CAMPUS PARK PROJECT

APPENDIX L

HYDROLOGY AND WATER QUALITY

SPA 03-008, GPA 03-004, R03-014, VTM 5338 RPL7,
S 07-030, S 07-031, LOG No. 03-02-059
State Clearinghouse No. 2005011092

for the

DRAFT FINAL SUBSEQUENT
ENVIRONMENTAL IMPACT REPORT

DECEMBER 3, 2010

FINAL ENVIRONMENTAL IMPACT REPORT
HYDROLOGY AND HYDRAULICS STUDY
INFORMATION FOR THE READER

This document consists of the Hydrology and Hydraulics Study (Hydrology Study) for the Campus Park Project (Proposed Project or Project) and analyzes hydrologic-related elements associated with construction and operation of the Project. Since circulation of the Project Draft Environmental Impact Report (EIR) and associated technical reports, refinements in Project description have been implemented in response to comments received.

The majority of Project refinements occur west of future Horse Ranch Creek Road and all of them would be south of proposed Harvest Glen Lane. The majority of the developed uses and their construction footprints (residential, office professional, recreational and commercial) remain the same as previously analyzed.

South of future Harvest Glen Lane and west of future Horse Ranch Creek Road, the Proposed Project has been refined to: (1) eliminate some development areas, (2) modify specifics of development detail in some areas, and (3) eliminate the potential for connection to an off-site future wastewater treatment plant (WTP) to be constructed by others. Specifics of road design improvements also vary.

Overall, primary design changes result in 325 fewer multi-family homes (a reduction of 41 percent), and an increase in the biological open space preserve of 20.7 acres (or 11 percent). See Figure A for a comparison of the Project evaluated in the Draft EIR with the current plan.

Project refinements relevant to this technical report are addressed below.

Relevant Refinements to Project Description

The Draft EIR included two multi-family residential areas (MF-1 and MF-4) west of future Horse Ranch Creek Road and north of SR 76. These areas were proposed to contain a total of 300 residential units sited on a total of 21.1 acres. Both have been eliminated and now would largely be in open space. Within the MF area east of future Horse Ranch Creek Road and north of future Harvest Glen Lane, Draft EIR MF-3 has been renamed MF-1. The style of housing in MF-2 has been changed to match that of new MF-1, and the density of MF housing in both MF-1 and MF-2 has been reduced.

A 2.4-acre detention basin was previously located south of (now eliminated) multi-family housing west of Horse Ranch Creek Road. With the elimination of that housing, this basin has been relocated to the north, and the basin size and shape have been modified to encompass a surface area of approximately 5.2 acres (although the detention capacity has not changed as the current basin is shallower). Similarly, a 2.6-acre potential wet weather storage pond associated with a previous wastewater management option would be eliminated (along with any associated impacts), as would any utility lines required to tie into the proposed off-site WTP under this option.

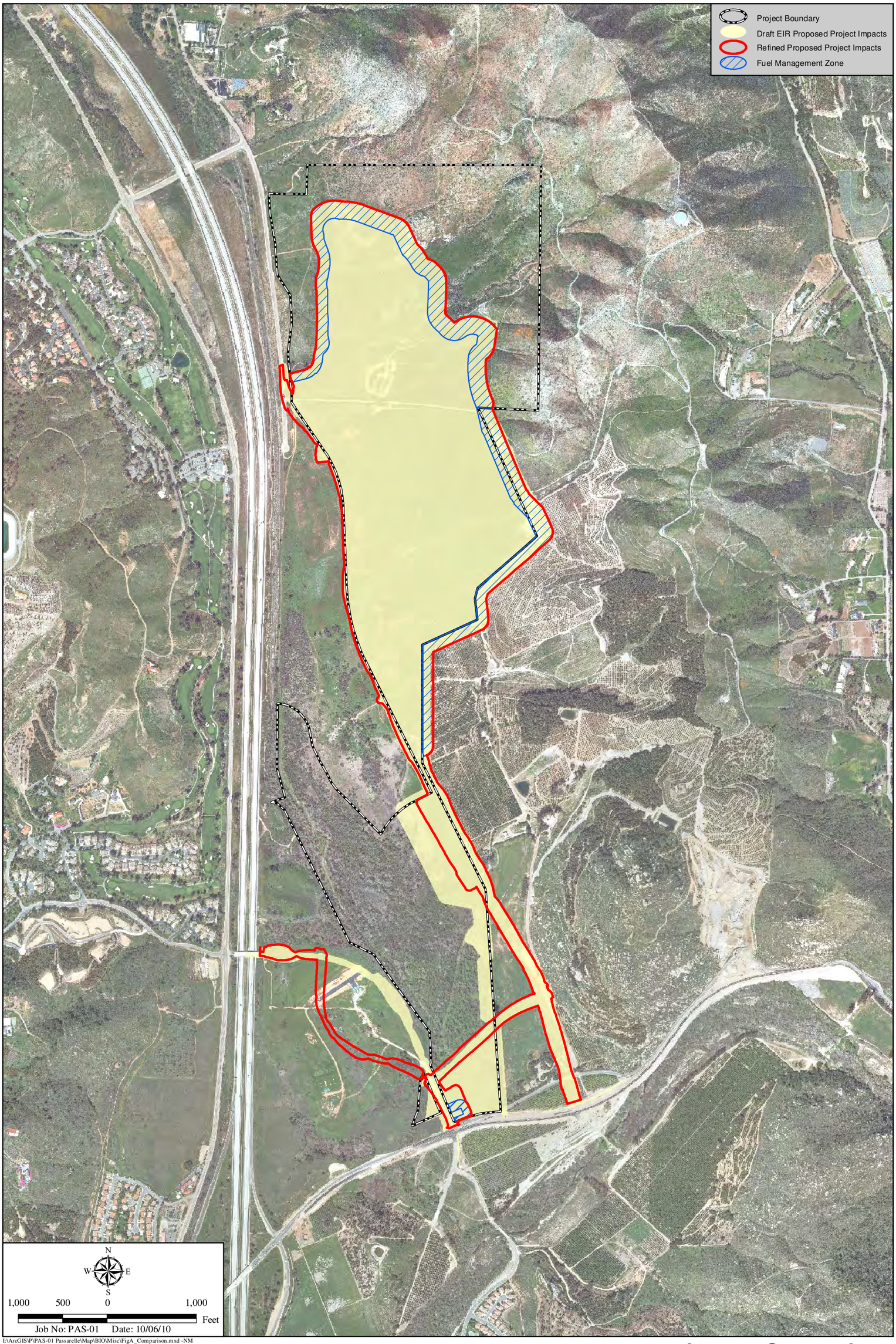
A sewer lift or pump station and trail staging area would be moved from an isolated small Project parcel west of future Pankey Road and north of SR 76 to east of future Pankey Road, in the old area of MF-4.

Changes have been made to specific design of an off-site portion of future Pala Mesa Drive, Pankey Road and on-site Pankey Place. With regard to Pala Mesa Drive/Pankey Road, modifications resulted from a request by the abutting Campus Park West Project to shift a portion of the alignment, and this shift has been worked out in coordination with the Department of Public Works. For on-site Pankey Place, the modification is related to deletion of MF-4 on the south side of the road, and retention of open space.

Technical Analysis Modifications Based on Project Description Refinements

With regard to hydrologic and hydraulic considerations, the described changes to the Project would result in an overall reduction of new impervious surface areas and associated Project-related runoff generation. While the on-site detention basin, Pala Mesa Drive/Panky Road and Pankey Place have been relocated/reconfigured as noted, the related basin capacity and hydrologic/hydraulic conditions associated the on- and off-site roadways would remain essentially the same and Project Environmental Design Considerations committed to as part of the Proposed Project would be implemented. Specifically, the modified detention basin would be adequate to accommodate all Project-related runoff, with no change to the related conclusions provided in the attached Hydrology Study. Similarly, the modified design of the two noted roadways would accommodate projected hydrologic/hydraulic conditions in a similar fashion as described in the Hydrology Study. Accordingly, while specifics of site design would be updated to reflect the refined Project prior to issuance of Project grading permits, the attached report has not been changed and the associated conclusions regarding impacts related to runoff generation, drainage patterns/directions, flow regulation, hydromodification, flooding potential, and the capacity of existing and proposed storm drain system facilities are still accurate. That is, the proposed Project and storm drain system design would accommodate projected flow rates and amounts, with no significant Project-related hydrologic/hydrologic impacts to on- or off-site areas or facilities. No change to environmental design considerations or significance conclusions reached in conformance with the California Environmental Quality Act would occur and no change is required to the attached technical analysis.

Each of the above-cited and additional specific revisions are now included as part of the public record and will be before the Board of Supervisors during their consideration of the Project.



E:\ArcGIS\P\PAS-01 Passarelle\Map\BIO\Misc\FigA_Comparison.mxd -NM

Impact Comparison

CAMPUS PARK

HELIX

Figure A

PRELIMINARY HYDROLOGY AND HYDRAULICS STUDY

A CEQA LEVEL PRELIMINARY HYDROLOGY & HYDRAULICS STUDY

FOR:

CAMPUS PARK

TM 5338 RPL6

San Diego, California

Prepared for:

Passerelle, LLC
402 W. Broadway, Suite 1320
San Diego, CA 92101

Prepared by:

Landmark Consulting
9555 Genesee Avenue, Suite 200
San Diego, Ca 92121
Tel: 858-587-8070
JN 6-14
REV. DATE: 9-15-09

TABLE OF CONTENTS

SECTION 1: VICINITY MAP & SITE PLAN

SECTION 2: INTRODUCTION

SECTION 3: METHOD OF ANALYSIS

SECTION 4: EXISTING UNDISTURBED UPSTREAM (EASTERLY) BASINS - 100-YEAR RATIONAL METHOD HYDROLOGY CALCS

SECTION 4A: CAMPUS PARK UPSTREAM – HYDROLOGY MAP (OFF-SITE)

SECTION 5: PRE-DEVELOPMENT CONDITIONS (ONSITE) – 100-YEAR RATIONAL METHOD HYDROLOGY CALCS

SECTION 5A: PRE-DEVELOPMENT CONDITIONS – HYDROLOGY MAP (ON-SITE)

SECTION 6: POST-DEVELOPMENT CONDITIONS (ONSITE) – 100-YEAR RATIONAL METHOD HYDROLOGY CALCS

SECTION 6A: BASIN 100
SECTION 6B: BYPASS BASIN 400
SECTION 6C: BASIN 200
SECTION 6D: BASIN 500
SECTION 6E: BASIN 300
SECTION 6F: POST-DEVELOPMENT CONDITIONS – HYDROLOGY MAP (ON-SITE)

SECTION 7: OFFSITE INTERSECTIONS ANALYSIS

SECTION 7A: OFF-SITE INTERSECTION HYDROLOGY AND HYDRAULICS CALCULATIONS
SECTION 7B: OFF-SITE INTERSECTION HYDROLOGY MAPS
MAP 7-B-1: PALA RD. @ I-15, OLD HWY 395 @ PALA RD.
MAP 7-B-4: RECHE RD. @ OLD HWY 395 & CANONITA RD @ OLD HWY 395

SECTION 8: HORSE RANCH CREEK 100-YEAR NRCS HYDROLOGIC METHOD

SECTION 8A: HEC HMS ANALYSIS FOR PRE AND POST-DEVELOPMENT CONDITIONS
SECTION 8B: PRE-DEVELOPMENT CONDITIONS HORSE RANCH CREEK HEC HMS HYDROLOGY/DEVELOPMENT TYPE MAP
SECTION 8C: POST-DEVELOPMENT CONDITIONS HORSE RANCH CREEK HEC HMS HYDROLOGY/DEVELOPMENT TYPE MAP
SECTION 8D: CURVE NUMBER (CN) CALCULATION

SECTION 9: 100-YEAR HYDRAULIC ANALYSIS

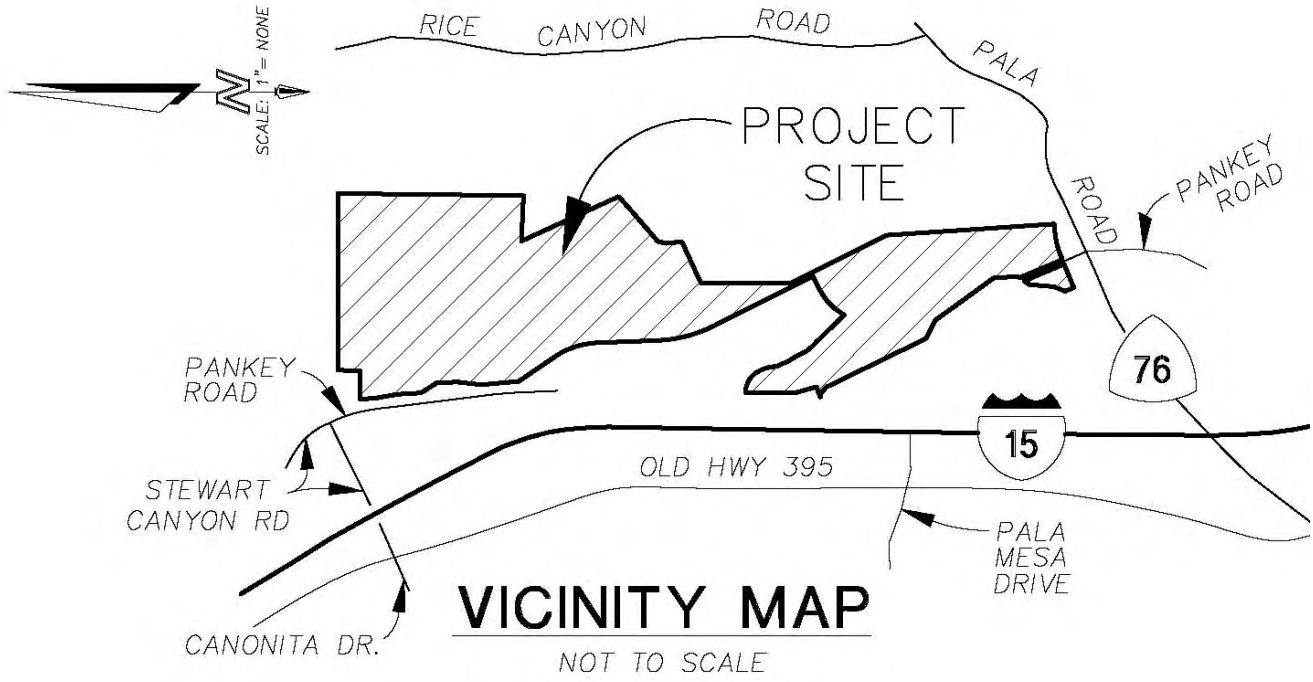
SECTION 9A: HORSE RANCH CREEK HEC-RAS CALCS - PRE-DEVELOPMENT CONDITIONS
CALCULATIONS AND CROSS-SECTIONS
100-YEAR FLOODPLAIN LIMITS EXHIBIT
SECTION 9B: HORSE RANCH CREEK HEC-RAS CALCS - POST-DEVELOPMENT CONDITIONS
CALCULATIONS AND CROSS-SECTIONS
100-YEAR FLOODPLAIN LIMITS EXHIBIT
SECTION 9C: HORSE RANCH CREEK HEC-RAS CALCS - POST-DEVELOPMENT CAPACITY
CALCULATIONS AND CROSS-SECTIONS
100-YEAR FLOODPLAIN LIMITS EXHIBIT
SECTION 9D: EXISTING CULVERT/BRIDGE HYDRAULIC CALCS
PRESSURE FLOW HYDRAULICS FOR EX. 8’X5’ CULVERT
HYDRAULIC CALCS FOR EXISTING BRIDGES UNDERCROSSING
SECTION 9E: HEC-RAS ROUGHNESS COEFFICIENT ANALYSIS

SECTION 10: DETENTION BASIN ANALYSIS

SECTION 10A: DETENTION BASIN ROUTING CALCS
SECTION 10B: DETENTION BASIN OUTLET HYDRAULIC CALCS

SECTION 11: SUMMARY
SECTION 11A: PRE AND POST DEVELOPMENT PROJECT DISCHARGE POINT SUMMARY EXHIBITS

SECTION 12: APPENDIX
HYDROLOGIC SOILS GROUP MAP
100-YEAR, 6-HOUR & 24-HOUR RAINFALL ISOPLUVIAL MAPS
RUNOFF COEFFICIENTS FOR URBAN AREAS TABLE
LAND USE SITE PLAN AND RUNOFF COEFFICIENTS EXHIBIT
LAND USE SUMMARY & C VALUE CHART(ON-SITE)
LAND USE & CURVE NUMBER WORKSHEETS FOR RUNOFF CURVE NUMBER CALCULATIONS
CHANNEL MANNINGS ROUGHNESS COEFFICIENTS CHART
EXISTING CANTRANS CHANNEL AS BUILT PLANS
FHWA MEMORANDUM – Highway Embankments versus Levee and other Flood Control Structures



SECTION 1:
VICINITY MAP

SECTION 2:
INTRODUCTION

The project is located on the northerly side of Pala Road (SR-76), between Interstate 15 and Rice Canyon Road. The project consists of approximately 416.1 acres of mixed-use development including 113.8 acres of single family dwelling units, 45.4 acres of multi-family dwelling units, 11.5 acres of professional office development, 8.1 acres of town center, 215.4 acres of parks and open space, 0.2 acres of pump station area as well as 21.7 acres of major circulation roads.

The project site is located at the downstream end of an approximately 7,500 acre upstream drainage basin. An existing Caltrans channel conveys runoff from this upstream basin southerly along a portion of the westerly boundary of this project. The runoff from this upstream basin creates the Horse Ranch Creek and floodplain which eventually confluences with the San Luis Rey River. (Please see Horse Ranch Creek Upstream Hydrology/Development Type Maps for the Pre and Post-Development Conditions in Section 8). The existing Horse Ranch Creek floodway and floodplain have neither been previously mapped by the County nor by FEMA and, furthermore, they are not shown on any floodplain maps approved by the Board of Supervisors. As such, the Horse Ranch Creek floodway and floodplain do not meet the Resource Protection Ordinance's definition of floodway or floodplain and a RPO analysis is not included with this report.

Under the pre-development conditions (see Campus Park Upstream - Hydrology Map in Section 4 and Pre-Development Conditions - Hydrology Map in Section 5), 287.6 acres of natural terrain in the northerly portion of the watershed (Basin 100) drains westerly through an existing 5'x8' box culvert crossing under existing Pankey Road (north). Under existing conditions, this existing box culvert flows under pressure during the 100-year storm. Past this box culvert, the existing runoff temporarily leaves our project boundary and flows into an existing, manufactured, earthen, trapezoidal drainage channel (i.e. Horse Ranch Creek) westerly of our project boundary. This channel was constructed by Caltrans as part of the Interstate 15 construction. The runoff from existing Basin 100 then confluences with the upstream Horse Ranch Creek watershed (Basins A & B) of 5,850 acres. The majority of the Horse Ranch Creek upstream basin is undeveloped and/or low density residential (see the Horse Ranch Creek Upstream Hydrology Map in Section 8C). Horse Ranch Creek then conveys the runoff southerly approximately 3,600 feet, opens up from the manufactured channel into a wide, shallow, open area and discharges onto natural terrain, within future biological open space Lot V (depicted as OS-2 on the Land Use Site Plan included in Section 12) on the southern half of the site.

The southerly portion of the watershed (Basin 200 thru 700) drain southwesterly into the Horse Ranch Creek floodplain and the above mentioned natural terrain (future Lot V) and confluences with the runoff within Horse Ranch Creek (Basin 100 and the upstream Horse Ranch Creek watershed). The runoff then flows southerly in the wide, shallow, open area of Horse Ranch Creek and then, necks down through an existing bridge crossing near the northerly terminus of existing Pankey Road (south) into a more well defined drainage channel of Horse Ranch Creek and then, crosses SR-76 (Pala Road) through another existing bridge crossing. Horse Ranch Creek then flows southwesterly approximately 2,000 feet until it confluences with San Luis Rey River. At this point, the Horse Ranch Creek watershed is about 11.6 sq. mi.

Under the post-development conditions, the project site is divided into 5 basins – Basins 100 thru 500 (see Post-Development Conditions - Hydrology Map in Section 6). The runoff from the northerly tip of the site creates Basin 100. The runoff from the upstream open space areas are collected in a series of brow ditches which is then conveyed through Basin 100 via an underground storm drain system into the existing creek on the west side of Basin 100 that eventually leads to the existing Pankey Road (north) box culvert. A separate underground storm drain system collects and conveys the runoff from the improved portions of this basin to the downstream end of Basin 100. The first flush runoff is diverted from the large storm flows with a low flow pipe exiting the most downstream curb inlet (at Node 140) into a engineered grass-lined swale within HOA Lot CC located at the southwesterly corner of Frigatebird Road and Jaeger Street before being outlet onto the undisturbed terrain

along the westerly project boundary. After confluence with the runoff in the existing creek on the west side of Basin 100, the basin runoff then enters an existing box culvert under existing Pankey Road (north), exits the project boundary and outlets into the existing drainage channel (Horse Ranch Creek) along the westerly project boundary (at Node 174). At this point, the discharge confluences with the upstream Horse Ranch Creek watershed of 9.1 sq. mi. and then, flows southerly in the Caltrans channel adjacent to I-15.

A portion of the upstream natural watershed in the northeasterly portion of the site (Bypass Basin 400) drains westerly, in natural swales, to the northerly tip of the project site (at Node 402). The discharge is then collected into an underground storm drain system that flows through the proposed development, without comingling with the on-site runoff (for water quality considerations), until it confluences with the combined runoff from Basin 100 and the upstream Horse Ranch Creek watershed in the existing drainage channel (Horse Ranch Creek) along the westerly project boundary (at Node 407). This bypass storm drain system also temporarily diverts some of the runoff around the existing box culvert on Pankey Road (north) thereby, reducing the runoff enough through this box culvert so that the existing box culvert adequately handles the 100-year post-development flows without inundating existing Pankey Road.

The largest amount of on-site runoff comes from the middle portion of the site to create Basin 200. The runoff from the upstream open space areas are collected in a series of brow ditches which is then conveyed through an underground storm drain system that also collects and conveys the runoff from the improved portions of this basin. This underground system conveys the runoff from the entire project development (southerly of Basins 100 and 400) southerly within Horse Ranch Creek Road. This runoff (and the runoff from a portion of Basin 300) then discharges into a proposed detention basin located on the westerly side of Horse Ranch Creek Road, just south of the proposed multi-family pad, MF-1. The runoff from MF-1 also discharges directly into this detention basin. The volume detained by the detention basin will mitigate for any increase in runoff due to the proposed development. After the increase in peak volumes are detained in the detention basin, the runoff flows southerly through the southern end of the site through existing Pankey Road (south) bridge crossing and existing SR76 bridge crossing further downstream.

The runoff from the southerly portion of the site creates Basins 300 and 500. The runoff leaving the detention basin (from Basin 200 and a portion of Basin 300), the runoff from Basins 100 & 400, the runoff from the upstream Horse Ranch Creek watershed plus the runoff from the northerly areas of Basin 300 then flow southerly within the wide, shallow, open area of Horse Ranch Creek, collecting additional runoff from other areas in Basin 300 and Basin 500, until Horse Ranch Creek necks down through an existing bridge crossing near the northerly terminus of existing Pankey Road (south) into a more well defined drainage channel of Horse Ranch Creek, crosses SR-76 (Pala Road) through another existing bridge crossing, and, then, exists the project site (at Node 348). With the proposed detention basin, the post-developed peak runoff leaving the subdivision boundary will be less than or equal to the pre-development volumes. Horse Ranch Creek then flows southwesterly approximately 2,000 feet until it confluences with the San Luis Rey River.

This project also requires the widening of several offsite intersections for additional turning lanes (at Old Hwy 395 & Stewart Cyn Rd, at Old Hwy 395 & Reche Rd, at Stewart Cyn Rd & Pankey Rd (north), at Old Hwy 395 & Pala Mesa Dr, at Old Hwy 395 & SR-76, at SR-76 & Pankey Rd (south), at SR-76 & Horse Ranch Creek Rd, and at southbound & northbound on-ramps at SR-76 & I-15. See below for a more detailed discussion of the proposed impacts to the drainage facilities at each of these off-site intersections.

