURB RETURN PROFILES
Scales: Hor. 1"=10'
Vert. 1"=5'

INWOOD DR. PROFILE
Scales: Hor. 1"=50'
Vert. 1"=5'

PLAN
Scale - 1"=50'

See WS-564 FOR CONT.

See Sheet WS-248

See Sheet WS-250

See Sheet WS-246

CARLTON OAKS DRIVE

OAKBOURNE ROAD

BURNING TREE WAY

INWOOD DR.

NOTE: ALL FIVE LOTS ARE TIED TO THIS LATERAL & SERVICE

Remove EXIST. plug & connect 6" V.C.P.

42" Bypass

BENCH MARK
Description: See Sheet No 1
Location:
Record From:
Elev.: Datum:

Rev. 6-1-67 J.E.H.

PRIVATE CONTRACT

SHEET	SANTEE COUNTY WATER DISTRICT SANTEE CALIFORNIA	10 SHEETS

PLANS FOR THE IMPROVEMENTS OF WATER & SEWER MAINS IN AND ADJOINING CARLTON COUNTRY CLUB ESTATES UNIT No 1

Recommended for Approval	Approved L. W. Brunner
Engineer of District Robert L. Flores R.C.E. 6335	Checked by E.W.H. Approval Date Sept. 8, 1959 WS-247

No.	Description	REVISED BY	Date
1	Changed Street Name	C.S.	2-2-70
2	UP DATE SERVICES	R.L.L.	11-29-71
3	REPLACED 1"P W/ 1"C	C.M.	3-13-00

LAWRENCE, FOGG, FLORER & SMITH
CIVIL ENGINEERS
4769 SPRING STREET NO. 9-6194 LA MESA, CALIF.

THIS DOCUMENT IS FURNISHED FOR INFORMATION ONLY, AND THE LOCATION OF FACILITIES SHOWN ARE SUBJECT TO FIELD VERIFICATION PRIOR TO CONSTRUCTION PADRE DAM MUNICIPAL WATER DISTRICT (619)258-4635

"AS-BUILT"
DATE March 15, 1960

FILE NO. 490-12

293