The purpose of this report is to determine preliminary post-development peak runoff rate and volume (for the 100-year storm) to and from the site and compare them to the pre-development levels for the evaluation of the project's impacts to surrounding properties with regard to drainage concentrations, diversions, flooding, erosion and siltation. The effects of building within the limits of the Horse Ranch Creek floodplain will be analyzed to determine if there are any negative flood-related impacts to the Horse Ranch Creek floodplain due to this construction. A HEC-RAS analysis of the Horse Ranch Creek floodplain will be prepared to demonstrate that this construction can be accomplished without detrimental effects to the flood carrying capacity of Horse Ranch

Creek or to the surrounding properties and that the proposed pad elevations at the lower reaches of the floodplain are high enough that the building pads will not be inundated by 100-year flood waters (see Section 9). A HEC-RAS analysis will be run for the pre-development, post-development (i.e. after the construction of TM 5338) and build-out (i.e. after the construction of TM 5338 and the surrounding developments along Horse Ranch Creek: TM 5354, TM 5424 and Palomar College) conditions to compare the impacts to the Horse Ranch Creek floodplain. Additionally, the 100-year flood will be routed through the proposed detention basin (within proposed Lot U) to evaluate the flood mitigating effects the detention basin has in the post-developed condition (see Sections 8).

For this report, it was assumed that any development upstream from this project would have to detain, treat and release the post-development 100-year storm waters such that the quantity, quality and discharge rate & time and location would substantially resemble the pre-development conditions. It is expected that the proposed surrounding developments (TM 5354, TM 5424 and Palomar College) will adhere to the regulation set forth by the San Diego County Drainage Design Manual Section 6.2.1, " ..a detention basin may be required to reduce peak flows to the capacity of the existing downstream facility." The County of San Diego has further stipulated that no increase in runoff is allowed to be discharged from a proposed development and that detention facilities are required for any development to regulate the discharge rate to that under the pre-development conditions. Thus, it is anticipated that the surrounding developments (TM 5354 & TM 5424) will design their own onsite detention facilities to mitigate for any increases in their post-development flows such that no adverse affect will occur to downstream drainage facilities, particularly, the existing bridge crossings under Pankey road (south) and SR-76.

OFF-SITE INTERSECTIONS

As part of this project, several off-site intersections will be improved with additional pavement and improved lane delineation to mitigate the potential impact in traffic volume and flow as a result of the proposed development.

Old Hwy 395 at Stewart Canyon Road (& Canonita Drive):

The proposed improvements consists of the widening and re-striping to accommodate additional lanes on Canonita Drive and Stewart Canyon Road, westerly and easterly of Old Hwy 395, respectively. Also, Old Hwy 395 must be widened on the easterly side to accommodate additional lanes. A new AC berm is proposed along the easterly side of Old Hwy 395. A traffic signal is also proposed for this intersection.

The existing runoff on Old Hwy 395 flows southerly, outletting several times in existing AC spillways, until it reaches the intersection of Stewart Cyn Rd/Canonita Dr. The runoff then splits – the easterly runoff drains down Stewart Cyn Rd and the westerly runoff flows down Canonita Dr. The easterly runoff down Stewart Cyn Rd continues easterly until it reaches two existing curb inlets immediately before the intersection with Pankey Rd (north). The westerly runoff flows about 100' westerly to a low point in Canonita Dr . The runoff on at the northerly low point exists the street via an existing AC spillway. The runoff then crosses Canonita Dr in an existing culvert which outlets to an existing 5' wide concrete channel that flows southerly along the westerly side of Old Hwy 395. The runoff at the southerly low point enters an existing curb inlet which then drains connects to the existing culvert under Canonita Dr and, then into the existing 5' concrete channel .

Even though the existing AC spillway and curb inlet on Canonita Dr will have to be relocated to allow for the road widening, the existing drainage pattern of the roadway will not be altered and the additional pavement is located in existing hardened dirt areas, thus, appreciable additional runoff is not anticipated at this location.

Old Hwy 395 & Reche Rd, Stewart Cyn Rd & Pankey Rd (north):

The only improvements proposed at these intersections is re-striping at Stewart Cyn Rd & Pankey Rd (north) and re-striping & traffic signal installation at Old Hwy 395 & Reche Rd. Therefore, the existing drainage pattern and/or facilities will not be altered in anyway and the proposed improvements to these intersections will have no impact to the existing drainage.

Old Hwy 395 at Pala Mesa Drive:

The improvements consist of the widening of Pala Mesa Drive (westerly of Old Hwy 395), the widening of Old Hwy 395 (northerly & southerly of Pala Mesa Drive), the installation of a traffic signal and the re-striping of this intersection to add additional turning lanes.

A high point exists on Old Hwy 395, approximately 1,700' south of Pala Mesa Drive, and low points exists on Old Hwy 395 north of Pala Mesa Drive (approximately 520' on the east side of Old Hwy 395 and 620' on the west side). The runoff from both sides of Pala Mesa Drive flows towards the intersection with Old Hwy 395, where it confluences with the runoff from Old Hwy 395 and continues northerly along both sides of Old Hwy 395. The runoff from the westerly side of Old Hwy 395 flows northerly along the existing berm, crossing Pala Mesa Drive and discharges into an existing AC spillway which then flows into an existing drainage ditch along the westerly side of Old Hwy 395 (north of Pala Mesa Drive). The runoff on the west side of Old Hwy 395, north of this AC spillway, continues northerly on Old Hwy 395 until it reaches the above referenced low point and exists the street in an existing AC spillway. The runoff from the east side of Old Hwy 395 sheet flows off the edge of pavement into a earthen swale along the existing edge of pavement and flows northerly to an existing drain inlet at the above referenced easterly low point on Old Hwy 395. The easterly runoff then crosses Old Hwy 395 in an existing 17" CMP culvert that outlets into the existing drainage ditch on the westerly side of

Old Hwy 395. The combined runoff then flows westerly in an existing wide earthen ditch.

Due to the road widening, the existing AC spillway at the low point on the west side of Old Hwy 395 will need to be reconstructed. The new AC spillway will outlet at the some location as the existing spillway. A new AC spillway will also be required on the easterly low point on Old Hwy 395 due to the new berm proposed along the easterly edge of pavement. This spillway will direct the street runoff to the existing drain inlet & CMP culvert. A curb inlet is proposed on Old Hwy 395 at the southeasterly curb return with Pala Mesa Drive. This curb inlet will pick up the runoff from the east side of Old Hwy 395 before it crosses Pala Mesa Drive. This curb inlet will outlet to the existing drainage ditch along the west side of Old Hwy 395 via a proposed storm drain culvert. Also, due to the road widening on Old Hwy 395, a fill slope will be required on the west side of Old Hwy 395, north of Pala Mesa Dr. In order to keep the fill slope out of the existing drainage ditch, along the westerly side of Old Hwy 395, a retaining wall is proposed at the toe of this fill slope.

Due to the fact that the widening in this area is relatively minimal, and due to the fact that the widening occurs is very hard compacted dirt areas, the additional amount of runoff generated by this construction should be minimal. Any proposed drainage facilities and any undersized existing facilities will have to be sized adequately to handle the proposed runoff volumes in this area.

Old Hwy 395 & SR-76:

The improvements proposed at this intersection include road widening of the west side of Old Hwy 395, north and south of SR-76, and the re-striping of this intersection to accommodate additional traffic lanes. There is plenty of flat area for the widening south of SR-76, however, the widening on the north side of SR-76 will require the construction of a large retaining wall with a brow ditch at the top of the wall to pick up the runoff from the large existing slope behind this wall.

Old Hwy 395 drains southerly to the intersection of SR-76 and gets picked up in two existing drain inlets on both side of Old Hwy 395. Runoff from SR-76 flows westerly to the intersection of Old Hwy 395 and also gets picked up in two existing drain inlets on both sides of SR-76. Runoff that falls in the intersection continues to flow southerly on Old Hwy 395 or westerly on SR-76. The improvements to these two legs of the intersection will not impact the existing drainage pattern or facilities.

The widening of the west side of Old Hwy 395 (north of SR-76) will cause the relocation of the existing drain inlet to the new AC berm line. The brow ditch behind the proposed retaining wall will be picked up in a catch basin and will connect to the back of the relocated drain inlet. Any increase in runoff due to the proposed improvements to this intersection should be minimal since the additional imperious area is minimal and the widening occurs in areas already more or less impervious (i.e. hard compacted dirt adjacent to the existing pavement). Any proposed drainage facilities and any undersized existing facilities will have to be sized adequately to handle the proposed runoff volumes in this area.

SR-76 & Pankey Rd (south):

The proposed improvements at this intersection include the road widening of Pankey Rd (south) & Pala Mesa Drive, south and north of the intersection with SR-76, respectively, the re-striping of this intersection and the installation of a traffic signal.

Runoff from both Pankey Rd (south) and Pala Mesa Dr (north) flow away from SR-76. Runoff from SR-76 flows westerly through this intersection. However the runoff in SR-76 exits the street prior to this intersection in AC spillways proposed with the SR-76 realignment/widening construction currently underway by Granite Construction.

Since improvements to this intersection have been designed per current Caltrans standards with the proposed realignment/widening of SR-76 and since runoff from these intersecting streets flows away from this intersection, the proposed improvements with this project should have minimal impact to the drainage in this area.

SR-76 & Horse Ranch Creek Rd:

Horse Ranch Creek Rd will be new road construction and any proposed drainage facilities will be designed and constructed per County/Caltrans standards. With this new road connection there is a right-turn lane proposed on SR-76 that would require the widening of the north side of SR-76, easterly of this intersection. This widening will require the relocation/extension of drainage facilities proposed with the SR-76 re-alignment/widening project currently under construction. Even with the relocation/extension of these drainage facilities there should be no impact to the drainage pattern or capacity of these improvements since the amount of additional impervious area, and the corresponding runoff, should be minimal.

Southbound & Northbound on-ramps at SR-76 & I-15:

The improvements at this location are primarily for new construction. However, the construction of the two new proposed on-ramps requires the construction of two culverts under the southbound ramp to allow existing runoff to cross the road and the construction of a drain inlet (and outlet pipe) on the northbound ramp to pick up runoff from the ramp before it connects to I-15.

See Section 7 of this report for detailed hydrologic and hydraulic analysis of these off-site intersections.

SECTION 3: METHOD OF ANALYSIS

A number of methods and computer programs were utilized in the analysis of the hydrologic impact of the project site.

The project site is located at the lower end of the Horse Ranch Creek watershed. The Horse Ranch Creek primarily bypasses the proposed development on the westerly end of the site. The Horse Ranch Creek watershed has approximately 7,443 acres of area, or 11.6 square miles. Since the watershed is way over one sq. mi., a NRCS hydrologic analysis was necessary. The entire watershed, under both the pre-development and post-development conditions, was analyzed with HECHMS souftware published by the Army Corp of Engineers. The lag times for the subareas with tributary areas greater than one square mile were determined using the Corps Lag Equation (4-17). The watershed lengths and slopes were determined using a topographical map obtained from the County Department of Public Works GIS Section. Centroid locations for the subareas were determined using the "MASSPROP" command for a region in AutoCAD. Basin "n" value of 0.05 was determined to be most representative of the rugged topography, ground cover, and channel characteristics of the watershed. HEC-HMS models were prepared to represent the existing and developed conditions in the watershed. The existing condition model consisted of two subareas and one routing reach. This configuration was selected to determine the hydrograph for the channel that passes through the project site. Since Subarea C has its confluence with the main channel near the Pankey Road North Bridge, it was assumed that runoff from this area was directly tributary to the bridge. The developed condition model was configured similarly to the existing condition model. Subarea AB was modified to AB-Rev to account for the proposed improvements at the southerly end of the subarea. Subarea C was changed to C-Rev to account for the separation of the Onsite area from the other areas within Subarea C. The Onsite-S subarea was comprised of the area that will be tributary to the proposed detention basin. As in the existing condition, Subarea C and the Onsite detention basin were assumed to be directly tributary to the Pankey Road North Bridge because of the close proximity of the confluences to the bridge. Models were simulated using a 5 minute time step to match the period of maximum precipitation intensity. Input data calculations and HEC-HMS output and data files are included with this submittal.

The curve number (Cn) values for the watershed is calculated based the latest land use map from the County of San Diego that was overlaid over an NRCS soils map. The watershed is comprised of Hydrologic Groups B, C, and D. The area of each group within each subarea was determined, and then land uses were assigned. A spreadsheet showing the calculations and the corresponding mapping are attached to this report in Section 9.

There are several types of development both present and proposed for the watershed: Industrial/commercial, low density residential, med density residential, high density residential, roadways and streets and natural areas. The individual land use areas are measured and tabulated based on the soil type, see Section 9 for detailed Cn value calculations. The areas of proposed high density residential, roadway and commercial developments are measure from the latest design of the proposed project.

A spreadsheet was developed to prepare a nested storm, per the criteria of the hydrology manual. Lag times ranged from 10 to 50 minutes, so a 5 minute period of maximum intensity was used for the hyetograph. Precipitation-area reduction factors were interpolated from Table 4-1 for the 11.54 square mile watershed. The hyetograph was entered into HEC-HMS as a precipitation time series.

The HECHMS analysis will provide the pre-development and post-development peak flow rates at critical points to facilitate the design of proposed drainage systems as well as the evaluation of existing system's adequacy to handle the post-development flows.

The proposed detention basin is ~~also~~ modeled and analyzed with Pondpack with tail water conditions (due to Horse Ranch Creek) simulated – see Section 10 of this report. These runoff rates were used for the HEC-RAS

hydraulic analysis of Horse Ranch Creek (See Section 9) and to compare the pre and post development runoff leaving the project.

The onsite project and its immediate upstream tributary areas (to the east) form a sub-basin less than 1 square mile, thus the AES Rational Method program was utilized to determine the peak discharge from the discharge points onto and away from the developed area of the site – See Section 4 for the existing upstream (easterly) hydrology calculations, Section 5 for the pre-development onsite hydrology calculations and Section 6 for the post-development onsite hydrology calculations. As was mentioned in the above Introduction, any development upstream from this project, such as TM 5354 and TM 5424 and Palomar College, would have to detain, treat and release the post-development 100-year storm waters such that the quantity, quality and discharge rate, time, location & concentration would substantially resemble the pre-development conditions. Due to the fact that these upstream projects must provide on-site mitigation for changes to this watershed's hydrologic characteristics, post-development runoff characteristics from these upstream areas were assumed to be the same as the pre-development.

Finally, a HEC-RAS program, published by the Army Corp of Engineers, is utilized to analyze the hydraulic characteristics of the Horse Ranch Creek using the peak flow rates calculated from the-HECHMS program (from Section 8). The pre and post-development floodplain limits of Horse Ranch Creek is determined from the water surface elevations at various cross sections along the creek bed. The runoff rates established with the HECHMS software were used in the HEC-RAS program to establish the pre and post-development 100-year floodplain limit – See Section 9 for the pre and post-development hydraulic calculations for Horse Ranch Creek. As required per the San Diego County Drainage Design Manual, a capacity analysis was also conducted with the channel n values set at 0.15, the maximum roughness coefficient expected during the life time of the channel. The water surface elevation determined under the capacity analysis will be used to set the elevations of improvements such as roadways and pads. Also included in Section 9 is preliminary hydraulic calculations of the existing 8' x 5' box culvert under Pankey Road (north) and the existing bridges on Pankey Road (both northerly and southerly of SR 76), as well as the existing SR76 bridge.

SECTION 3
RATIONAL METHOD AND MODIFIED RATIONAL METHOD

3.1 THE RATIONAL METHOD

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. The RM is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 1 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section 3.4); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Section 4).

The RM can be applied using any design storm frequency (e.g., 100-year, 50-year, 10-year, etc.). The local agency determines the design storm frequency that must be used based on the type of project and specific local requirements. A discussion of design storm frequency is provided in Section 2.3 of this manual. A procedure has been developed that converts the 6-hour and 24-hour precipitation isopluvial map data to an Intensity-Duration curve that can be used for the rainfall intensity in the RM formula as shown in Figure 3-1. The RM is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration.

3.1.1 Rational Method Formula

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (T_c), which is the time required for water to

flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

$$Q = C\,I\,A$$

Where: Q = peak discharge, in cubic feet per second (cfs)

C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)

I = average rainfall intensity for a duration equal to the T_c for the area, in inches per hour (Note: If the computed T_c is less than 5 minutes, use 5 minutes for computing the peak discharge, Q)

A = drainage area contributing to the design location, in acres

Combining the units for the expression CIA yields:

$$\left(\frac{1\,\text{acre}\times\text{inch}}{\text{hour}}\right)\left(\frac{43{,}560\,\text{ft}^2}{\text{acre}}\right)\left(\frac{1\,\text{foot}}{12\,\text{inches}}\right)\left(\frac{1\,\text{hour}}{3{,}600\,\text{seconds}}\right) \Rightarrow 1.008\,\text{cfs}$$

For practical purposes the unit conversion coefficient difference of 0.8% can be ignored.

The RM formula is based on the assumption that for constant rainfall intensity, the peak discharge rate at a point will occur when the raindrop that falls at the most upstream point in the tributary drainage basin arrives at the point of interest.

Unlike the MRM (discussed in Section 3.4) or the NRCS hydrologic method (discussed in Section 4), the RM does not create hydrographs and therefore does not add separate subarea hydrographs at collection points. Instead, the RM develops peak discharges in the main line by increasing the T_c as flow travels downstream.

Characteristics of, or assumptions inherent to, the RM are listed below:

- The discharge flow rate resulting from any I is maximum when the I lasts as long as or longer than the T_c.

- The storm frequency of peak discharges is the same as that of I for the given T_c.

- The fraction of rainfall that becomes runoff (or the runoff coefficient, C) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in Section 4.1.2.4).

- The peak rate of runoff is the only information produced by using the RM.

3.1.2 Runoff Coefficient

Table 3-1 lists the estimated runoff coefficients for urban areas. The concepts related to the runoff coefficient were evaluated in a report entitled *Evaluation, Rational Method "C" Values* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

The runoff coefficients are based on land use and soil type. Soil type can be determined from the soil type map provided in Appendix A. An appropriate runoff coefficient (C) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient ($\Sigma[CA]$). Good engineering judgment should be used when applying the values presented in Table 3-1, as adjustments to these values may be appropriate based on site-specific characteristics. In any event, the impervious percentage (% Impervious) as given in the table, for any area, shall govern the selected value for C. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:

$$C = 0.90 \times (\% \text{ Impervious}) + C_p \times (1 - \% \text{ Impervious})$$

Where: C_p = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious). Soil type can be determined from the soil type map provided in Appendix A.

The values in Table 3-1 are typical for most urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the local agency.

SECTION 4:
EXISTING UNDISTURBED UPSTREAM (EASTERLY) BASINS - 100-YEAR RATIONAL HYDROLOGY CALCS

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                          Analysis prepared by:

                           LANDMARK CONSULTING
                      9555 GENESEE AVENUE, SUITE 200
                           SAN DEIGO, CA 92121
                            TEL:  858-587-8070

 ************************** DESCRIPTION OF STUDY **************************
* CAMPUS PARK                                                              *
* VALLEY CENTER, CA. UPSTREAM HYDROLOGY ANALYSIS (EASTERLY OF SITE)        *
* 100-YEAR STORM                                                           *
 ****************************************************************************

  FILE NAME: 614USC.DAT
  TIME/DATE OF STUDY: 09:33 02/09/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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

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

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    950.00
  DOWNSTREAM ELEVATION(FEET) =    927.50
  ELEVATION DIFFERENCE(FEET) =     22.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE   1001.10 TO NODE   1002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    927.50  DOWNSTREAM(FEET) =    770.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00   CHANNEL SLOPE =  0.2250
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.312
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.12
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   5.49
  Tc(MIN.) =  11.76
  SUBAREA AREA(ACRES) =     1.40       SUBAREA RUNOFF(CFS) =    2.60
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      1.60         PEAK FLOW RATE(CFS) =       2.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   2.50
  LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1002.00 =   800.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2001.00 TO NODE   2001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1150.00
  DOWNSTREAM ELEVATION(FEET) =   1116.70
  ELEVATION DIFFERENCE(FEET) =     33.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE   2001.10 TO NODE   2002.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1116.70  DOWNSTREAM(FEET) =   1050.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =  0.3335
CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.706
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.91
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.73
AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.93
Tc(MIN.) =   8.19
SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.70
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       1.17

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.06
LONGEST FLOWPATH FROM NODE   2001.00 TO NODE   2002.00 =   300.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2002.00 TO NODE   2003.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =    602.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1350.00   CHANNEL SLOPE =  0.3319
CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.057
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     15.03
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.01
AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   4.49
Tc(MIN.) =  12.69
SUBAREA AREA(ACRES) =    15.30       SUBAREA RUNOFF(CFS) =   27.08
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =     15.80         PEAK FLOW RATE(CFS) =      27.97

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   6.34
LONGEST FLOWPATH FROM NODE   2001.00 TO NODE   2003.00 =  1650.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3001.00 TO NODE   3001.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1525.00
  DOWNSTREAM ELEVATION(FEET) =   1475.00
  ELEVATION DIFFERENCE(FEET) =     50.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE   3001.10 TO NODE   3002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1475.00  DOWNSTREAM(FEET) =   1300.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.5000
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.487
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.47
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.36
  Tc(MIN.) =   8.63
  SUBAREA AREA(ACRES) =     1.10       SUBAREA RUNOFF(CFS) =    2.50
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      1.40         PEAK FLOW RATE(CFS) =       3.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.96
  LONGEST FLOWPATH FROM NODE   3001.00 TO NODE   3002.00 =   450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3002.00 TO NODE   3003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1300.00  DOWNSTREAM(FEET) =    875.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00   CHANNEL SLOPE =  0.3864
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.161
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.00
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   3.67
  Tc(MIN.) =  12.29
  SUBAREA AREA(ACRES) =    15.10       SUBAREA RUNOFF(CFS) =   27.28
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     16.50         PEAK FLOW RATE(CFS) =      29.81
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   6.32
  LONGEST FLOWPATH FROM NODE   3001.00 TO NODE   3003.00 =  1550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3003.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.29
  RAINFALL INTENSITY(INCH/HR) =   5.16
  TOTAL STREAM AREA(ACRES) =    16.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.81

****************************************************************************
  FLOW PROCESS FROM NODE   3004.00 TO NODE   3004.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1420.00
  DOWNSTREAM ELEVATION(FEET) =   1368.00
  ELEVATION DIFFERENCE(FEET) =     52.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE   3004.10 TO NODE   3005.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1368.00  DOWNSTREAM(FEET) =   1200.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.5250
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.890
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.36
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.59
  Tc(MIN.) =   7.86
  SUBAREA AREA(ACRES) =     1.60       SUBAREA RUNOFF(CFS) =    3.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.10         PEAK FLOW RATE(CFS) =       5.06
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.23
  LONGEST FLOWPATH FROM NODE   3004.00 TO NODE   3005.00 =   420.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1200.00  DOWNSTREAM(FEET) =    875.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.3824
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.898
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     23.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.62
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.14
  Tc(MIN.) =  10.00
  SUBAREA AREA(ACRES) =    17.90       SUBAREA RUNOFF(CFS) =   36.95
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     20.00         PEAK FLOW RATE(CFS) =      41.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   7.98
  LONGEST FLOWPATH FROM NODE   3004.00 TO NODE   3003.00 =  1270.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3003.00 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.) =  10.00
  RAINFALL INTENSITY(INCH/HR) =   5.90
  TOTAL STREAM AREA(ACRES) =    20.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.29

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        29.81    12.29        5.161         16.50
     2        41.29    10.00        5.898         20.00

  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        65.52    10.00       5.898
     2        65.94    12.29       5.161
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     65.94   Tc(MIN.) =   12.29
  TOTAL AREA(ACRES) =     36.50
  LONGEST FLOWPATH FROM NODE   3001.00 TO NODE   3003.00 =  1550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3006.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    875.00  DOWNSTREAM(FEET) =    820.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1719
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.988
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     72.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.99
  AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   0.67
  Tc(MIN.) =  12.96
  SUBAREA AREA(ACRES) =     7.00       SUBAREA RUNOFF(CFS) =   12.22
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     43.50         PEAK FLOW RATE(CFS) =      75.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   8.13
  LONGEST FLOWPATH FROM NODE   3001.00 TO NODE   3006.00 =  1870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3007.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    820.00  DOWNSTREAM(FEET) =    666.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   905.00   CHANNEL SLOPE =  0.1702
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.602
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     83.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.74
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   1.73
  Tc(MIN.) =  14.69
  SUBAREA AREA(ACRES) =     8.90       SUBAREA RUNOFF(CFS) =   14.33
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     52.40         PEAK FLOW RATE(CFS) =      84.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   8.76
  LONGEST FLOWPATH FROM NODE   3001.00 TO NODE   3007.00 =  2775.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   4001.00 TO NODE   4001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1090.00
  DOWNSTREAM ELEVATION(FEET) =   1048.00
  ELEVATION DIFFERENCE(FEET) =     42.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE   4001.10 TO NODE   4002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1048.00  DOWNSTREAM(FEET) =    900.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.4229
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.430
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.35
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.48
  Tc(MIN.) =   8.75
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    1.58
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      0.90         PEAK FLOW RATE(CFS) =       2.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.77
  LONGEST FLOWPATH FROM NODE   4001.00 TO NODE   4002.00 =   450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   4003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    900.00  DOWNSTREAM(FEET) =    620.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1050.00   CHANNEL SLOPE =  0.2667
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.343
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.02
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   2.91
  Tc(MIN.) =  11.65
  SUBAREA AREA(ACRES) =     9.80       SUBAREA RUNOFF(CFS) =   18.33
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     10.70         PEAK FLOW RATE(CFS) =      20.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   7.42
  LONGEST FLOWPATH FROM NODE   4001.00 TO NODE   4003.00 =  1500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5001.00 TO NODE   5001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1325.00
  DOWNSTREAM ELEVATION(FEET) =   1267.00
  ELEVATION DIFFERENCE(FEET) =     58.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE   5001.10 TO NODE   5002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1267.00  DOWNSTREAM(FEET) =   1050.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   370.00   CHANNEL SLOPE =  0.5865
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.618
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.94
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.10
  Tc(MIN.) =   8.36
  SUBAREA AREA(ACRES) =     1.60       SUBAREA RUNOFF(CFS) =    3.71
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.00         PEAK FLOW RATE(CFS) =       4.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE   5001.00 TO NODE   5002.00 =   470.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00   CHANNEL SLOPE =  0.3333
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.432
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.17
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   3.00
  Tc(MIN.) =  11.36
  SUBAREA AREA(ACRES) =     7.90       SUBAREA RUNOFF(CFS) =   15.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      9.90         PEAK FLOW RATE(CFS) =      18.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   5.02
  LONGEST FLOWPATH FROM NODE   5001.00 TO NODE   5003.00 =  1220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 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.) =  11.36
  RAINFALL INTENSITY(INCH/HR) =   5.43
  TOTAL STREAM AREA(ACRES) =     9.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.82

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1175.00
  DOWNSTREAM ELEVATION(FEET) =   1122.00
  ELEVATION DIFFERENCE(FEET) =     53.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.84
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5004.10 TO NODE   5005.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1122.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.5304
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.750
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.08
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   1.84
  Tc(MIN.) =   8.11
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    1.65
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      1.00         PEAK FLOW RATE(CFS) =       2.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.28
  LONGEST FLOWPATH FROM NODE   5004.00 TO NODE   5005.00 =   330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5005.00 TO NODE   5003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   570.00   CHANNEL SLOPE =  0.3509
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.865
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.81
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.98
  Tc(MIN.) =  10.09
  SUBAREA AREA(ACRES) =    13.60       SUBAREA RUNOFF(CFS) =   27.92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     14.60         PEAK FLOW RATE(CFS) =      29.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   6.11
  LONGEST FLOWPATH FROM NODE   5004.00 TO NODE   5003.00 =   900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 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.) =  10.09
  RAINFALL INTENSITY(INCH/HR) =   5.86
  TOTAL STREAM AREA(ACRES) =    14.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.97

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       18.82    11.36        5.432          9.90
     2       29.97    10.09        5.865         14.60

  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       46.68    10.09       5.865
     2       46.58    11.36       5.432

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     46.68   Tc(MIN.) =   10.09
  TOTAL AREA(ACRES) =     24.50
  LONGEST FLOWPATH FROM NODE   5001.00 TO NODE   5003.00 =  1220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5006.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1070.00   CHANNEL SLOPE =  0.1402
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.115
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     65.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.49
  AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   2.38
  Tc(MIN.) =  12.47
  SUBAREA AREA(ACRES) =    21.20       SUBAREA RUNOFF(CFS) =   37.95
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     45.70         PEAK FLOW RATE(CFS) =      81.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   8.11
  LONGEST FLOWPATH FROM NODE   5001.00 TO NODE   5006.00 =  2290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5006.00 TO NODE   5007.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    590.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   478.00   CHANNEL SLOPE =  0.1255
CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     83.35
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.96
AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   1.00
Tc(MIN.) =  13.47
SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    3.07
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =     47.50         PEAK FLOW RATE(CFS) =      81.82

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.49   FLOW VELOCITY(FEET/SEC.) =   7.91
LONGEST FLOWPATH FROM NODE   5001.00 TO NODE   5007.00 =  2768.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   6001.00 TO NODE   6001.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
UPSTREAM ELEVATION(FEET) =   1030.00
DOWNSTREAM ELEVATION(FEET) =    981.00
ELEVATION DIFFERENCE(FEET) =     49.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =      0.56
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
FLOW PROCESS FROM NODE   6001.10 TO NODE   6002.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =    981.00  DOWNSTREAM(FEET) =    885.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =  0.4800
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.113
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.18
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.75
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.21
  Tc(MIN.) =   7.48
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    1.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      0.70         PEAK FLOW RATE(CFS) =       1.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   3.39
  LONGEST FLOWPATH FROM NODE   6001.00 TO NODE   6002.00 =   300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6002.00 TO NODE   6003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    885.00  DOWNSTREAM(FEET) =    614.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1280.00   CHANNEL SLOPE =  0.2117
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.183
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.50
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   4.74
  Tc(MIN.) =  12.22
  SUBAREA AREA(ACRES) =     6.50       SUBAREA RUNOFF(CFS) =   11.79
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      7.20         PEAK FLOW RATE(CFS) =      13.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   5.34
  LONGEST FLOWPATH FROM NODE   6001.00 TO NODE   6003.00 =  1580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6003.00 TO NODE   6003.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.22
  RAINFALL INTENSITY(INCH/HR) =   5.18
  TOTAL STREAM AREA(ACRES) =     7.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.06

****************************************************************************
  FLOW PROCESS FROM NODE   6004.00 TO NODE   6004.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
```

```
  UPSTREAM ELEVATION(FEET) =    935.00
  DOWNSTREAM ELEVATION(FEET) =    894.00
  ELEVATION DIFFERENCE(FEET) =     41.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE   6004.10 TO NODE   6005.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    894.00  DOWNSTREAM(FEET) =    825.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE =  0.4059
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.996
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.02
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.41
  Tc(MIN.) =   7.67
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      0.60         PEAK FLOW RATE(CFS) =       1.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.16
  LONGEST FLOWPATH FROM NODE   6004.00 TO NODE   6005.00 =   270.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    825.00  DOWNSTREAM(FEET) =    614.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.2740
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.698
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.46
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   2.88
  Tc(MIN.) =  10.55
  SUBAREA AREA(ACRES) =     9.20       SUBAREA RUNOFF(CFS) =   18.35
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      9.80         PEAK FLOW RATE(CFS) =      19.54
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   5.69
  LONGEST FLOWPATH FROM NODE   6004.00 TO NODE   6003.00 =  1040.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6003.00 TO NODE   6003.00 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.) =  10.55
  RAINFALL INTENSITY(INCH/HR) =   5.70
  TOTAL STREAM AREA(ACRES) =     9.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.54

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       13.06    12.22        5.183          7.20
     2       19.54    10.55        5.698          9.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       30.82    10.55       5.698
     2       30.84    12.22       5.183

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     30.84   Tc(MIN.) =   12.22
  TOTAL AREA(ACRES) =     17.00
  LONGEST FLOWPATH FROM NODE   6001.00 TO NODE   6003.00 =  1580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6003.00 TO NODE   6006.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    614.00  DOWNSTREAM(FEET) =    590.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.1600
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.047
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     31.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.86
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   0.51
  Tc(MIN.) =  12.73
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    1.77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
```

```
  TOTAL AREA(ACRES) =     18.00          PEAK FLOW RATE(CFS) =      31.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   4.87
  LONGEST FLOWPATH FROM NODE   6001.00 TO NODE   6006.00 =  1730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7001.00 TO NODE   7001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    889.10
  DOWNSTREAM ELEVATION(FEET) =    837.30
  ELEVATION DIFFERENCE(FEET) =     51.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE   7001.10 TO NODE   7002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    837.30  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.5182
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.443
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.72
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.45
  Tc(MIN.) =   8.72
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    2.26
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      1.30         PEAK FLOW RATE(CFS) =       2.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   3.28
  LONGEST FLOWPATH FROM NODE   7001.00 TO NODE   7002.00 =   500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8001.00 TO NODE   8001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    847.30
  DOWNSTREAM ELEVATION(FEET) =    809.00
  ELEVATION DIFFERENCE(FEET) =     38.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      3.63
  TOTAL AREA(ACRES) =      1.30   TOTAL RUNOFF(CFS) =      3.63

****************************************************************************
  FLOW PROCESS FROM NODE   8001.10 TO NODE   8002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    809.00  DOWNSTREAM(FEET) =    486.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.3800
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.661
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.04
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.01
  Tc(MIN.) =   8.28
  SUBAREA AREA(ACRES) =    11.40       SUBAREA RUNOFF(CFS) =   26.58
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     12.70         PEAK FLOW RATE(CFS) =      29.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   8.57
  LONGEST FLOWPATH FROM NODE   8001.00 TO NODE   8002.00 =   950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9001.00 TO NODE   9001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    680.00
  DOWNSTREAM ELEVATION(FEET) =    644.60
  ELEVATION DIFFERENCE(FEET) =     35.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE   9001.10 TO NODE   9002.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    644.60  DOWNSTREAM(FEET) =    450.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   550.00   CHANNEL SLOPE =  0.3538
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.627
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.04
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   4.49
  Tc(MIN.) =  10.75
  SUBAREA AREA(ACRES) =     0.60       SUBAREA RUNOFF(CFS) =    1.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      1.00         PEAK FLOW RATE(CFS) =       1.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.33
  LONGEST FLOWPATH FROM NODE   9001.00 TO NODE   9002.00 =   650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  10001.00 TO NODE  10001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    725.00
  DOWNSTREAM ELEVATION(FEET) =    693.70
  ELEVATION DIFFERENCE(FEET) =     31.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      2.79
  TOTAL AREA(ACRES) =      1.00   TOTAL RUNOFF(CFS) =      2.79

****************************************************************************
  FLOW PROCESS FROM NODE  10001.10 TO NODE  10002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    693.70  DOWNSTREAM(FEET) =    600.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.3123
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.909
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.32
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.21
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.56
  Tc(MIN.) =   7.82
  SUBAREA AREA(ACRES) =     2.90       SUBAREA RUNOFF(CFS) =    7.01
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      3.90         PEAK FLOW RATE(CFS) =       9.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   3.76
  LONGEST FLOWPATH FROM NODE  10001.00 TO NODE  10002.00 =   400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  10002.00 TO NODE  10003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1450.00   CHANNEL SLOPE =  0.0931
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.194
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     53.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.55
  AVERAGE FLOW DEPTH(FEET) =   0.40   TRAVEL TIME(MIN.) =   4.35
  Tc(MIN.) =  12.17
  SUBAREA AREA(ACRES) =    47.40       SUBAREA RUNOFF(CFS) =   86.17
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     51.30         PEAK FLOW RATE(CFS) =      93.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   6.70
  LONGEST FLOWPATH FROM NODE  10001.00 TO NODE  10003.00 =  1850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  10003.00 TO NODE  10003.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.17
  RAINFALL INTENSITY(INCH/HR) =   5.19
  TOTAL STREAM AREA(ACRES) =    51.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     93.26

****************************************************************************
  FLOW PROCESS FROM NODE  10004.00 TO NODE  10004.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    775.00
  DOWNSTREAM ELEVATION(FEET) =    743.00
  ELEVATION DIFFERENCE(FEET) =     32.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      2.51
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      2.51

****************************************************************************
  FLOW PROCESS FROM NODE  10004.10 TO NODE  10005.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    625.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   370.00   CHANNEL SLOPE =  0.3189
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.733
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.29
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.87
  Tc(MIN.) =   8.14
  SUBAREA AREA(ACRES) =     3.30       SUBAREA RUNOFF(CFS) =    7.78
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      4.20         PEAK FLOW RATE(CFS) =       9.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   3.96
  LONGEST FLOWPATH FROM NODE  10004.00 TO NODE  10005.00 =   470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  10005.00 TO NODE  10003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1050.00   CHANNEL SLOPE =  0.1524
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.090
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     19.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.96
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   4.42
  Tc(MIN.) =  12.56
  SUBAREA AREA(ACRES) =    10.50       SUBAREA RUNOFF(CFS) =   18.70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     14.70         PEAK FLOW RATE(CFS) =      26.19
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   4.57
  LONGEST FLOWPATH FROM NODE  10004.00 TO NODE  10003.00 =  1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  10003.00 TO NODE  10003.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.56
  RAINFALL INTENSITY(INCH/HR) =   5.09
  TOTAL STREAM AREA(ACRES) =    14.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.19

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        93.26    12.17        5.194        51.30
     2        26.19    12.56        5.090        14.70

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       118.64    12.17       5.194
     2       117.57    12.56       5.090

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    118.64   Tc(MIN.) =   12.17
  TOTAL AREA(ACRES) =     66.00
  LONGEST FLOWPATH FROM NODE  10001.00 TO NODE  10003.00 =  1850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  10003.00 TO NODE  10006.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    436.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.0483
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.821
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    126.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.71
  AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   1.49
  Tc(MIN.) =  13.67
  SUBAREA AREA(ACRES) =     9.00       SUBAREA RUNOFF(CFS) =   15.19
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     75.00          PEAK FLOW RATE(CFS) =     126.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   6.72
  LONGEST FLOWPATH FROM NODE  10001.00 TO NODE  10006.00 =  2450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  11001.00 TO NODE  11001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    890.00
  DOWNSTREAM ELEVATION(FEET) =    836.00
  ELEVATION DIFFERENCE(FEET) =     54.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE  11001.10 TO NODE  11002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    836.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.5367
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.951
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.37
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.48
  Tc(MIN.) =   7.75
  SUBAREA AREA(ACRES) =     1.60       SUBAREA RUNOFF(CFS) =    3.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.10          PEAK FLOW RATE(CFS) =       5.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.27
  LONGEST FLOWPATH FROM NODE  11001.00 TO NODE  11002.00 =   400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  11002.00 TO NODE  11003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00   CHANNEL SLOPE =  0.1531
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     20.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.66
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   5.72
  Tc(MIN.) =  13.47
  SUBAREA AREA(ACRES) =    17.80       SUBAREA RUNOFF(CFS) =   30.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     19.90         PEAK FLOW RATE(CFS) =      33.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   5.53
  LONGEST FLOWPATH FROM NODE  11001.00 TO NODE  11003.00 =  2000.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12001.00 TO NODE  12001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    730.00
  DOWNSTREAM ELEVATION(FEET) =    691.00
  ELEVATION DIFFERENCE(FEET) =     39.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE  12001.10 TO NODE  12002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    691.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.3867
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.941
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.33
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.50
  Tc(MIN.) =   7.77
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    4.13
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.20         PEAK FLOW RATE(CFS) =       5.34

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.93
  LONGEST FLOWPATH FROM NODE  12001.00 TO NODE  12002.00 =   400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12002.00 TO NODE  12003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    575.00  DOWNSTREAM(FEET) =    420.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1400.00   CHANNEL SLOPE =  0.1107
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.084
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     26.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.84
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   4.82
  Tc(MIN.) =  12.58
  SUBAREA AREA(ACRES) =    23.30       SUBAREA RUNOFF(CFS) =   41.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     25.50         PEAK FLOW RATE(CFS) =      45.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   5.86
  LONGEST FLOWPATH FROM NODE  12001.00 TO NODE  12003.00 =  1800.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13001.00 TO NODE  13001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    760.00
  DOWNSTREAM ELEVATION(FEET) =    732.00
  ELEVATION DIFFERENCE(FEET) =     28.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      2.23
  TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =      2.23

****************************************************************************
  FLOW PROCESS FROM NODE  13001.10 TO NODE  13002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    732.00  DOWNSTREAM(FEET) =    525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00   CHANNEL SLOPE =  0.2760
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.213
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.23
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   2.96
  Tc(MIN.) =   9.22
  SUBAREA AREA(ACRES) =     5.90       SUBAREA RUNOFF(CFS) =   12.83
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      6.70         PEAK FLOW RATE(CFS) =      14.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   5.09
  LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13002.00 =   850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13002.00 TO NODE  13003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00   CHANNEL SLOPE =  0.1333
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.576
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     18.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.46
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   1.68
  Tc(MIN.) =  10.91
  SUBAREA AREA(ACRES) =     4.00       SUBAREA RUNOFF(CFS) =    7.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     10.70         PEAK FLOW RATE(CFS) =      20.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   4.80
  LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13003.00 =  1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13003.00 TO NODE  13003.00 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.) =  10.91
  RAINFALL INTENSITY(INCH/HR) =   5.58
  TOTAL STREAM AREA(ACRES) =    10.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.88
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  13004.00 TO NODE  13004.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    720.43
  DOWNSTREAM ELEVATION(FEET) =    686.70
  ELEVATION DIFFERENCE(FEET) =     33.73
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      2.23
  TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =      2.23

****************************************************************************
  FLOW PROCESS FROM NODE  13004.10 TO NODE  13005.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    686.70  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   330.00   CHANNEL SLOPE =  0.3385
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.767
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.03
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.81
  Tc(MIN.) =   8.08
  SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    5.92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      3.30         PEAK FLOW RATE(CFS) =       7.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.56
  LONGEST FLOWPATH FROM NODE  13004.00 TO NODE  13005.00 =   430.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13005.00 TO NODE  13003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    575.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.1429
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.416
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.85
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   3.33
  Tc(MIN.) =  11.41
  SUBAREA AREA(ACRES) =     3.70       SUBAREA RUNOFF(CFS) =    7.01
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      7.00         PEAK FLOW RATE(CFS) =      13.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.06
  LONGEST FLOWPATH FROM NODE  13004.00 TO NODE  13003.00 =  1200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13003.00 TO NODE  13003.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.41
  RAINFALL INTENSITY(INCH/HR) =   5.42
  TOTAL STREAM AREA(ACRES) =     7.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.27

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       20.88    10.91        5.576         10.70
     2       13.27    11.41        5.416          7.00

  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       33.56    10.91       5.576
     2       33.55    11.41       5.416

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     33.56   Tc(MIN.) =   10.91
  TOTAL AREA(ACRES) =     17.70
  LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13003.00 =  1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13003.00 TO NODE  13006.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    435.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.0938
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.287
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     43.47
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.68
AVERAGE FLOW DEPTH(FEET) =   0.37   TRAVEL TIME(MIN.) =   0.94
Tc(MIN.) =  11.85
SUBAREA AREA(ACRES) =    10.70       SUBAREA RUNOFF(CFS) =   19.80
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =     28.40         PEAK FLOW RATE(CFS) =      52.55

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   6.08
LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13006.00 =  1620.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE  13006.00 TO NODE  13006.00 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.) =  11.85
RAINFALL INTENSITY(INCH/HR) =   5.29
TOTAL STREAM AREA(ACRES) =    28.40
PEAK FLOW RATE(CFS) AT CONFLUENCE =     52.55

****************************************************************************
FLOW PROCESS FROM NODE  13007.00 TO NODE  13007.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
UPSTREAM ELEVATION(FEET) =    800.00
DOWNSTREAM ELEVATION(FEET) =    755.00
ELEVATION DIFFERENCE(FEET) =     45.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =      1.12
TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.12

****************************************************************************
FLOW PROCESS FROM NODE  13007.10 TO NODE  13008.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    755.00  DOWNSTREAM(FEET) =    575.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.4500
CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  12.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.332
```

```
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.48
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.69
  Tc(MIN.) =   8.96
  SUBAREA AREA(ACRES) =     1.50       SUBAREA RUNOFF(CFS) =    3.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      1.90         PEAK FLOW RATE(CFS) =       4.21

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.95
  LONGEST FLOWPATH FROM NODE  13007.00 TO NODE  13008.00 =   500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13008.00 TO NODE  13006.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    575.00  DOWNSTREAM(FEET) =    435.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   950.00   CHANNEL SLOPE =  0.1474
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.953
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.82
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   4.15
  Tc(MIN.) =  13.11
  SUBAREA AREA(ACRES) =     8.00       SUBAREA RUNOFF(CFS) =   13.87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      9.90         PEAK FLOW RATE(CFS) =      17.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   4.41
  LONGEST FLOWPATH FROM NODE  13007.00 TO NODE  13006.00 =  1450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13006.00 TO NODE  13006.00 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.) =  13.11
  RAINFALL INTENSITY(INCH/HR) =   4.95
  TOTAL STREAM AREA(ACRES) =     9.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.16

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

```
    1       52.55    11.85        5.287         28.40
    2       17.16    13.11        4.953          9.90

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1        68.06    11.85       5.287
    2        66.39    13.11       4.953

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     68.06   Tc(MIN.) =   11.85
  TOTAL AREA(ACRES) =     38.30
  LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13006.00 =  1620.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13006.00 TO NODE  13009.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    435.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00   CHANNEL SLOPE =  0.0688
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.417
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     97.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.00
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   3.81
  Tc(MIN.) =  15.65
  SUBAREA AREA(ACRES) =    37.90       SUBAREA RUNOFF(CFS) =   58.59
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     76.20         PEAK FLOW RATE(CFS) =     117.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   7.52
  LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13009.00 =  3220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13009.00 TO NODE  13010.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    310.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0429
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.257
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    120.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.33
  AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   0.92
  Tc(MIN.) =  16.58
  SUBAREA AREA(ACRES) =     3.00       SUBAREA RUNOFF(CFS) =    4.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     79.20         PEAK FLOW RATE(CFS) =     118.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =   6.28
  LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13010.00 =  3570.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  14001.00 TO NODE  14001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    510.00
  DOWNSTREAM ELEVATION(FEET) =    483.00
  ELEVATION DIFFERENCE(FEET) =     27.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE  14001.10 TO NODE  14002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    483.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.2633
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.824
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.55
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   3.93
  Tc(MIN.) =  10.19
  SUBAREA AREA(ACRES) =     2.70       SUBAREA RUNOFF(CFS) =    5.50
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      3.10         PEAK FLOW RATE(CFS) =       6.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.12
  LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14002.00 =   700.00 FEET.

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

```
  FLOW PROCESS FROM NODE  14002.00 TO NODE  14003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    280.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00   CHANNEL SLOPE =  0.0643
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.875
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     19.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.60
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   3.24
  Tc(MIN.) =  13.43
  SUBAREA AREA(ACRES) =    15.10       SUBAREA RUNOFF(CFS) =   25.76
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     18.20         PEAK FLOW RATE(CFS) =      31.05

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   4.27
  LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14003.00 =  1400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  15001.00 TO NODE  15001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    450.00
  DOWNSTREAM ELEVATION(FEET) =    436.50
  ELEVATION DIFFERENCE(FEET) =     13.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE  15001.10 TO NODE  15002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    436.50  DOWNSTREAM(FEET) =    302.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.1345
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.840
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.28
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   7.32
  Tc(MIN.) =  13.58
  SUBAREA AREA(ACRES) =     4.40       SUBAREA RUNOFF(CFS) =    7.45
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      4.80         PEAK FLOW RATE(CFS) =       8.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.77
  LONGEST FLOWPATH FROM NODE  15001.00 TO NODE  15002.00 =  1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  16001.00 TO NODE  16001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    415.00
  DOWNSTREAM ELEVATION(FEET) =    403.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE  16001.10 TO NODE  16002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    403.00  DOWNSTREAM(FEET) =    304.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.1165
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.277
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.52
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   5.61
  Tc(MIN.) =  11.88
  SUBAREA AREA(ACRES) =     3.80       SUBAREA RUNOFF(CFS) =    7.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      4.20         PEAK FLOW RATE(CFS) =       7.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   3.04
  LONGEST FLOWPATH FROM NODE  16001.00 TO NODE  16002.00 =   950.00 FEET.

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

```
  FLOW PROCESS FROM NODE  17001.00 TO NODE  17001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    337.00
  DOWNSTREAM ELEVATION(FEET) =    333.20
  ELEVATION DIFFERENCE(FEET) =      3.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.184
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.300
  SUBAREA RUNOFF(CFS) =      0.51
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.51

****************************************************************************
  FLOW PROCESS FROM NODE  17001.10 TO NODE  17002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    333.20  DOWNSTREAM(FEET) =    304.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00   CHANNEL SLOPE =  0.0471
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.571
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.35
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   7.66
  Tc(MIN.) =  14.84
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    2.88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.00         PEAK FLOW RATE(CFS) =       3.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE  17001.00 TO NODE  17002.00 =   700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  18001.00 TO NODE  18001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    810.00
  DOWNSTREAM ELEVATION(FEET) =    778.00
  ELEVATION DIFFERENCE(FEET) =     32.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
```

```
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE  18001.10 TO NODE  18002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    778.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.3200
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.577
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.06
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   2.18
  Tc(MIN.) =   8.44
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    4.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.30         PEAK FLOW RATE(CFS) =       5.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.64
  LONGEST FLOWPATH FROM NODE  18001.00 TO NODE  18002.00 =   500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  18002.00 TO NODE  18003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1550.00   CHANNEL SLOPE =  0.1613
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.908
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     24.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.33
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   4.85
  Tc(MIN.) =  13.29
  SUBAREA AREA(ACRES) =    22.10       SUBAREA RUNOFF(CFS) =   37.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     24.40         PEAK FLOW RATE(CFS) =      41.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   6.45
  LONGEST FLOWPATH FROM NODE  18001.00 TO NODE  18003.00 =  2050.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  18003.00 TO NODE  18003.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.29
  RAINFALL INTENSITY(INCH/HR) =   4.91
  TOTAL STREAM AREA(ACRES) =    24.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.92

****************************************************************************
  FLOW PROCESS FROM NODE  18004.00 TO NODE  18004.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    686.00
  DOWNSTREAM ELEVATION(FEET) =    667.90
  ELEVATION DIFFERENCE(FEET) =     18.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.67
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      1.67

****************************************************************************
  FLOW PROCESS FROM NODE  18004.10 TO NODE  18005.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    667.90  DOWNSTREAM(FEET) =    550.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =  0.1814
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.784
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.68
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   4.04
  Tc(MIN.) =  10.31
  SUBAREA AREA(ACRES) =     4.10       SUBAREA RUNOFF(CFS) =    8.30
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      4.70         PEAK FLOW RATE(CFS) =       9.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   3.24
  LONGEST FLOWPATH FROM NODE  18004.00 TO NODE  18005.00 =   750.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  18005.00 TO NODE  18003.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =    550.00  DOWNSTREAM(FEET) =    400.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.2239
CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   6.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.078
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     15.76
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.84
AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.31
Tc(MIN.) =  12.61
SUBAREA AREA(ACRES) =     7.00       SUBAREA RUNOFF(CFS) =   12.44
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =     11.70         PEAK FLOW RATE(CFS) =      20.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   5.47
LONGEST FLOWPATH FROM NODE  18004.00 TO NODE  18003.00 =  1420.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE  18003.00 TO NODE  18003.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  12.61
RAINFALL INTENSITY(INCH/HR) =   5.08
TOTAL STREAM AREA(ACRES) =    11.70
PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.79

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       41.92    13.29        4.908         24.40
    2       20.79    12.61        5.078         11.70

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       60.56    12.61       5.078
    2       62.02    13.29       4.908

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     62.02   Tc(MIN.) =   13.29
TOTAL AREA(ACRES) =     36.10
LONGEST FLOWPATH FROM NODE  18001.00 TO NODE  18003.00 =  2050.00 FEET.

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

```
  FLOW PROCESS FROM NODE  18003.00 TO NODE  18006.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    400.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.0974
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.470
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     71.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.18
  AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   2.08
  Tc(MIN.) =  15.37
  SUBAREA AREA(ACRES) =    12.00       SUBAREA RUNOFF(CFS) =   18.77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     48.10         PEAK FLOW RATE(CFS) =      75.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   6.36
  LONGEST FLOWPATH FROM NODE  18001.00 TO NODE  18006.00 =  2820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  18006.00 TO NODE  18006.00 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.) =  15.37
  RAINFALL INTENSITY(INCH/HR) =   4.47
  TOTAL STREAM AREA(ACRES) =    48.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     75.25

****************************************************************************
  FLOW PROCESS FROM NODE  18007.00 TO NODE  18007.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    510.00
  DOWNSTREAM ELEVATION(FEET) =    499.00
  ELEVATION DIFFERENCE(FEET) =     11.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.67
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      1.67

****************************************************************************
  FLOW PROCESS FROM NODE  18007.10 TO NODE  18008.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    499.00  DOWNSTREAM(FEET) =    425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =  0.1138
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.796
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.70
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.01
  Tc(MIN.) =  10.27
  SUBAREA AREA(ACRES) =     4.10       SUBAREA RUNOFF(CFS) =    8.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      4.70         PEAK FLOW RATE(CFS) =       9.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   3.18
  LONGEST FLOWPATH FROM NODE  18007.00 TO NODE  18008.00 =   750.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  18008.00 TO NODE  18006.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    425.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   900.00   CHANNEL SLOPE =  0.1111
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.805
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     19.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.33
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   3.47
  Tc(MIN.) =  13.74
  SUBAREA AREA(ACRES) =    12.10       SUBAREA RUNOFF(CFS) =   20.35
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     16.80         PEAK FLOW RATE(CFS) =      28.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   4.90
  LONGEST FLOWPATH FROM NODE  18007.00 TO NODE  18006.00 =  1650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  18006.00 TO NODE  18006.00 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.) =  13.74
  RAINFALL INTENSITY(INCH/HR) =   4.80
  TOTAL STREAM AREA(ACRES) =    16.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     28.25

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       75.25    15.37        4.470         48.10
     2       28.25    13.74        4.805         16.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       98.25    13.74       4.805
     2      101.53    15.37       4.470

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    101.53   Tc(MIN.) =   15.37
  TOTAL AREA(ACRES) =     64.90
  LONGEST FLOWPATH FROM NODE  18001.00 TO NODE  18006.00 =  2820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  18006.00 TO NODE  18009.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    272.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1150.00   CHANNEL SLOPE =  0.0461
  CHANNEL BASE(FEET) =   60.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.824
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    126.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   4.20
  Tc(MIN.) =  19.57
  SUBAREA AREA(ACRES) =    37.90       SUBAREA RUNOFF(CFS) =   50.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =    102.80         PEAK FLOW RATE(CFS) =     137.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.47   FLOW VELOCITY(FEET/SEC.) =   4.69
  LONGEST FLOWPATH FROM NODE  18001.00 TO NODE  18009.00 =  3970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  19001.00 TO NODE  19001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    910.00
  DOWNSTREAM ELEVATION(FEET) =    852.00
  ELEVATION DIFFERENCE(FEET) =     58.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE  19001.10 TO NODE  19002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    852.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.5771
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.757
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.18
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.83
  Tc(MIN.) =   8.10
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    4.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.20         PEAK FLOW RATE(CFS) =       5.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE  19001.00 TO NODE  19002.00 =   450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  19002.00 TO NODE  19003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    278.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.3720
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.278
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.41
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   3.78
  Tc(MIN.) =  11.88
```

```
  SUBAREA AREA(ACRES) =     12.70        SUBAREA RUNOFF(CFS) =    23.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      14.90          PEAK FLOW RATE(CFS) =       27.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   5.57
  LONGEST FLOWPATH FROM NODE  19001.00 TO NODE  19003.00 =  1450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  20001.00 TO NODE  20001.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    837.50
  DOWNSTREAM ELEVATION(FEET) =    785.00
  ELEVATION DIFFERENCE(FEET) =     52.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE  20001.10 TO NODE  20002.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    785.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.5250
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.290
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.40
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.78
  Tc(MIN.) =   9.05
  SUBAREA AREA(ACRES) =     0.70        SUBAREA RUNOFF(CFS) =    1.54
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      0.90          PEAK FLOW RATE(CFS) =       1.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.75
  LONGEST FLOWPATH FROM NODE  20001.00 TO NODE  20002.00 =   500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  20002.00 TO NODE  20003.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    575.00  DOWNSTREAM(FEET) =    270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1300.00   CHANNEL SLOPE =  0.2346
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.660
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     18.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.04
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   5.36
  Tc(MIN.) =  14.41
  SUBAREA AREA(ACRES) =    19.90       SUBAREA RUNOFF(CFS) =   32.45
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     20.80         PEAK FLOW RATE(CFS) =      33.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   5.15
  LONGEST FLOWPATH FROM NODE  20001.00 TO NODE  20003.00 =  1800.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     20.80  TC(MIN.) =     14.41
  PEAK FLOW RATE(CFS)   =     33.92
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

SECTION 4A:
CAMPUS PARK UPSTREAM – RATIONAL HYDROLOGY MAP (OFF-SITE)

CAMPUS PARK UP STREAM HYDROLOGY MAP

SECTION 5:
PRE-DEVELOPMENT CONDITIONS (ONSITE)
100-YEAR RATIONAL HYDROLOGY CALCULATIONS

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                          Analysis prepared by:

                           LANDMARK CONSULTING
                      9555 GENESEE AVENUE, SUITE 200
                           SAN DEIGO, CA 92121
                            TEL:  858-587-8070

 ************************** DESCRIPTION OF STUDY **************************
* CAMPUS PARK, COUNTY OF SAN DIEGO                                         *
* ON-SITE, PRE-CONSTRUCTION CONDITIONS                                     *
* 100-YEAR STORM                                                           *
 ***************************************************************************

  FILE NAME: 614EXC.DAT
  TIME/DATE OF STUDY: 18:22 05/06/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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

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

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    528.50
  DOWNSTREAM ELEVATION(FEET) =    514.00
  ELEVATION DIFFERENCE(FEET) =     14.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.40

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

```
  FLOW PROCESS FROM NODE    101.10 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    514.00  DOWNSTREAM(FEET) =    444.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   464.00   CHANNEL SLOPE =  0.1509
  CHANNEL BASE(FEET) =   24.00   "Z" FACTOR =  15.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.567
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.52
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   2.20
  Tc(MIN.) =   8.46
  SUBAREA AREA(ACRES) =     5.00       SUBAREA RUNOFF(CFS) =   11.49
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      5.50         PEAK FLOW RATE(CFS) =      12.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   4.41
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    102.00 =   564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 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.) =   8.46
  RAINFALL INTENSITY(INCH/HR) =   6.57
  TOTAL STREAM AREA(ACRES) =     5.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.64

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   8.73   RAIN INTENSITY(INCH/HOUR) =  6.44
  TOTAL AREA(ACRES) =     1.60   TOTAL RUNOFF(CFS) =      3.61

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    770.00  DOWNSTREAM(FEET) =    444.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   991.00   CHANNEL SLOPE =  0.3290
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.187
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.76
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   3.47
  Tc(MIN.) =  12.20
  SUBAREA AREA(ACRES) =     4.90       SUBAREA RUNOFF(CFS) =    8.90
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      6.50         PEAK FLOW RATE(CFS) =      11.80
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   5.59
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    102.00 =   991.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.20
  RAINFALL INTENSITY(INCH/HR) =   5.19
  TOTAL STREAM AREA(ACRES) =     6.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.80

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       12.64     8.46        6.567          5.50
     2       11.80    12.20        5.187          6.50

  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       20.83     8.46       6.567
     2       21.79    12.20       5.187

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     21.79   Tc(MIN.) =   12.20
  TOTAL AREA(ACRES) =     12.00
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    102.00 =   991.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    444.00  DOWNSTREAM(FEET) =    408.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   395.00   CHANNEL SLOPE =  0.0911
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.902
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     25.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.89
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   1.12
  Tc(MIN.) =  13.32
  SUBAREA AREA(ACRES) =     4.70       SUBAREA RUNOFF(CFS) =    8.06
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     16.70         PEAK FLOW RATE(CFS) =      28.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   6.15
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    103.00 =  1386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.32
  RAINFALL INTENSITY(INCH/HR) =   4.90
  TOTAL STREAM AREA(ACRES) =    16.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     28.66

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.48   RAIN INTENSITY(INCH/HOUR) =  5.39
  TOTAL AREA(ACRES) =    15.80   TOTAL RUNOFF(CFS) =     29.84

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =    408.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1427.00   CHANNEL SLOPE =  0.1359
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.616
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     48.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.57
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   3.14
  Tc(MIN.) =  14.62
  SUBAREA AREA(ACRES) =    22.70       SUBAREA RUNOFF(CFS) =   36.67
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     38.50         PEAK FLOW RATE(CFS) =      62.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   8.34
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    103.00 =  2418.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.62
  RAINFALL INTENSITY(INCH/HR) =   4.62
  TOTAL STREAM AREA(ACRES) =    38.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     62.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       28.66    13.32        4.902         16.70
     2       62.20    14.62        4.616         38.50

  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       85.32    13.32       4.902
```

```
    2       89.19    14.62       4.616

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     89.19   Tc(MIN.) =   14.62
  TOTAL AREA(ACRES) =     55.20
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    103.00 =  2418.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    408.00  DOWNSTREAM(FEET) =    403.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0500
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.572
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     89.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.62
  AVERAGE FLOW DEPTH(FEET) =   0.67   TRAVEL TIME(MIN.) =   0.22
  Tc(MIN.) =  14.84
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    1.12
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     55.90         PEAK FLOW RATE(CFS) =      89.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.66   FLOW VELOCITY(FEET/SEC.) =   7.67
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    104.00 =  2518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.84
  RAINFALL INTENSITY(INCH/HR) =   4.57
  TOTAL STREAM AREA(ACRES) =    55.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     89.46

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.93   RAIN INTENSITY(INCH/HOUR) =  5.26
  TOTAL AREA(ACRES) =    52.40   TOTAL RUNOFF(CFS) =     96.53

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    666.00  DOWNSTREAM(FEET) =    403.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2144.00   CHANNEL SLOPE =  0.1227
  CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.409
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    109.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.49
  AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   3.77
  Tc(MIN.) =  15.70
  SUBAREA AREA(ACRES) =    16.20       SUBAREA RUNOFF(CFS) =   25.00
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     68.60         PEAK FLOW RATE(CFS) =     105.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   9.34
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    104.00 =  4562.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =  15.70
  RAINFALL INTENSITY(INCH/HR) =   4.41
  TOTAL STREAM AREA(ACRES) =    68.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    105.87

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       89.46    14.84        4.572         55.90
     2      105.87    15.70        4.409         68.60

  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      189.55    14.84       4.572
     2      192.15    15.70       4.409

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    192.15   Tc(MIN.) =   15.70
  TOTAL AREA(ACRES) =    124.50
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    104.00 =  4562.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    403.00  DOWNSTREAM(FEET) =    358.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   979.00   CHANNEL SLOPE =  0.0460
  CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.098
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    204.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.67
  AVERAGE FLOW DEPTH(FEET) =   0.83   TRAVEL TIME(MIN.) =   1.88
  Tc(MIN.) =  17.58
  SUBAREA AREA(ACRES) =    17.80       SUBAREA RUNOFF(CFS) =   25.53
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =    142.30         PEAK FLOW RATE(CFS) =     204.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =   8.70
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    105.00 =  5541.00 FEET.

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

****************************************************************************
  FLOW PROCESS FROM NODE   4003.00 TO NODE   4003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.64   RAIN INTENSITY(INCH/HOUR) =  5.67
  TOTAL AREA(ACRES) =    10.70   TOTAL RUNOFF(CFS) =     21.22

****************************************************************************
  FLOW PROCESS FROM NODE   4003.00 TO NODE    106.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    464.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1362.00   CHANNEL SLOPE =  0.1145
  CHANNEL BASE(FEET) =   23.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.654
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     30.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.98
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   3.79
  Tc(MIN.) =  14.43
  SUBAREA AREA(ACRES) =    11.50       SUBAREA RUNOFF(CFS) =   18.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     22.20         PEAK FLOW RATE(CFS) =      36.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   6.38
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    106.00 =  6903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.71   RAIN INTENSITY(INCH/HOUR) =  5.64
  TOTAL AREA(ACRES) =    47.50   TOTAL RUNOFF(CFS) =     93.82

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE    107.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    590.00  DOWNSTREAM(FEET) =    580.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   124.00   CHANNEL SLOPE =  0.0806
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
```

```
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.563
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     94.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.69
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   0.24
  Tc(MIN.) =  10.95
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     48.00         PEAK FLOW RATE(CFS) =      93.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   8.68
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    107.00 =  7027.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 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.) =  10.95
  RAINFALL INTENSITY(INCH/HR) =   5.56
  TOTAL STREAM AREA(ACRES) =    48.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     93.82

****************************************************************************
  FLOW PROCESS FROM NODE   6006.00 TO NODE   6006.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.53   RAIN INTENSITY(INCH/HOUR) =  6.08
  TOTAL AREA(ACRES) =    18.00   TOTAL RUNOFF(CFS) =     66.30

****************************************************************************
  FLOW PROCESS FROM NODE   6006.00 TO NODE    107.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    590.00  DOWNSTREAM(FEET) =    580.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   111.00   CHANNEL SLOPE =  0.0901
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.988
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     66.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.85
  AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   0.24
  Tc(MIN.) =   9.77
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.603
  TOTAL AREA(ACRES) =     18.20         PEAK FLOW RATE(CFS) =      66.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   7.82
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    107.00 =  4673.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 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.) =   9.77
  RAINFALL INTENSITY(INCH/HR) =   5.99
  TOTAL STREAM AREA(ACRES) =    18.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     66.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       93.82    10.95        5.563         48.00
     2       66.30     9.77        5.988         18.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      149.99     9.77       5.988
     2      155.41    10.95       5.563

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    155.41   Tc(MIN.) =   10.95
  TOTAL AREA(ACRES) =     66.20
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    107.00 =  7027.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    106.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    580.00  DOWNSTREAM(FEET) =    464.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   921.00   CHANNEL SLOPE =  0.1260
  CHANNEL BASE(FEET) =   22.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.172
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    162.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.73
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   1.31
  Tc(MIN.) =  12.26
  SUBAREA AREA(ACRES) =     8.30       SUBAREA RUNOFF(CFS) =   15.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.412
  TOTAL AREA(ACRES) =     74.50         PEAK FLOW RATE(CFS) =     158.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =  11.59
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    106.00 =  7948.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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      158.67    12.26       5.172        74.50
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    106.00 =  7948.00 FEET.

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

```
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       36.17    14.43       4.654       22.20
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    106.00 =  6903.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     189.38      12.26        5.172
     2     178.95      14.43        4.654

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    189.38   Tc(MIN.) =   12.26
  TOTAL AREA(ACRES) =     96.70

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    464.00  DOWNSTREAM(FEET) =    358.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1631.00   CHANNEL SLOPE =  0.0650
  CHANNEL BASE(FEET) =   11.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.661
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    209.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.67
  AVERAGE FLOW DEPTH(FEET) =   1.23   TRAVEL TIME(MIN.) =   2.15
  Tc(MIN.) =  14.40
  SUBAREA AREA(ACRES) =    25.20       SUBAREA RUNOFF(CFS) =   41.11
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.388
  TOTAL AREA(ACRES) =    121.90         PEAK FLOW RATE(CFS) =     220.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.) =  12.89
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    105.00 =  9579.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 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      220.30    14.40       4.661      121.90
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    105.00 =  9579.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      204.14    17.58       4.098      142.30
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    105.00 =  5541.00 FEET.

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

```
     1      387.55       14.40         4.661
     2      397.86       17.58         4.098

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    397.86   Tc(MIN.) =   17.58
  TOTAL AREA(ACRES) =    264.20

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    108.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    342.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0372
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.997
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    403.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.32
  AVERAGE FLOW DEPTH(FEET) =   1.44   TRAVEL TIME(MIN.) =   0.69
  Tc(MIN.) =  18.27
  SUBAREA AREA(ACRES) =     7.60       SUBAREA RUNOFF(CFS) =   10.63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.367
  TOTAL AREA(ACRES) =    271.80         PEAK FLOW RATE(CFS) =     398.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.42   FLOW VELOCITY(FEET/SEC.) =  10.32
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    108.00 = 10009.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.27
  RAINFALL INTENSITY(INCH/HR) =   4.00
  TOTAL STREAM AREA(ACRES) =   271.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    398.68

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    556.90
  DOWNSTREAM ELEVATION(FEET) =    536.00
  ELEVATION DIFFERENCE(FEET) =     20.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    109.10 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    536.00  DOWNSTREAM(FEET) =    472.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   337.00   CHANNEL SLOPE =  0.1899
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  15.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.951
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.56
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.59
  Tc(MIN.) =   9.86
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    1.04
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      0.60         PEAK FLOW RATE(CFS) =       1.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.21
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    110.00 =   437.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    108.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    342.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2050.00   CHANNEL SLOPE =  0.0634
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.014
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.12
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   8.29
  Tc(MIN.) =  18.15
  SUBAREA AREA(ACRES) =    15.20       SUBAREA RUNOFF(CFS) =   21.36
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     15.80         PEAK FLOW RATE(CFS) =      22.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   5.14
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    108.00 =  2487.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 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.) =  18.15
  RAINFALL INTENSITY(INCH/HR) =   4.01
  TOTAL STREAM AREA(ACRES) =    15.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
```

```
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1       398.68     18.27         3.997         271.80
     2        22.20     18.15         4.014          15.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1       418.23     18.15        4.014
     2       420.78     18.27        3.997

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    420.78   Tc(MIN.) =   18.27
  TOTAL AREA(ACRES) =    287.60
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    108.00 = 10009.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.00  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =   213.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  40.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  35.24
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    420.78
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  18.37
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    111.00 = 10222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    888.00
  DOWNSTREAM ELEVATION(FEET) =    880.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.431
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    880.00  DOWNSTREAM(FEET) =    390.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2481.00   CHANNEL SLOPE =  0.1975
  CHANNEL BASE(FEET) =   44.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.506
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     43.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.18
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   6.69
  Tc(MIN.) =  11.12
  SUBAREA AREA(ACRES) =    41.40       SUBAREA RUNOFF(CFS) =   79.79
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     41.50         PEAK FLOW RATE(CFS) =      79.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   7.91
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    203.00 =  2531.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    344.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   863.00   CHANNEL SLOPE =  0.0533
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.790
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     89.95
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.36
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   2.68
  Tc(MIN.) =  13.81
  SUBAREA AREA(ACRES) =    11.90       SUBAREA RUNOFF(CFS) =   19.95
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     53.40         PEAK FLOW RATE(CFS) =      89.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   5.33
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    204.00 =  3394.00 FEET.

+---------------------------------------------------------------------------+
| FLOW CONFLUENCES WITH OVERALL HORSE RANCH CREEK                           |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    68.00
  UPSTREAM ELEVATION(FEET) =    484.00
  DOWNSTREAM ELEVATION(FEET) =    476.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.168
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.028
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  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) =    476.00  DOWNSTREAM(FEET) =    350.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1870.00   CHANNEL SLOPE =  0.0674
```

```
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.107
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     25.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.25
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   7.33
  Tc(MIN.) =  12.50
  SUBAREA AREA(ACRES) =    26.60       SUBAREA RUNOFF(CFS) =   47.55
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     26.70         PEAK FLOW RATE(CFS) =      47.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   5.33
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    303.00 =  1938.00 FEET.

+----------------------------------------------------------------------------+
| FLOW CONFLUENCES WITH FLOW IN FORSE RANCH CREEK                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  10006.00 TO NODE  10006.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  13.67   RAIN INTENSITY(INCH/HOUR) =  4.82
  TOTAL AREA(ACRES) =    75.00   TOTAL RUNOFF(CFS) =    126.35

+----------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                              |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  10006.00 TO NODE    401.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   444.00  DOWNSTREAM(FEET) =   426.00
  FLOW LENGTH(FEET) =   176.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.03
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    126.35
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  13.77
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    401.00 =  2114.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.77
  RAINFALL INTENSITY(INCH/HR) =   4.80
  TOTAL STREAM AREA(ACRES) =    75.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    126.35

****************************************************************************
  FLOW PROCESS FROM NODE   9002.00 TO NODE   9002.00 IS CODE =   7
```

```
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.75   RAIN INTENSITY(INCH/HOUR) =  5.63
  TOTAL AREA(ACRES) =     1.00   TOTAL RUNOFF(CFS) =      2.00

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   9002.00 TO NODE    401.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    456.00  DOWNSTREAM(FEET) =    426.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   216.00   CHANNEL SLOPE =  0.1389
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.213
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.66
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.35
  Tc(MIN.) =  12.11
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    1.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.353
  TOTAL AREA(ACRES) =      1.80         PEAK FLOW RATE(CFS) =       3.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   2.80
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    401.00 =  2703.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.11
  RAINFALL INTENSITY(INCH/HR) =   5.21
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.31

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      126.35    13.77        4.798         75.00
      2        3.31    12.11        5.213          1.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      114.42    12.11       5.213
      2      129.40    13.77       4.798

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =    129.40   Tc(MIN.) =   13.77
  TOTAL AREA(ACRES) =     76.80
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    401.00 =  2703.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    426.00  DOWNSTREAM(FEET) =    302.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2874.00   CHANNEL SLOPE =  0.0431
  CHANNEL BASE(FEET) =   60.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.568
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    170.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.97
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   8.02
  Tc(MIN.) =  21.79
  SUBAREA AREA(ACRES) =    64.60       SUBAREA RUNOFF(CFS) =   80.68
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =    141.40         PEAK FLOW RATE(CFS) =     176.49

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.47   FLOW VELOCITY(FEET/SEC.) =   6.09
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    402.00 =  5577.00 FEET.

+--------------------------------------------------------------------------+
| FLOW CONFLUENCES WITH HORSE RANCH CREEK                                  |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  11003.00 TO NODE  11003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  13.47   RAIN INTENSITY(INCH/HOUR) =  4.87
  TOTAL AREA(ACRES) =    19.90   TOTAL RUNOFF(CFS) =     33.90

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  11003.00 TO NODE    501.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.60  DOWNSTREAM(FEET) =   424.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.57
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     33.90
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  13.52
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    501.00 =  5637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.52
  RAINFALL INTENSITY(INCH/HR) =   4.86
  TOTAL STREAM AREA(ACRES) =    19.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.90

****************************************************************************
  FLOW PROCESS FROM NODE  12003.00 TO NODE  12003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.58   RAIN INTENSITY(INCH/HOUR) =  5.09
  TOTAL AREA(ACRES) =    25.50   TOTAL RUNOFF(CFS) =     45.40

+---------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                             |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  12003.00 TO NODE    501.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    424.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    30.00   CHANNEL SLOPE =  0.1333
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     45.40
  FLOW VELOCITY(FEET/SEC.) =   7.53   FLOW DEPTH(FEET) =   0.29
  TRAVEL TIME(MIN.) =   0.07   Tc(MIN.) =  12.65
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    501.00 =  2733.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.65
  RAINFALL INTENSITY(INCH/HR) =   5.07
  TOTAL STREAM AREA(ACRES) =    25.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     45.40

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       33.90    13.52        4.855         19.90
     2       45.40    12.65        5.068         25.50

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       77.11    12.65       5.068
     2       77.39    13.52       4.855
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     77.39   Tc(MIN.) =   13.52
  TOTAL AREA(ACRES) =     45.40
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    501.00 =  5637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    424.00  DOWNSTREAM(FEET) =    296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2968.00   CHANNEL SLOPE =  0.0431
  CHANNEL BASE(FEET) =   35.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.569
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    103.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.99
  AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   8.26
  Tc(MIN.) =  21.78
  SUBAREA AREA(ACRES) =    41.30       SUBAREA RUNOFF(CFS) =   51.60
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     86.70         PEAK FLOW RATE(CFS) =     108.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   6.07
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    502.00 =  8605.00 FEET.

+--------------------------------------------------------------------------+
| FLOW CONFLUENCES WITH HORSE RANCH CREEK                                  |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  13010.00 TO NODE  13010.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  16.58   RAIN INTENSITY(INCH/HOUR) =  4.26
  TOTAL AREA(ACRES) =    79.20   TOTAL RUNOFF(CFS) =    118.00

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  13010.00 TO NODE    601.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    310.00  DOWNSTREAM(FEET) =    284.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   821.00   CHANNEL SLOPE =  0.0317
  CHANNEL BASE(FEET) =   35.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.903
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    121.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.75
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.57   TRAVEL TIME(MIN.) =   2.38
  Tc(MIN.) =  18.96
  SUBAREA AREA(ACRES) =     5.30       SUBAREA RUNOFF(CFS) =    7.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     84.50         PEAK FLOW RATE(CFS) =     118.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   5.72
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    601.00 =  9426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    601.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.96
  RAINFALL INTENSITY(INCH/HR) =   3.90
  TOTAL STREAM AREA(ACRES) =    84.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    118.00

****************************************************************************
  FLOW PROCESS FROM NODE  14003.00 TO NODE  14003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  13.43   RAIN INTENSITY(INCH/HOUR) =  4.88
  TOTAL AREA(ACRES) =    18.20   TOTAL RUNOFF(CFS) =     31.60

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  14003.00 TO NODE    601.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    289.00  DOWNSTREAM(FEET) =    284.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   281.00   CHANNEL SLOPE =  0.0178
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.552
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     33.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
  AVERAGE FLOW DEPTH(FEET) =   0.34   TRAVEL TIME(MIN.) =   1.51
  Tc(MIN.) =  14.94
  SUBAREA AREA(ACRES) =     2.80       SUBAREA RUNOFF(CFS) =    4.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.355
  TOTAL AREA(ACRES) =     21.00         PEAK FLOW RATE(CFS) =      33.96

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   3.11
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    601.00 =  3014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    601.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.94
  RAINFALL INTENSITY(INCH/HR) =   4.55
  TOTAL STREAM AREA(ACRES) =    21.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.96

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      118.00    18.96        3.903        84.50
      2       33.96    14.94        4.552        21.00

  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      126.95    14.94       4.552
      2      147.12    18.96       3.903

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    147.12   Tc(MIN.) =   18.96
  TOTAL AREA(ACRES) =    105.50
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    601.00 =  9426.00 FEET.

+----------------------------------------------------------------------------+
| FLOW CONFLUENCES WITH HORSE RANCH CREEK                                    |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  15002.00 TO NODE  15002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  13.58   RAIN INTENSITY(INCH/HOUR) =  4.84
  TOTAL AREA(ACRES) =     4.80   TOTAL RUNOFF(CFS) =      8.10

+----------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                              |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  15002.00 TO NODE    701.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    302.00  DOWNSTREAM(FEET) =    300.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   195.00   CHANNEL SLOPE =  0.0077
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.434
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.64
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   1.98
  Tc(MIN.) =  15.56
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    1.24
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.349
  TOTAL AREA(ACRES) =      5.60         PEAK FLOW RATE(CFS) =       8.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   1.63
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    701.00 =  9621.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    300.50  DOWNSTREAM(FEET) =    299.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   663.00   CHANNEL SLOPE =  0.0023
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.302
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.23
  AVERAGE FLOW DEPTH(FEET) =   0.40   TRAVEL TIME(MIN.) =   9.01
  Tc(MIN.) =  24.57
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    3.93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.349
  TOTAL AREA(ACRES) =      9.00         PEAK FLOW RATE(CFS) =      10.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   1.20
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    702.00 = 10284.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 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.) =  24.57
  RAINFALL INTENSITY(INCH/HR) =   3.30
  TOTAL STREAM AREA(ACRES) =     9.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.38

****************************************************************************
  FLOW PROCESS FROM NODE  16002.00 TO NODE  16002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.88   RAIN INTENSITY(INCH/HOUR) =  5.28
  TOTAL AREA(ACRES) =     4.20   TOTAL RUNOFF(CFS) =      7.76

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  16002.00 TO NODE    702.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    311.00  DOWNSTREAM(FEET) =    299.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   189.00   CHANNEL SLOPE =  0.0635
```

```
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.993
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.96
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   1.07
  Tc(MIN.) =  12.95
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.17
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      4.30         PEAK FLOW RATE(CFS) =       7.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   2.92
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    702.00 =  3203.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.95
  RAINFALL INTENSITY(INCH/HR) =   4.99
  TOTAL STREAM AREA(ACRES) =     4.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.76

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       10.38    24.57        3.302          9.00
     2        7.76    12.95        4.993          4.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       13.23    12.95       4.993
     2       15.51    24.57       3.302

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     15.51   Tc(MIN.) =   24.57
  TOTAL AREA(ACRES) =     13.30
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    702.00 = 10284.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    299.00  DOWNSTREAM(FEET) =    276.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   310.00   CHANNEL SLOPE =  0.0742
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.198
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.13
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   1.25
```

```
  Tc(MIN.) =  25.82
  SUBAREA AREA(ACRES) =     1.30       SUBAREA RUNOFF(CFS) =    1.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     14.60         PEAK FLOW RATE(CFS) =      16.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   4.15
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    703.00 = 10594.00 FEET.

+----------------------------------------------------------------------+
| FLOW CONFLUENCES WITH HORSE RANCH CREEK                              |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

**********************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    802.00 IS CODE =  21
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    320.70
  DOWNSTREAM ELEVATION(FEET) =    317.90
  ELEVATION DIFFERENCE(FEET) =      2.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.953
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.836
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.24

**********************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    317.90  DOWNSTREAM(FEET) =    268.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1219.00   CHANNEL SLOPE =  0.0406
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.178
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.23
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   9.11
  Tc(MIN.) =  17.06
  SUBAREA AREA(ACRES) =    15.60       SUBAREA RUNOFF(CFS) =   22.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     15.70         PEAK FLOW RATE(CFS) =      22.96

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   2.88
  LONGEST FLOWPATH FROM NODE    801.00 TO NODE    803.00 =  1299.00 FEET.

+----------------------------------------------------------------------+
| FLOW CONFLUENCES WITH HORSE RANCH CREEK                              |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+
======================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     15.70  TC(MIN.) =     17.06
  PEAK FLOW RATE(CFS)   =     22.96
======================================================================
```

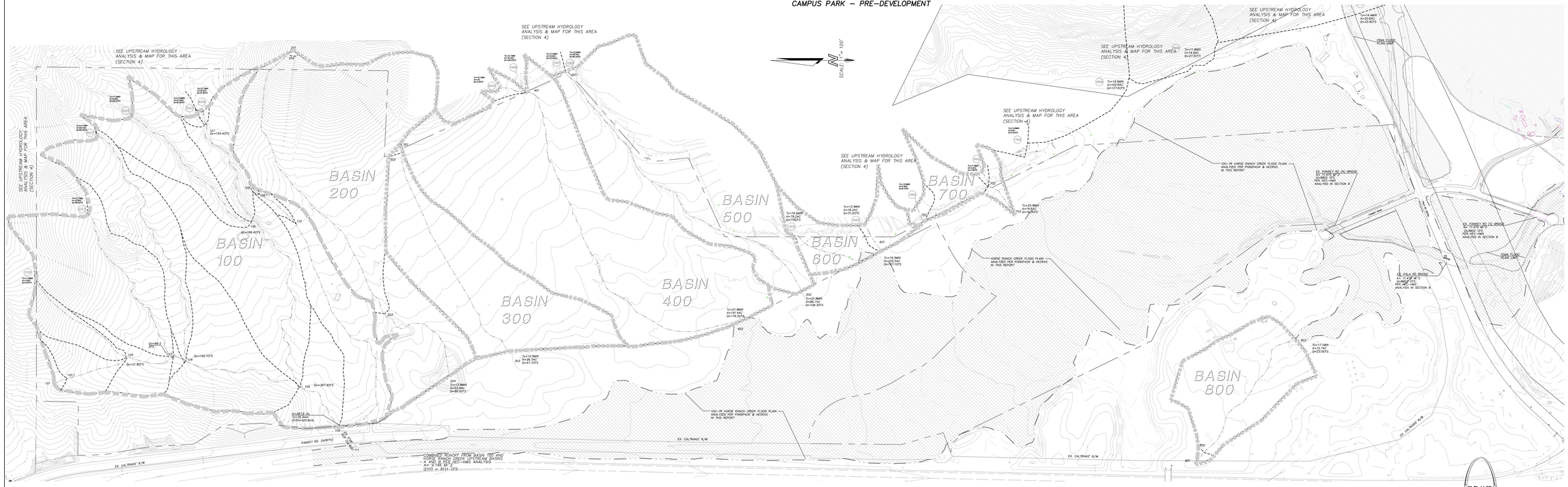
==========

END OF RATIONAL METHOD ANALYSIS

SECTION 5A:
PRE-DEVELOPMENT CONDITIONS
HYDROLOGY MAP (ON-SITE)

RATIONAL HYDROLOGY MAP FOR:

CAMPUS PARK – PRE-DEVELOPMENT



LEGEND

UPSTREAM ENDRUN NODE	003
NODE	103
SUB-BASIN BOUNDARY	
BASIN BOUNDARY	
FLOW PATH	
Qc	CONFLUENCED FLOW RATE
SUBDIVISION BNDY.	

SUB-BASIN AREAS

BASIN 100		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
101	101.1	0.5
101.1	102	5
1002	102	4.9
102	103	4.7
2003	103	22.7
103	104	0.7
3007	104	16.2
104	105	17.8
4003	106	11.5
5007	107	0.5
6006	107	0.2
107	106	8.3
106	105	25.2
105	108	7.8
108	109.1	0.1
109.1	110	0.5
110	108	15.2

BASIN 200		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
201	202	0.1
202	203	41.4
203	204	11.9

BASIN 300		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
301	302	0.1
302	303	26.6

BASIN 400		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
9000	401	0.8
401	402	64.6

BASIN 500		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
501	502	41.3

BASIN 600		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
13010	601	5.3
14003	601	2.3

BASIN 700		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
15002	701	0.8
701	702	3.4
16002	702	0.1
702	703	1.3

BASIN 800		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
801	802	0.1
802	803	15.6

LANDMARK CONSULTING
JOB NO. 1000
4207 SENECA STREET, STE. 200
SAN DIEGO, CA 92111, 858-581-9926

PRE-DEVELOPMENT CONDITIONS

CAMPUS PARK

SECTION 6:
POST-DEVELOPMENT CONDITIONS (ONSITE)
100-YEAR RATIONAL HYDROLOGY CALCS

SECTION 6A:
BASIN 100

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                          Analysis prepared by:

                           LANDMARK CONSULTING
                      9555 GENESEE AVENUE, SUITE 200
                           SAN DEIGO, CA 92121
                            TEL:  858-587-8070

 ************************** DESCRIPTION OF STUDY **************************
* CAMPUS PARK, BASIN 100.1                                                 *
* POST-DEVLOPMENT CONDITIONS                                               *
* 100-YEAR STORM                                                           *
 ***************************************************************************

  FILE NAME: 614P0C.DAT
  TIME/DATE OF STUDY: 11:54 02/28/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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   18.0     13.0    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 =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.93   RAIN INTENSITY(INCH/HOUR) =  5.26
  TOTAL AREA(ACRES) =    52.40   TOTAL RUNOFF(CFS) =     96.53
```

```
+----------------------------------------------------------------------+
| DATA PER UPSTREAM HYDROLOGY                                          |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE    101.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    666.00  DOWNSTREAM(FEET) =    524.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1189.00   CHANNEL SLOPE =  0.1194
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.825
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    103.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.54
  AVERAGE FLOW DEPTH(FEET) =   1.38   TRAVEL TIME(MIN.) =   1.72
  Tc(MIN.) =  13.65
  SUBAREA AREA(ACRES) =     7.80       SUBAREA RUNOFF(CFS) =   13.17
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     60.20         PEAK FLOW RATE(CFS) =     101.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.37   FLOW VELOCITY(FEET/SEC.) =  11.55
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    101.00 =  1189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   524.00  DOWNSTREAM(FEET) =   471.00
  FLOW LENGTH(FEET) =   313.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    101.68
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  13.80
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    102.00 =  1502.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.80
  RAINFALL INTENSITY(INCH/HR) =   4.79
```

```
  TOTAL STREAM AREA(ACRES) =     60.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     101.68

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.48   RAIN INTENSITY(INCH/HOUR) =  5.39
  TOTAL AREA(ACRES) =     15.80   TOTAL RUNOFF(CFS) =     29.84

+--------------------------------------------------------------------------+
| DATA PER UPSTREAM HYDROLOGY                                              |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE    106.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   553.00   CHANNEL SLOPE =  0.2025
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.156
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     38.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.02
  AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =   0.84
  Tc(MIN.) =  12.32
  SUBAREA AREA(ACRES) =     9.30       SUBAREA RUNOFF(CFS) =   16.78
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     25.10         PEAK FLOW RATE(CFS) =      45.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =  11.63
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    106.00 =   553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.00  DOWNSTREAM(FEET) =   471.50
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.53
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     45.30
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  12.43
```

```
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    103.00 =   703.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   471.50  DOWNSTREAM(FEET) =   471.00
  FLOW LENGTH(FEET) =    24.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.73
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     45.30
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  12.46
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    102.00 =   727.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.46
  RAINFALL INTENSITY(INCH/HR) =   5.12
  TOTAL STREAM AREA(ACRES) =    25.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     45.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      101.68    13.80        4.791         60.20
     2       45.30    12.46        5.116         25.10

  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      137.13    12.46       5.116
     2      144.10    13.80       4.791

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    144.10   Tc(MIN.) =   13.80
  TOTAL AREA(ACRES) =     85.30
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    102.00 =  1502.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   471.00  DOWNSTREAM(FEET) =   441.50
```

```
  FLOW LENGTH(FEET) =   615.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.17
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    144.10
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  14.24
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    104.00 =  2117.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.24
  RAINFALL INTENSITY(INCH/HR) =   4.69
  TOTAL STREAM AREA(ACRES) =    85.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    144.10

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   8.73   RAIN INTENSITY(INCH/HOUR) =  6.44
  TOTAL AREA(ACRES) =     1.60   TOTAL RUNOFF(CFS) =      3.61

+--------------------------------------------------------------------------+
| DATA PER UPSTREAM HYDROLOGY                                              |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    770.00  DOWNSTREAM(FEET) =    474.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1090.00   CHANNEL SLOPE =  0.2716
  CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.139
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     13.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.98
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.65
  Tc(MIN.) =  12.38
  SUBAREA AREA(ACRES) =    10.50       SUBAREA RUNOFF(CFS) =   18.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     12.10         PEAK FLOW RATE(CFS) =      21.77
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   5.79
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    112.00 =  1817.00 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) =   474.00  DOWNSTREAM(FEET) =   444.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.13
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.77
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  12.41
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    113.00 =  1882.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   444.00  DOWNSTREAM(FEET) =   441.50
  FLOW LENGTH(FEET) =   137.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.13
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.77
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =  12.64
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    104.00 =  2019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.64
  RAINFALL INTENSITY(INCH/HR) =   5.07
  TOTAL STREAM AREA(ACRES) =    12.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.77

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       144.10    14.24        4.694        85.30
     2        21.77    12.64        5.071        12.10

  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      155.15    12.64       5.071
    2      164.25    14.24       4.694

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    164.25   Tc(MIN.) =   14.24
TOTAL AREA(ACRES) =     97.40
LONGEST FLOWPATH FROM NODE      0.00 TO NODE    104.00 =  2117.50 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   441.50  DOWNSTREAM(FEET) =   441.00
FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  22.95
ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    164.25
PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  14.25
LONGEST FLOWPATH FROM NODE      0.00 TO NODE    105.00 =  2128.50 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  14.25
RAINFALL INTENSITY(INCH/HR) =   4.69
TOTAL STREAM AREA(ACRES) =    97.40
PEAK FLOW RATE(CFS) AT CONFLUENCE =    164.25

****************************************************************************
FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  98
INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
UPSTREAM ELEVATION(FEET) =    497.60
DOWNSTREAM ELEVATION(FEET) =    496.80
ELEVATION DIFFERENCE(FEET) =      0.80
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.503
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.80
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

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

```
  FLOW PROCESS FROM NODE    107.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  496.80  DOWNSTREAM ELEVATION(FEET) =  447.00
  STREET LENGTH(FEET) =  1140.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   16.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.97
  STREET FLOW TRAVEL TIME(MIN.) =   2.97   Tc(MIN.) =   5.48
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.574
  SUBAREA AREA(ACRES) =    7.30      SUBAREA RUNOFF(CFS) =   36.18
  TOTAL AREA(ACRES) =      7.40        PEAK FLOW RATE(CFS) =      36.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  6.63   DEPTH*VELOCITY(FT*FT/SEC.) =   3.22
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    105.00 =  1190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.48
  RAINFALL INTENSITY(INCH/HR) =   8.70
  TOTAL STREAM AREA(ACRES) =     7.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     36.94

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      164.25    14.25        4.692         97.40
     2       36.94     5.48        8.695          7.40
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       125.57     5.48       8.695
     2       184.18    14.25       4.692

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    184.18   Tc(MIN.) =   14.25
  TOTAL AREA(ACRES) =    104.80
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    105.00 =  2128.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   441.00  DOWNSTREAM(FEET) =   439.90
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.37
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    184.18
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  14.39
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    114.00 =  2238.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   439.90  DOWNSTREAM(FEET) =   413.00
  FLOW LENGTH(FEET) =   426.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.97
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    184.18
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  14.65
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    115.00 =  2664.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.609
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3656
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    3.07
  TOTAL AREA(ACRES) =    106.70   TOTAL RUNOFF(CFS) =  184.18
  TC(MIN.) =  14.65
```

```
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   413.00  DOWNSTREAM(FEET) =   398.00
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.96
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    184.18
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =  14.85
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    115.10 =  2964.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.10 TO NODE    115.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.569
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3655
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.12
  TOTAL AREA(ACRES) =    107.40   TOTAL RUNOFF(CFS) =  184.18
  TC(MIN.) =  14.85
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

+--------------------------------------------------------------------------+
| RUNOFF ENTERS CONCRETE DITCH                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    107.40  TC(MIN.) =     14.85
  PEAK FLOW RATE(CFS)    =    184.18
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                           Analysis prepared by:

                            LANDMARK CONSULTING
                      9555 GENESEE AVENUE, SUITE 200
                            SAN DEIGO, CA 92121
                             TEL:  858-587-8070

 ************************** DESCRIPTION OF STUDY **************************
* CAMPUS PARK, BASIN 100                                                  *
* POST-DEVELOPMENT CONDITIONS                                             *
* 100-YEAR STORM                                                          *
 ***************************************************************************

  FILE NAME: 614P1C.DAT
  TIME/DATE OF STUDY: 15:59 05/06/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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   18.0     13.0    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 =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    499.00
  DOWNSTREAM ELEVATION(FEET) =    497.60
  ELEVATION DIFFERENCE(FEET) =      1.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.335
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.916
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE    108.10 TO NODE    109.00 IS CODE =  62
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  497.60  DOWNSTREAM ELEVATION(FEET) =  493.80
  STREET LENGTH(FEET) =   226.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.85
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
  STREET FLOW TRAVEL TIME(MIN.) =   1.55   Tc(MIN.) =   7.88
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.877
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.96
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       2.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.68
  FLOW VELOCITY(FEET/SEC.) =  2.70   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    109.00 =   296.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  493.80  DOWNSTREAM ELEVATION(FEET) =  473.20
  STREET LENGTH(FEET) =   406.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.44
  STREET FLOW TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =   9.31
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.175
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
```

```
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    3.87
  TOTAL AREA(ACRES) =      1.70        PEAK FLOW RATE(CFS) =       5.98

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.26
  FLOW VELOCITY(FEET/SEC.) =  5.11   DEPTH*VELOCITY(FT*FT/SEC.) =   1.69
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    110.00 =   702.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    123.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  473.20  DOWNSTREAM ELEVATION(FEET) =  447.30
  STREET LENGTH(FEET) =   290.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.24
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.00
  STREET FLOW TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =  10.06
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.873
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.587
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.51
  TOTAL AREA(ACRES) =      1.80        PEAK FLOW RATE(CFS) =       6.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.19
  FLOW VELOCITY(FEET/SEC.) =  6.44   DEPTH*VELOCITY(FT*FT/SEC.) =   2.00
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    123.00 =   992.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 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.) =  10.06
  RAINFALL INTENSITY(INCH/HR) =   5.87
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.20

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    121.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
```

```
  UPSTREAM ELEVATION(FEET) =    462.70
  DOWNSTREAM ELEVATION(FEET) =    462.51
  ELEVATION DIFFERENCE(FEET) =      0.19
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.499
  WARNING: THE MINIMUM OVERLAND FLOW SLOPE, 0.5%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.549
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    121.10 TO NODE    122.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  462.51  DOWNSTREAM ELEVATION(FEET) =  461.90
  STREET LENGTH(FEET) =   161.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.35
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.44
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.42
  STREET FLOW TRAVEL TIME(MIN.) =   2.00   Tc(MIN.) =  10.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.714
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.95
  TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       2.28

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.78
  FLOW VELOCITY(FEET/SEC.) =  1.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    122.00 =   211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  461.90  DOWNSTREAM ELEVATION(FEET) =  447.00
  STREET LENGTH(FEET) =   275.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.44
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.49
  STREET FLOW TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =  11.44
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.407
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    4.32
  TOTAL AREA(ACRES) =      2.10        PEAK FLOW RATE(CFS) =       6.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.46
  FLOW VELOCITY(FEET/SEC.) =  5.34   DEPTH*VELOCITY(FT*FT/SEC.) =   1.79
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    123.00 =   486.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.44
  RAINFALL INTENSITY(INCH/HR) =   5.41
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         6.20    10.06        5.873         1.80
     2         6.47    11.44        5.407         2.10

  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        11.90    10.06       5.873
     2        12.18    11.44       5.407

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     12.18   Tc(MIN.) =   11.44
  TOTAL AREA(ACRES) =      3.90
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    123.00 =   992.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   441.00  DOWNSTREAM(FEET) =   422.50
  FLOW LENGTH(FEET) =   391.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.18
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =  11.96
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    116.00 =  1383.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 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.) =  11.96
  RAINFALL INTENSITY(INCH/HR) =   5.26
  TOTAL STREAM AREA(ACRES) =     3.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.18

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    468.00
  DOWNSTREAM ELEVATION(FEET) =    461.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.982
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    119.10 TO NODE    120.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  461.00  DOWNSTREAM ELEVATION(FEET) =  446.50
  STREET LENGTH(FEET) =   190.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.50
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
  STREET FLOW TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   2.69
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.05
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.23
  FLOW VELOCITY(FEET/SEC.) =  4.73   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
```

```
  LONGEST FLOWPATH FROM NODE    119.00 TO NODE    120.00 =   280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    116.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  446.50  DOWNSTREAM ELEVATION(FEET) =  428.00
  STREET LENGTH(FEET) =   357.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   10.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.86
  STREET FLOW TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   3.79
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.583
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =   10.51
  TOTAL AREA(ACRES) =      2.30        PEAK FLOW RATE(CFS) =      12.37

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.76
  FLOW VELOCITY(FEET/SEC.) =  6.15   DEPTH*VELOCITY(FT*FT/SEC.) =   2.47
  LONGEST FLOWPATH FROM NODE    119.00 TO NODE    116.00 =   637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   3.79
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     2.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.37

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       12.18    11.96        5.256         3.90
     2       12.37     3.79        9.222         2.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       19.31     3.79       9.222
```

```
    2       19.23    11.96       5.256

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     19.31   Tc(MIN.) =    3.79
  TOTAL AREA(ACRES) =      6.20
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    116.00 =  1383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   422.50  DOWNSTREAM(FEET) =   407.00
  FLOW LENGTH(FEET) =   288.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.63
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.31
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   4.12
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    130.00 =  1671.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    131.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    427.20
  DOWNSTREAM ELEVATION(FEET) =    426.20
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.233
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.000
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    131.10 TO NODE    132.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  426.20  DOWNSTREAM ELEVATION(FEET) =  424.90
  STREET LENGTH(FEET) =   118.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.21
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.02
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.55
  STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   7.21
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.284
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.66
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       2.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.04
  FLOW VELOCITY(FEET/SEC.) =  2.22   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    132.00 =   178.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  424.90  DOWNSTREAM ELEVATION(FEET) =  413.00
  STREET LENGTH(FEET) =   433.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.39
  STREET FLOW TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   9.03
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.298
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    6.82
  TOTAL AREA(ACRES) =      2.40        PEAK FLOW RATE(CFS) =       8.62

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.56
  FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    133.00 =   611.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 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.) =   9.03
  RAINFALL INTENSITY(INCH/HR) =   6.30
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.62

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

```
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    462.90
  DOWNSTREAM ELEVATION(FEET) =    462.30
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    134.10 TO NODE    135.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  462.30  DOWNSTREAM ELEVATION(FEET) =  458.30
  STREET LENGTH(FEET) =   156.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    4.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.67
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
  STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   8.36
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.617
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.13
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.51

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.35
  FLOW VELOCITY(FEET/SEC.) =  2.90   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE    134.00 TO NODE    135.00 =   216.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    133.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  458.30  DOWNSTREAM ELEVATION(FEET) =  413.00
  STREET LENGTH(FEET) =   800.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.46
  STREET FLOW TRAVEL TIME(MIN.) =   2.72   Tc(MIN.) =  11.08
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.520
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =    5.35
  TOTAL AREA(ACRES) =      2.10        PEAK FLOW RATE(CFS) =       6.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.46
  FLOW VELOCITY(FEET/SEC.) =  5.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.83
  LONGEST FLOWPATH FROM NODE    134.00 TO NODE    133.00 =  1016.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.08
  RAINFALL INTENSITY(INCH/HR) =   5.52
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        8.62     9.03        6.298          2.40
     2        6.61    11.08        5.520          2.10

  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       14.00     9.03       6.298
     2       14.16    11.08       5.520

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     14.16   Tc(MIN.) =   11.08
  TOTAL AREA(ACRES) =      4.50
  LONGEST FLOWPATH FROM NODE    134.00 TO NODE    133.00 =  1016.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    136.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   407.00  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.83
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.16
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  11.16
  LONGEST FLOWPATH FROM NODE    134.00 TO NODE    136.00 =  1056.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    136.00 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.) =  11.16
  RAINFALL INTENSITY(INCH/HR) =   5.49
  TOTAL STREAM AREA(ACRES) =     4.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.16

****************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    137.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    426.90
  DOWNSTREAM ELEVATION(FEET) =    426.30
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    137.10 TO NODE    138.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  426.30  DOWNSTREAM ELEVATION(FEET) =  424.10
  STREET LENGTH(FEET) =   167.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.90
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.33
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.68
  STREET FLOW TRAVEL TIME(MIN.) =   1.19   Tc(MIN.) =   8.58
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.509
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.97
  TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       3.34
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.66
  FLOW VELOCITY(FEET/SEC.) =  2.66   DEPTH*VELOCITY(FT*FT/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE    137.00 TO NODE    138.00 =   227.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    139.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  424.10  DOWNSTREAM ELEVATION(FEET) =  420.40
  STREET LENGTH(FEET) =   294.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.16
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.02
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =  10.20
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.822
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =    5.64
  TOTAL AREA(ACRES) =      2.60        PEAK FLOW RATE(CFS) =       8.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.84
  FLOW VELOCITY(FEET/SEC.) =  3.28   DEPTH*VELOCITY(FT*FT/SEC.) =   1.45
  LONGEST FLOWPATH FROM NODE    137.00 TO NODE    139.00 =   521.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    139.00 TO NODE    136.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  420.40  DOWNSTREAM ELEVATION(FEET) =  413.00
  STREET LENGTH(FEET) =   272.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.94
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.76
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
  STREET FLOW TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =  11.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.474
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.62
  TOTAL AREA(ACRES) =      2.80        PEAK FLOW RATE(CFS) =       8.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.66
  FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.76
  LONGEST FLOWPATH FROM NODE    137.00 TO NODE    136.00 =   793.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    136.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.22
  RAINFALL INTENSITY(INCH/HR) =   5.47
  TOTAL STREAM AREA(ACRES) =     2.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.74

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.16    11.16        5.493          4.50
      2        8.74    11.22        5.474          2.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       22.85    11.16       5.493
      2       22.85    11.22       5.474

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     22.85   Tc(MIN.) =   11.16
  TOTAL AREA(ACRES) =      7.30
  LONGEST FLOWPATH FROM NODE    134.00 TO NODE    136.00 =  1056.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.50  DOWNSTREAM(FEET) =   406.00
  FLOW LENGTH(FEET) =    49.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.23
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     22.85
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  11.26
  LONGEST FLOWPATH FROM NODE    134.00 TO NODE    130.00 =  1105.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
```

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

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       22.85    11.26       5.461        7.30
  LONGEST FLOWPATH FROM NODE    134.00 TO NODE    130.00 =  1105.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       19.31     4.12       9.222        6.20
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    130.00 =  1671.60 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      27.67       4.12        9.222
     2      34.29      11.26        5.461

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     34.29   Tc(MIN.) =   11.26
  TOTAL AREA(ACRES) =     13.50

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.00  DOWNSTREAM(FEET) =   376.00
  FLOW LENGTH(FEET) =   556.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.55
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.29
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =  11.82
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    140.00 =  2227.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    413.80
  DOWNSTREAM ELEVATION(FEET) =    413.20
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    141.10 TO NODE    142.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  413.20  DOWNSTREAM ELEVATION(FEET) =  409.20
  STREET LENGTH(FEET) =   131.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
  STREET FLOW TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =   8.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.733
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.15
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.54

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.09
  FLOW VELOCITY(FEET/SEC.) =  3.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE    141.00 TO NODE    142.00 =   191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    143.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  409.20  DOWNSTREAM ELEVATION(FEET) =  383.00
  STREET LENGTH(FEET) =   350.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.55
  STREET FLOW TRAVEL TIME(MIN.) =   1.07   Tc(MIN.) =   9.21
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.218
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     1.40      SUBAREA RUNOFF(CFS) =     4.96
  TOTAL AREA(ACRES) =       1.80        PEAK FLOW RATE(CFS) =       6.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.70
  FLOW VELOCITY(FEET/SEC.) =  6.03   DEPTH*VELOCITY(FT*FT/SEC.) =   1.93
  LONGEST FLOWPATH FROM NODE    141.00 TO NODE    143.00 =   541.00 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.) =   9.21
  RAINFALL INTENSITY(INCH/HR) =   6.22
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.38

****************************************************************************
  FLOW PROCESS FROM NODE   1431.00 TO NODE   1431.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    433.20
  DOWNSTREAM ELEVATION(FEET) =    432.60
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE   1431.10 TO NODE   1432.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  432.60  DOWNSTREAM ELEVATION(FEET) =  424.20
  STREET LENGTH(FEET) =   152.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    3.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =   8.07
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.773
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     1.16
  TOTAL AREA(ACRES) =       0.40        PEAK FLOW RATE(CFS) =       1.54

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.18
  FLOW VELOCITY(FEET/SEC.) =  4.00   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE   1431.00 TO NODE   1432.00 =   212.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1432.00 TO NODE    143.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  424.20  DOWNSTREAM ELEVATION(FEET) =  383.00
  STREET LENGTH(FEET) =   487.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.16
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.62
  STREET FLOW TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =   9.48
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.105
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     1.50      SUBAREA RUNOFF(CFS) =     5.22
  TOTAL AREA(ACRES) =       1.90        PEAK FLOW RATE(CFS) =       6.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.60
  FLOW VELOCITY(FEET/SEC.) =  6.36   DEPTH*VELOCITY(FT*FT/SEC.) =   2.02
  LONGEST FLOWPATH FROM NODE   1431.00 TO NODE    143.00 =   699.00 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.) =   9.48
  RAINFALL INTENSITY(INCH/HR) =   6.11
  TOTAL STREAM AREA(ACRES) =     1.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        6.38     9.21        6.218          1.80
     2        6.61     9.48        6.105          1.90
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        12.81     9.21       6.218
     2        12.88     9.48       6.105

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     12.88   Tc(MIN.) =    9.48
  TOTAL AREA(ACRES) =      3.70
  LONGEST FLOWPATH FROM NODE   1431.00 TO NODE    143.00 =   699.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   376.50  DOWNSTREAM(FEET) =   376.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.70
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.88
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   9.56
  LONGEST FLOWPATH FROM NODE   1431.00 TO NODE    140.00 =   739.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    144.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    461.70
  DOWNSTREAM ELEVATION(FEET) =    461.10
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    144.10 TO NODE    145.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  461.10  DOWNSTREAM ELEVATION(FEET) =  450.60
  STREET LENGTH(FEET) =   183.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =   8.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.732
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    2.30
  TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       2.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.90
  FLOW VELOCITY(FEET/SEC.) =  4.52   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    144.00 TO NODE    145.00 =   243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    146.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  450.60  DOWNSTREAM ELEVATION(FEET) =  429.00
  STREET LENGTH(FEET) =   291.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.74
  STREET FLOW TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   8.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.317
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    5.04
  TOTAL AREA(ACRES) =      2.10        PEAK FLOW RATE(CFS) =       7.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.46
  FLOW VELOCITY(FEET/SEC.) =  6.24   DEPTH*VELOCITY(FT*FT/SEC.) =   2.09
  LONGEST FLOWPATH FROM NODE    144.00 TO NODE    146.00 =   534.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    146.00 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.) =   8.99
  RAINFALL INTENSITY(INCH/HR) =   6.32
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.56

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    147.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    498.40
  DOWNSTREAM ELEVATION(FEET) =    497.80
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    147.10 TO NODE    148.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  497.80  DOWNSTREAM ELEVATION(FEET) =  491.00
  STREET LENGTH(FEET) =   171.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.17
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   8.24
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.681
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.52
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.90

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.40
  FLOW VELOCITY(FEET/SEC.) =  3.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE    147.00 TO NODE    148.00 =   231.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE   1481.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =  491.00  DOWNSTREAM ELEVATION(FEET) =  470.00
  STREET LENGTH(FEET) =   460.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.42
  STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =   9.92
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.929
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    5.07
  TOTAL AREA(ACRES) =      2.00        PEAK FLOW RATE(CFS) =       6.76

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.02
  FLOW VELOCITY(FEET/SEC.) =  5.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.76
  LONGEST FLOWPATH FROM NODE    147.00 TO NODE   1481.00 =   691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1481.00 TO NODE   1482.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  470.00  DOWNSTREAM ELEVATION(FEET) =  447.80
  STREET LENGTH(FEET) =   310.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.02
  STREET FLOW TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =  10.76
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.624
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.64
  TOTAL AREA(ACRES) =      2.20        PEAK FLOW RATE(CFS) =       7.05

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.21
  FLOW VELOCITY(FEET/SEC.) =  6.08   DEPTH*VELOCITY(FT*FT/SEC.) =   2.01
  LONGEST FLOWPATH FROM NODE    147.00 TO NODE   1482.00 =  1001.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1482.00 TO NODE    146.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  447.80  DOWNSTREAM ELEVATION(FEET) =  429.00
  STREET LENGTH(FEET) =   312.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.14
  STREET FLOW TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =  11.63
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.349
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    3.35
  TOTAL AREA(ACRES) =      3.30        PEAK FLOW RATE(CFS) =      10.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.29
  FLOW VELOCITY(FEET/SEC.) =  6.18   DEPTH*VELOCITY(FT*FT/SEC.) =   2.30
  LONGEST FLOWPATH FROM NODE    147.00 TO NODE    146.00 =  1313.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    146.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.63
  RAINFALL INTENSITY(INCH/HR) =   5.35
  TOTAL STREAM AREA(ACRES) =     3.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.06

****************************************************************************
  FLOW PROCESS FROM NODE    149.00 TO NODE    149.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    461.90
  DOWNSTREAM ELEVATION(FEET) =    461.30
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
SUBAREA RUNOFF(CFS) =      0.41
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
FLOW PROCESS FROM NODE    149.10 TO NODE    150.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  461.30  DOWNSTREAM ELEVATION(FEET) =  451.30
STREET LENGTH(FEET) =   156.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.99
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.20
  HALFSTREET FLOOD WIDTH(FEET) =    3.55
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.05
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
STREET FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   8.03
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.793
RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  87
AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.16
TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.55

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   4.97
FLOW VELOCITY(FEET/SEC.) =  4.24   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
LONGEST FLOWPATH FROM NODE    149.00 TO NODE    150.00 =   216.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    150.00 TO NODE    151.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  451.30  DOWNSTREAM ELEVATION(FEET) =  430.50
STREET LENGTH(FEET) =   278.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.81
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.26
  HALFSTREET FLOOD WIDTH(FEET) =    6.60
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.08
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =   8.94
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.338
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    2.53
  TOTAL AREA(ACRES) =      1.10        PEAK FLOW RATE(CFS) =       3.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.82
  FLOW VELOCITY(FEET/SEC.) =  5.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.54
  LONGEST FLOWPATH FROM NODE    149.00 TO NODE    151.00 =   494.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    146.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   424.50  DOWNSTREAM(FEET) =   424.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.53
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.97
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   9.08
  LONGEST FLOWPATH FROM NODE    149.00 TO NODE    146.00 =   539.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    146.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.08
  RAINFALL INTENSITY(INCH/HR) =   6.28
  TOTAL STREAM AREA(ACRES) =     1.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.97

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         7.56     8.99        6.317         2.10
     2        10.06    11.63        5.349         3.30
     3         3.97     9.08        6.276         1.10

  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        19.27     8.99       6.317
     2        19.34     9.08       6.276
     3        19.85    11.63       5.349

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     19.85   Tc(MIN.) =   11.63
  TOTAL AREA(ACRES) =      6.50
  LONGEST FLOWPATH FROM NODE    147.00 TO NODE    146.00 =  1313.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE   1511.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   424.00  DOWNSTREAM(FEET) =   397.00
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.85
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =  11.93
  LONGEST FLOWPATH FROM NODE    147.00 TO NODE   1511.00 =  1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1511.00 TO NODE   1511.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
================================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    152.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    451.50
  DOWNSTREAM ELEVATION(FEET) =    450.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.677
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE    152.10 TO NODE    153.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  451.00  DOWNSTREAM ELEVATION(FEET) =  448.00
  STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
  STREET FLOW TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =   5.45
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.721
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.99
```

```
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.40
  FLOW VELOCITY(FEET/SEC.) =  2.83   DEPTH*VELOCITY(FT*FT/SEC.) =   0.72
  LONGEST FLOWPATH FROM NODE    152.00 TO NODE    153.00 =   173.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  448.00  DOWNSTREAM ELEVATION(FEET) =  427.60
  STREET LENGTH(FEET) =   219.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.33
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.29
  STREET FLOW TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =   6.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.080
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.84
  TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       3.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.70
  FLOW VELOCITY(FEET/SEC.) =  5.68   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE    152.00 TO NODE    154.00 =   392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    155.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  427.60  DOWNSTREAM ELEVATION(FEET) =  405.00
  STREET LENGTH(FEET) =   212.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.97
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
```

```
    HALFSTREET FLOOD WIDTH(FEET) =    8.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.54   Tc(MIN.) =   6.68
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.651
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    3.49
  TOTAL AREA(ACRES) =      1.50        PEAK FLOW RATE(CFS) =       6.54

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.09
  FLOW VELOCITY(FEET/SEC.) =  6.93   DEPTH*VELOCITY(FT*FT/SEC.) =   2.13
  LONGEST FLOWPATH FROM NODE    152.00 TO NODE    155.00 =   604.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.68
  RAINFALL INTENSITY(INCH/HR) =   7.65
  TOTAL STREAM AREA(ACRES) =     1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.54

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    162.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    421.30
  DOWNSTREAM ELEVATION(FEET) =    420.70
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    162.10 TO NODE    163.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  420.70  DOWNSTREAM ELEVATION(FEET) =  419.30
  STREET LENGTH(FEET) =   118.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
```

```
    HALFSTREET FLOOD WIDTH(FEET) =    4.59
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
  STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   8.48
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.561
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.33
  FLOW VELOCITY(FEET/SEC.) =  1.86   DEPTH*VELOCITY(FT*FT/SEC.) =   0.43
  LONGEST FLOWPATH FROM NODE    162.00 TO NODE    163.00 =   178.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    161.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  419.30  DOWNSTREAM ELEVATION(FEET) =  409.00
  STREET LENGTH(FEET) =   530.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.97
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.72
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   3.20   Tc(MIN.) =  11.68
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.336
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.43
  TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =       3.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.39
  FLOW VELOCITY(FEET/SEC.) =  3.04   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE    162.00 TO NODE    161.00 =   708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    155.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  409.00  DOWNSTREAM ELEVATION(FEET) =  405.00
  STREET LENGTH(FEET) =   225.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
```

```
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.06
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =  12.76
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.039
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    6.03
  TOTAL AREA(ACRES) =      3.10        PEAK FLOW RATE(CFS) =       8.90

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.98
  FLOW VELOCITY(FEET/SEC.) =  3.77   DEPTH*VELOCITY(FT*FT/SEC.) =   1.61
  LONGEST FLOWPATH FROM NODE    162.00 TO NODE    155.00 =   933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 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.) =  12.76
  RAINFALL INTENSITY(INCH/HR) =   5.04
  TOTAL STREAM AREA(ACRES) =     3.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.90

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    421.30
  DOWNSTREAM ELEVATION(FEET) =    420.70
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    165.10 TO NODE    166.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  420.70  DOWNSTREAM ELEVATION(FEET) =  419.30
  STREET LENGTH(FEET) =   173.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
```

```
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.76
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    5.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
  STREET FLOW TRAVEL TIME(MIN.) =   1.80   Tc(MIN.) =   9.19
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.228
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.71
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.11
  FLOW VELOCITY(FEET/SEC.) =  1.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.46
  LONGEST FLOWPATH FROM NODE    165.00 TO NODE    166.00 =   233.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    164.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  419.30  DOWNSTREAM ELEVATION(FEET) =  405.00
  STREET LENGTH(FEET) =   377.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.93
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.76
  STREET FLOW TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =  10.49
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.717
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =   12.71
  TOTAL AREA(ACRES) =      4.20        PEAK FLOW RATE(CFS) =      13.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.28
  FLOW VELOCITY(FEET/SEC.) =  5.58   DEPTH*VELOCITY(FT*FT/SEC.) =   2.41
  LONGEST FLOWPATH FROM NODE    165.00 TO NODE    164.00 =   610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    155.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   398.50  DOWNSTREAM(FEET) =   398.00
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.95
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     13.69
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  10.57
  LONGEST FLOWPATH FROM NODE    165.00 TO NODE    155.00 =   648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 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.) =  10.57
  RAINFALL INTENSITY(INCH/HR) =   5.69
  TOTAL STREAM AREA(ACRES) =     4.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.69

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         6.54     6.68        7.651         1.50
     2         8.90    12.76        5.039         3.10
     3        13.69    10.57        5.689         4.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        19.85     6.68       7.651
     2        25.93    10.57       5.689
     3        25.33    12.76       5.039

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     25.93   Tc(MIN.) =   10.57
  TOTAL AREA(ACRES) =      8.80
  LONGEST FLOWPATH FROM NODE    162.00 TO NODE    155.00 =   933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE   1511.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   398.00  DOWNSTREAM(FEET) =   397.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.90
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     25.93
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  10.63
  LONGEST FLOWPATH FROM NODE    162.00 TO NODE   1511.00 =   973.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1511.00 TO NODE   1511.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
** MAIN STREAM CONFLUENCE DATA **
STREAM     RUNOFF     Tc      INTENSITY     AREA
NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
    1       25.93    10.63       5.670        8.80
LONGEST FLOWPATH FROM NODE    162.00 TO NODE   1511.00 =   973.00 FEET.

** MEMORY BANK #  3 CONFLUENCE DATA **
STREAM     RUNOFF     Tc      INTENSITY     AREA
NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
    1       19.85    11.93       5.261        6.50
LONGEST FLOWPATH FROM NODE    147.00 TO NODE   1511.00 =  1633.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc      INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1      43.61      10.63        5.670
    2      43.91      11.93        5.261

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     43.91   Tc(MIN.) =   11.93
TOTAL AREA(ACRES) =     15.30

****************************************************************************
FLOW PROCESS FROM NODE   1511.00 TO NODE   1511.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE   1511.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   397.00  DOWNSTREAM(FEET) =   376.00
FLOW LENGTH(FEET) =   374.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  18.21
ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     43.91
PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =  12.28
LONGEST FLOWPATH FROM NODE    147.00 TO NODE    140.00 =  2007.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
STREAM     RUNOFF     Tc      INTENSITY     AREA
NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
    1       43.91    12.28       5.166       15.30
LONGEST FLOWPATH FROM NODE    147.00 TO NODE    140.00 =  2007.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
STREAM     RUNOFF     Tc      INTENSITY     AREA
NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
    1       34.29    11.82       5.293       13.50
LONGEST FLOWPATH FROM NODE    108.00 TO NODE    140.00 =  2227.60 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc      INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1      76.58      11.82        5.293
    2      77.38      12.28        5.166
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     77.38   Tc(MIN.) =   12.28
  TOTAL AREA(ACRES) =     28.80

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 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       77.38    12.28       5.166       28.80
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    140.00 =  2227.60 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       12.88     9.56       6.070        3.70
  LONGEST FLOWPATH FROM NODE   1431.00 TO NODE    140.00 =   739.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      73.15       9.56        6.070
     2      88.34      12.28        5.166

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     88.34   Tc(MIN.) =   12.28
  TOTAL AREA(ACRES) =     32.50

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    173.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   376.00  DOWNSTREAM(FEET) =   368.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.23
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     88.34
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  12.32
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    173.00 =  2297.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    173.00 TO NODE    173.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.32
  RAINFALL INTENSITY(INCH/HR) =   5.16
```

```
  TOTAL STREAM AREA(ACRES) =    32.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     88.34

****************************************************************************
  FLOW PROCESS FROM NODE    115.10 TO NODE    115.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  14.46   RAIN INTENSITY(INCH/HOUR) =  4.65
  TOTAL AREA(ACRES) =   107.40   TOTAL RUNOFF(CFS) =    187.57

+--------------------------------------------------------------------------+
| DATA PER BASIN 100.1 HYDROLOGY                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    115.10 TO NODE    173.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    368.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   386.00   CHANNEL SLOPE =  0.1088
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.552
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    189.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.46
  AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   0.48
  Tc(MIN.) =  14.94
  SUBAREA AREA(ACRES) =     1.90       SUBAREA RUNOFF(CFS) =    3.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.375
  TOTAL AREA(ACRES) =    109.30         PEAK FLOW RATE(CFS) =     187.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =  13.45
  LONGEST FLOWPATH FROM NODE    162.00 TO NODE    173.00 =  1319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    173.00 TO NODE    173.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.94
  RAINFALL INTENSITY(INCH/HR) =   4.55
  TOTAL STREAM AREA(ACRES) =   109.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    187.57

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        88.34    12.32       5.155         32.50
     2       187.57    14.94       4.552        109.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
```

```
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1       243.01     12.32        5.155
     2       265.57     14.94        4.552

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    265.57   Tc(MIN.) =   14.94
  TOTAL AREA(ACRES) =    141.80
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    173.00 =  2297.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    173.00 TO NODE    169.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    368.00  DOWNSTREAM(FEET) =    354.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00   CHANNEL SLOPE =  0.0368
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.427
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    267.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.57
  AVERAGE FLOW DEPTH(FEET) =   1.19   TRAVEL TIME(MIN.) =   0.66
  Tc(MIN.) =  15.60
  SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =    3.25
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.419
  TOTAL AREA(ACRES) =    143.90         PEAK FLOW RATE(CFS) =     267.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.18   FLOW VELOCITY(FEET/SEC.) =   9.62
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    169.00 =  2677.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 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.) =  15.60
  RAINFALL INTENSITY(INCH/HR) =   4.43
  TOTAL STREAM AREA(ACRES) =   143.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    267.08

****************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    167.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    380.00
  DOWNSTREAM ELEVATION(FEET) =    379.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.946
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.73
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.73

****************************************************************************
  FLOW PROCESS FROM NODE    167.10 TO NODE    168.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    379.50  DOWNSTREAM(FEET) =    378.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   290.00   CHANNEL SLOPE =  0.0052
CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =  12.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.075
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  94
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.95
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.20
AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   2.20
Tc(MIN.) =   6.14
SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    6.38
AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
TOTAL AREA(ACRES) =      1.10         PEAK FLOW RATE(CFS) =       7.02

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   2.64
LONGEST FLOWPATH FROM NODE    167.00 TO NODE    168.00 =   340.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    168.00 TO NODE    169.00 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) =   354.00
FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  22.06
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      7.02
PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   6.19
LONGEST FLOWPATH FROM NODE    167.00 TO NODE    169.00 =   400.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 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.) =   6.19
RAINFALL INTENSITY(INCH/HR) =   8.04
TOTAL STREAM AREA(ACRES) =     1.10
PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.02

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1      267.08    15.60        4.427        143.90
    2        7.02     6.19        8.037          1.10

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      154.12     6.19       8.037
    2      270.94    15.60       4.427

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =    270.94   Tc(MIN.) =   15.60
  TOTAL AREA(ACRES) =    145.00
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    169.00 =  2677.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    170.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    354.00  DOWNSTREAM(FEET) =    342.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   315.00   CHANNEL SLOPE =  0.0381
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.331
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    273.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.77
  AVERAGE FLOW DEPTH(FEET) =   1.19   TRAVEL TIME(MIN.) =   0.54
  Tc(MIN.) =  16.14
  SUBAREA AREA(ACRES) =     3.20       SUBAREA RUNOFF(CFS) =    4.85
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.421
  TOTAL AREA(ACRES) =    148.20         PEAK FLOW RATE(CFS) =     270.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.18   FLOW VELOCITY(FEET/SEC.) =   9.76
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    170.00 =  2992.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    174.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.00  DOWNSTREAM(FEET) =   325.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.16
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    270.94
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  16.27
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    174.00 =  3222.60 FEET.

+--------------------------------------------------------------------------+
| RUNOFF ENTERS EXISTING 5'X8' RCP CULVERT                                 |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    148.20  TC(MIN.) =     16.27
  PEAK FLOW RATE(CFS)    =    270.94
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

SECTION 6B:
BYPASS BASIN 400

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                           Analysis prepared by:

                            LANDMARK CONSULTING
                       9555 GENESEE AVENUE, SUITE 200
                            SAN DEIGO, CA 92121
                             TEL:  858-587-8070

 ************************** DESCRIPTION OF STUDY **************************
* CAMPUS PARK, BASIN 400, BYPASS FLOW                                      *
* POST-DEVELOPMENT CONDITIONS                                              *
* 100-YEAR STORM                                                           *
 ***************************************************************************

  FILE NAME: 614P4C.DAT
  TIME/DATE OF STUDY: 12:41 02/28/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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   18.0     13.0    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 =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.71   RAIN INTENSITY(INCH/HOUR) =  5.64
  TOTAL AREA(ACRES) =    47.50   TOTAL RUNOFF(CFS) =     93.82
```

```
+----------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM CALCULATOINS                                        |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE    401.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    590.00  DOWNSTREAM(FEET) =    581.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    73.00   CHANNEL SLOPE =  0.1233
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.599
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     93.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.49
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   0.13
  Tc(MIN.) =  10.84
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.20
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     47.60         PEAK FLOW RATE(CFS) =      93.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   9.48
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    401.00 =    73.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 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.) =  10.84
  RAINFALL INTENSITY(INCH/HR) =   5.60
  TOTAL STREAM AREA(ACRES) =    47.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     93.82

****************************************************************************
  FLOW PROCESS FROM NODE   6006.00 TO NODE   6006.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.53   RAIN INTENSITY(INCH/HOUR) =  6.08
  TOTAL AREA(ACRES) =    18.00   TOTAL RUNOFF(CFS) =     66.30

+----------------------------------------------------------------------------+
| FLOW DATA PE RUPSTREAM CALCULATIONS                                        |
|                                                                            |
```

```
|                                                                                |
+--------------------------------------------------------------------------------+

*********************************************************************************
  FLOW PROCESS FROM NODE   6006.00 TO NODE    401.00 IS CODE =  51
---------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    590.00  DOWNSTREAM(FEET) =    581.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    73.00   CHANNEL SLOPE =  0.1233
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.024
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     66.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.38
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   0.15
  Tc(MIN.) =   9.68
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.21
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.604
  TOTAL AREA(ACRES) =     18.10         PEAK FLOW RATE(CFS) =      66.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   8.36
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    401.00 =    73.00 FEET.

*********************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 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.) =   9.68
  RAINFALL INTENSITY(INCH/HR) =   6.02
  TOTAL STREAM AREA(ACRES) =    18.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     66.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        93.82    10.84       5.599         47.60
     2        66.30     9.68       6.024         18.10

  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       150.05     9.68       6.024
     2       155.44    10.84       5.599
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    155.44   Tc(MIN.) =   10.84
  TOTAL AREA(ACRES) =     65.70
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    401.00 =    73.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    581.00  DOWNSTREAM(FEET) =    466.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   964.00   CHANNEL SLOPE =  0.1193
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.214
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    159.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.69
  AVERAGE FLOW DEPTH(FEET) =   0.73   TRAVEL TIME(MIN.) =   1.27
  Tc(MIN.) =  12.10
  SUBAREA AREA(ACRES) =     4.00       SUBAREA RUNOFF(CFS) =    7.30
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.416
  TOTAL AREA(ACRES) =     69.70         PEAK FLOW RATE(CFS) =     155.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =  12.58
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    402.00 =  1037.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 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.) =  12.10
  RAINFALL INTENSITY(INCH/HR) =   5.21
  TOTAL STREAM AREA(ACRES) =    69.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    155.44

****************************************************************************
  FLOW PROCESS FROM NODE   4003.00 TO NODE   4003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.64   RAIN INTENSITY(INCH/HOUR) =  5.67
  TOTAL AREA(ACRES) =     9.80   TOTAL RUNOFF(CFS) =     21.22

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM CALCULATION                                       |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   4003.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    466.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1327.00   CHANNEL SLOPE =  0.1161
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.723
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     32.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.38
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   3.47
  Tc(MIN.) =  14.11
  SUBAREA AREA(ACRES) =    13.50       SUBAREA RUNOFF(CFS) =   22.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.364
  TOTAL AREA(ACRES) =     23.30         PEAK FLOW RATE(CFS) =      40.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   6.97
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    402.00 =  1400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 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.) =  14.11
  RAINFALL INTENSITY(INCH/HR) =   4.72
  TOTAL STREAM AREA(ACRES) =    23.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     40.01

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    403.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    889.10
  DOWNSTREAM ELEVATION(FEET) =    860.00
  ELEVATION DIFFERENCE(FEET) =     29.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.945
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.247
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    403.10 TO NODE    404.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    534.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   378.00   CHANNEL SLOPE =  0.8624
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.640
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.41
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =   6.69
  SUBAREA AREA(ACRES) =     9.30       SUBAREA RUNOFF(CFS) =   24.87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      9.40         PEAK FLOW RATE(CFS) =      25.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =  10.78
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    404.00 =   468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    534.00  DOWNSTREAM(FEET) =    446.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   695.00   CHANNEL SLOPE =  0.1266
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.202
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     28.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  18.05
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   0.64
  Tc(MIN.) =   7.34
  SUBAREA AREA(ACRES) =     2.90       SUBAREA RUNOFF(CFS) =    7.31
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     12.30         PEAK FLOW RATE(CFS) =      31.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =  18.43
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    402.00 =  1163.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.34
  RAINFALL INTENSITY(INCH/HR) =   7.20
  TOTAL STREAM AREA(ACRES) =    12.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.00

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      155.44    12.10        5.214         69.70
      2       40.01    14.11        4.723         23.30
      3       31.00     7.34        7.202         12.30

  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      164.34     7.34       7.202
      2      212.21    12.10       5.214
      3      201.16    14.11       4.723

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    212.21   Tc(MIN.) =   12.10
  TOTAL AREA(ACRES) =    105.30
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    402.00 =  1400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    405.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   463.00  DOWNSTREAM(FEET) =   432.70
  FLOW LENGTH(FEET) =   540.98   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.69
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    212.21
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =  12.44
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    405.00 =  1940.98 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   432.30  DOWNSTREAM(FEET) =   399.81
  FLOW LENGTH(FEET) =   580.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.69
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    212.21
```

```
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  12.80
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    406.00 =  2521.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    407.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   399.41  DOWNSTREAM(FEET) =   323.20
  FLOW LENGTH(FEET) =  1455.38   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.87
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    212.21
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =  13.74
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    407.00 =  3976.61 FEET.

+--------------------------------------------------------------------------+
| FLOW ENTERS EXISTING DRAINAGE CHANNEL                                    |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    105.30  TC(MIN.) =     13.74
  PEAK FLOW RATE(CFS)    =    212.21
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

SECTION 6C:
BASIN 200

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                          Analysis prepared by:

                           LANDMARK CONSULTING
                      9555 GENESEE AVENUE, SUITE 200
                           SAN DEIGO, CA 92121
                            TEL:  858-587-8070

 ************************** DESCRIPTION OF STUDY **************************
* CAMPUS PARK                                                              *
* PIPE SIZE WITH BASIN 12000 ADDED UPSTREAM                                *
* BASIN 200 POST-DEV. 100-YEAR STORM                                       *
 ***************************************************************************

  FILE NAME: 614P2CA.DAT
  TIME/DATE OF STUDY: 16:04 05/06/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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   18.0     13.0    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 =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    495.00
  DOWNSTREAM ELEVATION(FEET) =    494.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.971
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.442
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  62
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  494.40  DOWNSTREAM ELEVATION(FEET) =  491.00
  STREET LENGTH(FEET) =   106.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =   7.49
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.106
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    3.41
  TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       3.84

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.34
  FLOW VELOCITY(FEET/SEC.) =  3.87   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    207.00 =   166.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  491.00  DOWNSTREAM ELEVATION(FEET) =  468.20
  STREET LENGTH(FEET) =   634.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.82
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.34
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
  STREET FLOW TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =   9.71
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.012
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
```

```
  SUBAREA AREA(ACRES) =     2.20      SUBAREA RUNOFF(CFS) =     7.94
  TOTAL AREA(ACRES) =       3.10        PEAK FLOW RATE(CFS) =       11.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.22
  FLOW VELOCITY(FEET/SEC.) =  5.23   DEPTH*VELOCITY(FT*FT/SEC.) =   2.15
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    208.00 =   800.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    224.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   463.20  DOWNSTREAM(FEET) =   441.00
  FLOW LENGTH(FEET) =   691.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.67
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.18
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =  10.78
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    224.00 =  1491.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    502.00
  DOWNSTREAM ELEVATION(FEET) =    501.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.971
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.442
  SUBAREA RUNOFF(CFS) =      0.89
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.89

****************************************************************************
  FLOW PROCESS FROM NODE    218.10 TO NODE    219.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  501.40  DOWNSTREAM ELEVATION(FEET) =  499.30
  STREET LENGTH(FEET) =   213.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.87
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
```

```
    HALFSTREET FLOOD WIDTH(FEET) =    8.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   8.66
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.468
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.94
  TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       2.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.36
  FLOW VELOCITY(FEET/SEC.) =  2.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
  LONGEST FLOWPATH FROM NODE    218.00 TO NODE    219.00 =   273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    219.00 TO NODE    220.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  499.00  DOWNSTREAM ELEVATION(FEET) =  490.00
  STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.59
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.85
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
  STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =  11.83
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.291
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    5.71
  TOTAL AREA(ACRES) =      2.50        PEAK FLOW RATE(CFS) =       7.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.78
  FLOW VELOCITY(FEET/SEC.) =  3.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.45
  LONGEST FLOWPATH FROM NODE    218.00 TO NODE    220.00 =   873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    215.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  490.00  DOWNSTREAM ELEVATION(FEET) =  447.60
  STREET LENGTH(FEET) =   459.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
```

```
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.76
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.41
  STREET FLOW TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =  12.91
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.001
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.645
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    2.18
  TOTAL AREA(ACRES) =      3.00        PEAK FLOW RATE(CFS) =       9.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.07
  FLOW VELOCITY(FEET/SEC.) =  7.20   DEPTH*VELOCITY(FT*FT/SEC.) =   2.50
  LONGEST FLOWPATH FROM NODE    218.00 TO NODE    215.00 =  1332.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.91
  RAINFALL INTENSITY(INCH/HR) =   5.00
  TOTAL STREAM AREA(ACRES) =     3.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.68

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    469.70
  DOWNSTREAM ELEVATION(FEET) =    469.10
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.82
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.82

****************************************************************************
  FLOW PROCESS FROM NODE    209.10 TO NODE    210.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  469.10  DOWNSTREAM ELEVATION(FEET) =  466.90
  STREET LENGTH(FEET) =   176.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
```

```
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.38
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   1.21   Tc(MIN.) =   8.60
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.499
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.594
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    3.12
  TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =       3.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.42
  FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE    209.00 TO NODE    210.00 =   236.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  466.90  DOWNSTREAM ELEVATION(FEET) =  447.20
  STREET LENGTH(FEET) =   572.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.94
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.97
  STREET FLOW TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =  10.53
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.704
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.575
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =   11.70
  TOTAL AREA(ACRES) =      4.60        PEAK FLOW RATE(CFS) =      15.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.20
  FLOW VELOCITY(FEET/SEC.) =  5.50   DEPTH*VELOCITY(FT*FT/SEC.) =   2.48
  LONGEST FLOWPATH FROM NODE    209.00 TO NODE    215.00 =   808.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 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.) =  10.53
  RAINFALL INTENSITY(INCH/HR) =   5.70
  TOTAL STREAM AREA(ACRES) =     4.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.09

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         9.68    12.91        5.001         3.00
     2        15.09    10.53        5.704         4.60

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        22.98    10.53       5.704
     2        22.91    12.91       5.001

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     22.98   Tc(MIN.) =   10.53
  TOTAL AREA(ACRES) =      7.60
  LONGEST FLOWPATH FROM NODE    218.00 TO NODE    215.00 =  1332.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    224.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   440.60  DOWNSTREAM(FEET) =   440.10
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.50
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     22.98
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  10.61
  LONGEST FLOWPATH FROM NODE    218.00 TO NODE    224.00 =  1374.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    222.00 TO NODE    222.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    470.80
  DOWNSTREAM ELEVATION(FEET) =    470.20
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.971
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.442
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.45
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    222.10 TO NODE    223.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  470.20  DOWNSTREAM ELEVATION(FEET) =  467.00
  STREET LENGTH(FEET) =   208.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.23
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.52   Tc(MIN.) =   8.49
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.554
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.57
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.17
  FLOW VELOCITY(FEET/SEC.) =  2.50   DEPTH*VELOCITY(FT*FT/SEC.) =   0.72
  LONGEST FLOWPATH FROM NODE    222.00 TO NODE    223.00 =   268.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    223.00 TO NODE    224.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  467.00  DOWNSTREAM ELEVATION(FEET) =  446.00
  STREET LENGTH(FEET) =   651.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.12
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   2.63   Tc(MIN.) =  11.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.506
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     5.95
  TOTAL AREA(ACRES) =       2.30        PEAK FLOW RATE(CFS) =       7.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.44
  FLOW VELOCITY(FEET/SEC.) =  4.56   DEPTH*VELOCITY(FT*FT/SEC.) =   1.71
  LONGEST FLOWPATH FROM NODE    222.00 TO NODE    224.00 =   919.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 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        7.60    11.12       5.506        2.30
  LONGEST FLOWPATH FROM NODE    222.00 TO NODE    224.00 =   919.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       11.18    10.78       5.617        3.10
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    224.00 =  1491.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      18.55      10.78       5.617
     2      18.56      11.12       5.506

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     18.56   Tc(MIN.) =   11.12
  TOTAL AREA(ACRES) =      5.40

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 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       18.56    11.12       5.506        5.40
  LONGEST FLOWPATH FROM NODE    206.00 TO NODE    224.00 =  1491.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       22.98    10.61       5.675        7.60
  LONGEST FLOWPATH FROM NODE    218.00 TO NODE    224.00 =  1374.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      40.70      10.61       5.675
     2      40.86      11.12       5.506

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     40.86   Tc(MIN.) =   11.12
  TOTAL AREA(ACRES) =     13.00

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

```
  FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    225.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    455.50
  DOWNSTREAM ELEVATION(FEET) =    449.40
  ELEVATION DIFFERENCE(FEET) =      6.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.090
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.11
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      1.11

****************************************************************************
  FLOW PROCESS FROM NODE    225.10 TO NODE    226.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  449.40  DOWNSTREAM ELEVATION(FEET) =  446.40
  STREET LENGTH(FEET) =   162.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.49
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
  STREET FLOW TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =   4.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    3.87
  TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       4.98

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.73
  FLOW VELOCITY(FEET/SEC.) =  3.33   DEPTH*VELOCITY(FT*FT/SEC.) =   1.20
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    226.00 =   242.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    221.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   440.10  DOWNSTREAM(FEET) =   420.00
  FLOW LENGTH(FEET) =   307.70   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.) =  11.18
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.98
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   5.45
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    221.00 =   549.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    221.00 TO NODE    221.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    227.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  449.00  DOWNSTREAM ELEVATION(FEET) =  430.00
  STREET LENGTH(FEET) =   448.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.02
  STREET FLOW TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =   6.87
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.516
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    8.57
  TOTAL AREA(ACRES) =      2.80        PEAK FLOW RATE(CFS) =      12.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.47
  FLOW VELOCITY(FEET/SEC.) =  5.71   DEPTH*VELOCITY(FT*FT/SEC.) =   2.37
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    227.00 =   997.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    227.00 TO NODE    227.00 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.) =   6.87
  RAINFALL INTENSITY(INCH/HR) =   7.52
  TOTAL STREAM AREA(ACRES) =     2.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.63

****************************************************************************
  FLOW PROCESS FROM NODE    228.00 TO NODE    228.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    457.30
  DOWNSTREAM ELEVATION(FEET) =    456.70
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.971
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.442
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE    228.10 TO NODE    229.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  456.70  DOWNSTREAM ELEVATION(FEET) =  449.00
  STREET LENGTH(FEET) =   156.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.26
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   0.72   Tc(MIN.) =   7.70
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.982
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.26
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.63
  FLOW VELOCITY(FEET/SEC.) =  3.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE    228.00 TO NODE    229.00 =   216.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    229.00 TO NODE    227.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =  449.00  DOWNSTREAM ELEVATION(FEET) =  430.00
  STREET LENGTH(FEET) =   420.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.37
  STREET FLOW TRAVEL TIME(MIN.) =   1.55   Tc(MIN.) =   9.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.203
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    4.84
  TOTAL AREA(ACRES) =      1.70        PEAK FLOW RATE(CFS) =       6.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.76
  FLOW VELOCITY(FEET/SEC.) =  4.96   DEPTH*VELOCITY(FT*FT/SEC.) =   1.69
  LONGEST FLOWPATH FROM NODE    228.00 TO NODE    227.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    227.00 TO NODE    227.00 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.) =   9.25
  RAINFALL INTENSITY(INCH/HR) =   6.20
  TOTAL STREAM AREA(ACRES) =     1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.33

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       12.63     6.87        7.516          2.80
     2        6.33     9.25        6.203          1.70

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       17.32     6.87       7.516
     2       16.75     9.25       6.203

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     17.32   Tc(MIN.) =    6.87
  TOTAL AREA(ACRES) =      4.50
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    227.00 =   997.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    227.00 TO NODE    221.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   424.00  DOWNSTREAM(FEET) =   420.00
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.32
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   6.92
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    221.00 =  1053.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    221.00 TO NODE    221.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       17.32     6.92       7.475        4.50
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    221.00 =  1053.70 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        4.98     5.45       8.720        0.90
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    221.00 =   549.70 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      18.62       5.45        8.720
     2      21.59       6.92        7.475

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     21.59   Tc(MIN.) =    6.92
  TOTAL AREA(ACRES) =      5.40

****************************************************************************
  FLOW PROCESS FROM NODE    221.00 TO NODE    221.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    221.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   420.00  DOWNSTREAM(FEET) =   392.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.23
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.59
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   7.36
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    230.00 =  1478.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    221.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.186
```

```
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6422
  SUBAREA AREA(ACRES) =     1.00   SUBAREA RUNOFF(CFS) =     6.25
  TOTAL AREA(ACRES) =       6.40   TOTAL RUNOFF(CFS) =    29.53
  TC(MIN.) =   7.36

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    231.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   392.00  DOWNSTREAM(FEET) =   362.00
  FLOW LENGTH(FEET) =   303.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.18
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.53
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   7.61
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    231.00 =  1781.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    231.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    232.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    414.70
  DOWNSTREAM ELEVATION(FEET) =    407.70
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.608
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    232.10 TO NODE    233.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  407.70  DOWNSTREAM ELEVATION(FEET) =  397.00
  STREET LENGTH(FEET) =    92.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.20
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.19
    HALFSTREET FLOOD WIDTH(FEET) =    3.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.03
  STREET FLOW TRAVEL TIME(MIN.) =   0.28   Tc(MIN.) =   1.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.80
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       1.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.15
  FLOW VELOCITY(FEET/SEC.) =  5.52   DEPTH*VELOCITY(FT*FT/SEC.) =   1.16
  LONGEST FLOWPATH FROM NODE    232.00 TO NODE    233.00 =   162.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    233.00 TO NODE    234.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  397.00  DOWNSTREAM ELEVATION(FEET) =  367.00
  STREET LENGTH(FEET) =   699.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.93
  STREET FLOW TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   4.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =   13.64
  TOTAL AREA(ACRES) =      1.90        PEAK FLOW RATE(CFS) =      15.24

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.54
  FLOW VELOCITY(FEET/SEC.) =  6.02   DEPTH*VELOCITY(FT*FT/SEC.) =   2.63
  LONGEST FLOWPATH FROM NODE    232.00 TO NODE    234.00 =   861.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    234.00 TO NODE    234.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   4.12
```

```
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     1.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.24

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    235.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    398.00
  DOWNSTREAM ELEVATION(FEET) =    390.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.896
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    235.10 TO NODE    234.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  390.00  DOWNSTREAM ELEVATION(FEET) =  367.00
  STREET LENGTH(FEET) =   262.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.61
  STREET FLOW TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =   2.65
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    6.42
  TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       7.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.85
  FLOW VELOCITY(FEET/SEC.) =  6.63   DEPTH*VELOCITY(FT*FT/SEC.) =   2.14
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    234.00 =   352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    234.00 TO NODE    234.00 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.) =   2.65
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     0.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.22

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       15.24     4.12        9.222          1.90
     2        7.22     2.65        9.222          0.90

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       17.00     2.65       9.222
     2       22.46     4.12       9.222

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     22.46   Tc(MIN.) =    4.12
  TOTAL AREA(ACRES) =      2.80
  LONGEST FLOWPATH FROM NODE    232.00 TO NODE    234.00 =   861.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    234.00 TO NODE    231.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   362.50  DOWNSTREAM(FEET) =   362.00
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.10
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     22.46
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   4.17
  LONGEST FLOWPATH FROM NODE    232.00 TO NODE    231.00 =   889.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    231.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       22.46     4.17       9.222         2.80
  LONGEST FLOWPATH FROM NODE    232.00 TO NODE    231.00 =   889.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       29.53     7.61       7.033         6.40
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    231.00 =  1781.70 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       38.65     4.17       9.222
     2       46.67     7.61       7.033

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     46.67   Tc(MIN.) =    7.61
```

```
  TOTAL AREA(ACRES) =      9.20

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    231.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    236.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   362.00  DOWNSTREAM(FEET) =   346.00
  FLOW LENGTH(FEET) =   338.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.54
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     46.67
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   7.93
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    236.00 =  2120.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    236.00 TO NODE    236.00 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.) =   7.93
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =     9.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     46.67

****************************************************************************
  FLOW PROCESS FROM NODE    237.00 TO NODE    237.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    397.90
  DOWNSTREAM ELEVATION(FEET) =    394.40
  ELEVATION DIFFERENCE(FEET) =      3.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.264
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    237.10 TO NODE    238.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  394.40  DOWNSTREAM ELEVATION(FEET) =  365.00
  STREET LENGTH(FEET) =   672.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
  STREET FLOW TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =   4.92
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    4.81
  TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       5.62

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.31
  FLOW VELOCITY(FEET/SEC.) =  4.76   DEPTH*VELOCITY(FT*FT/SEC.) =   1.58
  LONGEST FLOWPATH FROM NODE    237.00 TO NODE    238.00 =   752.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    238.00 TO NODE    236.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  365.00  DOWNSTREAM ELEVATION(FEET) =  354.00
  STREET LENGTH(FEET) =   302.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
  STREET FLOW TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =   5.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.226
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    4.29
  TOTAL AREA(ACRES) =      1.30        PEAK FLOW RATE(CFS) =       9.30

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.20
  FLOW VELOCITY(FEET/SEC.) =  5.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.95
  LONGEST FLOWPATH FROM NODE    237.00 TO NODE    236.00 =  1054.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    236.00 TO NODE    236.00 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.) =   5.97
  RAINFALL INTENSITY(INCH/HR) =   8.23
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.30

****************************************************************************
  FLOW PROCESS FROM NODE    239.00 TO NODE    239.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  OFFICE PROFESSIONAL/COMMERCIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    380.00
  DOWNSTREAM ELEVATION(FEET) =    379.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.486
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE    239.10 TO NODE    240.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.40  DOWNSTREAM(FEET) =    378.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE =  0.0104
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  OFFICE PROFESSIONAL/COMMERCIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.11
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   0.54
  Tc(MIN.) =   4.03
  SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =   16.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  TOTAL AREA(ACRES) =      2.20         PEAK FLOW RATE(CFS) =      17.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   4.85
  LONGEST FLOWPATH FROM NODE    239.00 TO NODE    240.00 =   194.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    236.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   345.00
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.24
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   4.11
  LONGEST FLOWPATH FROM NODE    239.00 TO NODE    236.00 =   318.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    236.00 TO NODE    236.00 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.) =   4.11
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     2.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.24

****************************************************************************
  FLOW PROCESS FROM NODE    241.00 TO NODE    241.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    386.40
  DOWNSTREAM ELEVATION(FEET) =    386.00
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.153
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    241.10 TO NODE    242.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  386.00  DOWNSTREAM ELEVATION(FEET) =  380.00
  STREET LENGTH(FEET) =   663.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.68
  STREET FLOW TRAVEL TIME(MIN.) =   5.25   Tc(MIN.) =   8.41
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.595
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    2.87
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       3.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.68
  FLOW VELOCITY(FEET/SEC.) =  2.32   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
```

```
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    242.00 =   713.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    242.00 TO NODE    236.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  380.00  DOWNSTREAM ELEVATION(FEET) =  354.00
  STREET LENGTH(FEET) =  1526.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.51
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.40
  STREET FLOW TRAVEL TIME(MIN.) =   7.26   Tc(MIN.) =  15.66
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.415
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    6.91
  TOTAL AREA(ACRES) =      2.40        PEAK FLOW RATE(CFS) =       9.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.28
  FLOW VELOCITY(FEET/SEC.) =  3.76   DEPTH*VELOCITY(FT*FT/SEC.) =   1.62
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    236.00 =  2239.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    236.00 TO NODE    236.00 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.) =  15.66
  RAINFALL INTENSITY(INCH/HR) =   4.41
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.22

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       46.67     7.93        6.847          9.20
     2        9.30     5.97        8.226          1.30
     3       17.24     4.11        9.222          2.20
     4        9.22    15.66        4.415          2.40

  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       50.28     4.11       9.222
     2       63.31     5.97       8.226
     3       71.88     7.93       6.847
     4       52.56    15.66       4.415

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     71.88   Tc(MIN.) =    7.93
  TOTAL AREA(ACRES) =     15.10
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    236.00 =  2239.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    236.00 TO NODE    243.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   345.00  DOWNSTREAM(FEET) =   341.00
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.71
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     71.88
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   8.55
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    243.00 =  2639.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    243.00 TO NODE    243.00 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.) =   8.55
  RAINFALL INTENSITY(INCH/HR) =   6.52
  TOTAL STREAM AREA(ACRES) =    15.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     71.88

****************************************************************************
  FLOW PROCESS FROM NODE    244.00 TO NODE    244.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    386.40
  DOWNSTREAM ELEVATION(FEET) =    386.00
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.153
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    244.10 TO NODE    245.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  386.00  DOWNSTREAM ELEVATION(FEET) =  380.00
  STREET LENGTH(FEET) =   663.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.68
  STREET FLOW TRAVEL TIME(MIN.) =   5.25   Tc(MIN.) =   8.41
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.595
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    2.87
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       3.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.68
  FLOW VELOCITY(FEET/SEC.) =  2.32   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
  LONGEST FLOWPATH FROM NODE    244.00 TO NODE    245.00 =   713.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    243.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  380.00  DOWNSTREAM ELEVATION(FEET) =  351.00
  STREET LENGTH(FEET) =  1842.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.72
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.37
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   9.12   Tc(MIN.) =  17.53
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.106
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    6.43
  TOTAL AREA(ACRES) =      2.40        PEAK FLOW RATE(CFS) =       8.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.08
  FLOW VELOCITY(FEET/SEC.) =  3.58   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
  LONGEST FLOWPATH FROM NODE    244.00 TO NODE    243.00 =  2555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    243.00 TO NODE    243.00 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.) =  17.53
  RAINFALL INTENSITY(INCH/HR) =   4.11
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.57

****************************************************************************
  FLOW PROCESS FROM NODE    246.00 TO NODE    246.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    447.20
  DOWNSTREAM ELEVATION(FEET) =    440.70
  ELEVATION DIFFERENCE(FEET) =      6.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.032
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    246.10 TO NODE    247.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  440.70  DOWNSTREAM ELEVATION(FEET) =  424.00
  STREET LENGTH(FEET) =   233.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.67
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =   2.86
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    2.41
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       3.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.16
  FLOW VELOCITY(FEET/SEC.) =  5.09   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
  LONGEST FLOWPATH FROM NODE    246.00 TO NODE    247.00 =   323.00 FEET.

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

```
  FLOW PROCESS FROM NODE    247.00 TO NODE    248.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  424.00  DOWNSTREAM ELEVATION(FEET) =  353.00
  STREET LENGTH(FEET) =  1117.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.88
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   10.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.97
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   5.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.211
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    9.29
  TOTAL AREA(ACRES) =      1.70        PEAK FLOW RATE(CFS) =      12.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.10
  FLOW VELOCITY(FEET/SEC.) =  6.62   DEPTH*VELOCITY(FT*FT/SEC.) =   2.57
  LONGEST FLOWPATH FROM NODE    246.00 TO NODE    248.00 =  1440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    248.00 TO NODE    249.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  353.00  DOWNSTREAM ELEVATION(FEET) =  350.50
  STREET LENGTH(FEET) =   252.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.71
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.49   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.16
    SPLIT DEPTH(FEET) =    0.35   SPLIT FLOOD WIDTH(FEET) =   10.97
    SPLIT FLOW(CFS) =    3.10   SPLIT VELOCITY(FEET/SEC.) =    2.35
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.54
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =   7.31
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.215
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    3.14
  TOTAL AREA(ACRES) =      2.20        PEAK FLOW RATE(CFS) =      13.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  3.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.54
  LONGEST FLOWPATH FROM NODE    246.00 TO NODE    249.00 =  1692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    249.00 TO NODE    243.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   344.00  DOWNSTREAM(FEET) =   341.00
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     13.81
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   7.42
  LONGEST FLOWPATH FROM NODE    246.00 TO NODE    243.00 =  1771.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    243.00 TO NODE    243.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.42
  RAINFALL INTENSITY(INCH/HR) =   7.15
  TOTAL STREAM AREA(ACRES) =     2.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.81

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       71.88     8.55        6.522         15.10
     2        8.57    17.53        4.106          2.40
     3       13.81     7.42        7.146          2.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       83.05     7.42       7.146
     2       88.67     8.55       6.522
     3       61.76    17.53       4.106

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     88.67   Tc(MIN.) =    8.55
  TOTAL AREA(ACRES) =     19.70
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    243.00 =  2639.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    243.00 TO NODE    250.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.00  DOWNSTREAM(FEET) =   339.00
  FLOW LENGTH(FEET) =   389.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.81
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     88.67
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   9.29
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    250.00 =  3028.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    251.00 TO NODE    251.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  OFFICE PROFESSIONAL/COMMERCIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    373.00
  DOWNSTREAM ELEVATION(FEET) =    372.10
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.045
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE    251.10 TO NODE    252.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    272.10  DOWNSTREAM(FEET) =    271.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    79.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  OFFICE PROFESSIONAL/COMMERCIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.20
  AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =   3.36
  SUBAREA AREA(ACRES) =     1.40       SUBAREA RUNOFF(CFS) =   10.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  TOTAL AREA(ACRES) =      1.50         PEAK FLOW RATE(CFS) =      11.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   4.92
  LONGEST FLOWPATH FROM NODE    251.00 TO NODE    252.00 =   139.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    252.00 TO NODE    253.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    371.00  DOWNSTREAM(FEET) =    363.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =  0.0123
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.756
  OFFICE PROFESSIONAL/COMMERCIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     34.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.41
  AVERAGE FLOW DEPTH(FEET) =   0.66   TRAVEL TIME(MIN.) =   3.18
  Tc(MIN.) =   6.54
  SUBAREA AREA(ACRES) =     6.80       SUBAREA RUNOFF(CFS) =   44.83
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  TOTAL AREA(ACRES) =      8.30         PEAK FLOW RATE(CFS) =      54.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   3.88
  LONGEST FLOWPATH FROM NODE    251.00 TO NODE    253.00 =   789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    253.00 TO NODE    254.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   359.00  DOWNSTREAM(FEET) =   342.00
  FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.60
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     54.72
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   6.59
  LONGEST FLOWPATH FROM NODE    251.00 TO NODE    254.00 =   885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    254.00 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.) =   6.59
  RAINFALL INTENSITY(INCH/HR) =   7.71
  TOTAL STREAM AREA(ACRES) =     8.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     54.72

****************************************************************************
  FLOW PROCESS FROM NODE   2541.00 TO NODE   2541.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    351.00
  DOWNSTREAM ELEVATION(FEET) =    350.70
  ELEVATION DIFFERENCE(FEET) =      0.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.471
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2541.10 TO NODE    254.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
UPSTREAM ELEVATION(FEET) =  350.70  DOWNSTREAM ELEVATION(FEET) =  349.00
STREET LENGTH(FEET) =   363.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.81
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.40
  HALFSTREET FLOOD WIDTH(FEET) =   13.91
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
STREET FLOW TRAVEL TIME(MIN.) =   3.26   Tc(MIN.) =   6.73
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.614
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  98
AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    5.96
TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =       6.62

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.31
FLOW VELOCITY(FEET/SEC.) =  2.13   DEPTH*VELOCITY(FT*FT/SEC.) =   1.00
LONGEST FLOWPATH FROM NODE   2541.00 TO NODE    254.00 =   413.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    254.00 TO NODE    254.00 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.) =   6.73
RAINFALL INTENSITY(INCH/HR) =   7.61
TOTAL STREAM AREA(ACRES) =     1.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.62

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       54.72     6.59        7.715         8.30
    2        6.62     6.73        7.614         1.00

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       61.21     6.59       7.715
    2       60.63     6.73       7.614

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     61.21   Tc(MIN.) =    6.59
TOTAL AREA(ACRES) =      9.30
LONGEST FLOWPATH FROM NODE    251.00 TO NODE    254.00 =   885.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    250.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   343.00  DOWNSTREAM(FEET) =   342.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.78
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     61.21
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   6.74
  LONGEST FLOWPATH FROM NODE    251.00 TO NODE    250.00 =   960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2501.00 TO NODE   2501.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    351.00
  DOWNSTREAM ELEVATION(FEET) =    350.80
  ELEVATION DIFFERENCE(FEET) =      0.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.688
  WARNING: THE MINIMUM OVERLAND FLOW SLOPE, 0.5%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2501.10 TO NODE    250.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  350.80  DOWNSTREAM ELEVATION(FEET) =  349.50
  STREET LENGTH(FEET) =   363.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.54
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =   7.62
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.029
```

```
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =     0.60      SUBAREA RUNOFF(CFS) =     3.67
  TOTAL AREA(ACRES) =       0.70        PEAK FLOW RATE(CFS) =       4.28

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.38
  FLOW VELOCITY(FEET/SEC.) =  1.72   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
  LONGEST FLOWPATH FROM NODE   2501.00 TO NODE    250.00 =   413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 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         4.28     7.62       7.029        0.70
  LONGEST FLOWPATH FROM NODE   2501.00 TO NODE    250.00 =   413.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        88.67     9.29       6.184       19.70
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    250.00 =  3028.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      76.98       7.62        7.029
     2      92.44       9.29        6.184

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     92.44   Tc(MIN.) =    9.29
  TOTAL AREA(ACRES) =     20.40

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        92.44     9.29       6.184       20.40
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    250.00 =  3028.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        61.21     6.74       7.609        9.30
  LONGEST FLOWPATH FROM NODE    251.00 TO NODE    250.00 =   960.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     128.22       6.74        7.609
     2     142.18       9.29        6.184

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    142.18   Tc(MIN.) =    9.29
  TOTAL AREA(ACRES) =     29.70
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.50  DOWNSTREAM(FEET) =   335.90
  FLOW LENGTH(FEET) =   307.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.08
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    142.18
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   9.59
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    255.00 =  3335.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    255.00 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.) =   9.59
  RAINFALL INTENSITY(INCH/HR) =   6.06
  TOTAL STREAM AREA(ACRES) =    29.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    142.18

****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    256.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    352.60
  DOWNSTREAM ELEVATION(FEET) =    351.00
  ELEVATION DIFFERENCE(FEET) =      1.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.584
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.061
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    256.10 TO NODE    257.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    351.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0160
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.465
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .3500
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.75
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   1.67
  Tc(MIN.) =  11.25
  SUBAREA AREA(ACRES) =     3.20       SUBAREA RUNOFF(CFS) =    6.12
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      3.30         PEAK FLOW RATE(CFS) =       6.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   4.42
  LONGEST FLOWPATH FROM NODE    256.00 TO NODE    257.00 =   455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    257.00 TO NODE    255.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   336.50  DOWNSTREAM(FEET) =   335.90
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.31
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =  11.71
  LONGEST FLOWPATH FROM NODE    256.00 TO NODE    255.00 =   578.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    255.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.71
  RAINFALL INTENSITY(INCH/HR) =   5.33
  TOTAL STREAM AREA(ACRES) =     3.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.31

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      142.18     9.59        6.058        29.70
     2        6.31    11.71        5.326         3.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      147.35     9.59       6.058
     2      131.30    11.71       5.326

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    147.35   Tc(MIN.) =    9.59
  TOTAL AREA(ACRES) =     33.00
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    255.00 =  3335.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    258.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   335.90  DOWNSTREAM(FEET) =   311.00
  FLOW LENGTH(FEET) =   785.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.89
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    147.35
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =  10.25
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    258.00 =  4120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    258.00 TO NODE    258.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    259.00 TO NODE    259.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    843.50
  DOWNSTREAM ELEVATION(FEET) =    810.00
  ELEVATION DIFFERENCE(FEET) =     33.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    259.10 TO NODE    260.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    810.00  DOWNSTREAM(FEET) =    486.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   751.00   CHANNEL SLOPE =  0.4314
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.28
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.64   Tc(MIN.) =   8.91
  LONGEST FLOWPATH FROM NODE    259.00 TO NODE    260.00 =   851.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    259.10 TO NODE    260.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.355
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   13.10   SUBAREA RUNOFF(CFS) =   29.14
  TOTAL AREA(ACRES) =     13.20   TOTAL RUNOFF(CFS) =   29.36
  TC(MIN.) =   8.91

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 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.) =   8.91
  RAINFALL INTENSITY(INCH/HR) =   6.35
  TOTAL STREAM AREA(ACRES) =    13.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.36

****************************************************************************
  FLOW PROCESS FROM NODE   2601.00 TO NODE   2601.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    502.00
  DOWNSTREAM ELEVATION(FEET) =    501.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE   2601.10 TO NODE   2602.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  501.40  DOWNSTREAM ELEVATION(FEET) =  499.00
  STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   8.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.315
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.80
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       2.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.99
  FLOW VELOCITY(FEET/SEC.) =  2.33   DEPTH*VELOCITY(FT*FT/SEC.) =   0.71
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2602.00 =   260.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2602.00 TO NODE    260.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =  499.00  DOWNSTREAM ELEVATION(FEET) =  483.60
  STREET LENGTH(FEET) =   807.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.42
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.33
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.18
  STREET FLOW TRAVEL TIME(MIN.) =   4.03   Tc(MIN.) =  13.03
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.972
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.770
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    5.19
  TOTAL AREA(ACRES) =      1.80        PEAK FLOW RATE(CFS) =       6.89

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.30
  FLOW VELOCITY(FEET/SEC.) =  3.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    260.00 =  1067.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 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.) =  13.03
  RAINFALL INTENSITY(INCH/HR) =   4.97
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.89

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       29.36     8.91        6.355         13.20
      2        6.89    13.03        4.972          1.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       34.07     8.91       6.355
      2       29.86    13.03       4.972

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     34.07   Tc(MIN.) =    8.91
  TOTAL AREA(ACRES) =     15.00
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    260.00 =  1067.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    261.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   477.50  DOWNSTREAM(FEET) =   469.60
  FLOW LENGTH(FEET) =   352.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.22
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.07
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   9.39
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    261.00 =  1419.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    261.00 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.) =   9.39
  RAINFALL INTENSITY(INCH/HR) =   6.14
  TOTAL STREAM AREA(ACRES) =    15.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.07

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE    262.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    487.80
  DOWNSTREAM ELEVATION(FEET) =    486.10
  ELEVATION DIFFERENCE(FEET) =      1.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.577
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    262.10 TO NODE    261.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  486.10  DOWNSTREAM ELEVATION(FEET) =  475.60
  STREET LENGTH(FEET) =   448.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   2.64   Tc(MIN.) =   5.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.969
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.56
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       2.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.02
  FLOW VELOCITY(FEET/SEC.) =  3.07   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE    262.00 TO NODE    261.00 =   518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    261.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.22
  RAINFALL INTENSITY(INCH/HR) =   8.97
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.34

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       34.07     9.39        6.143         15.00
     2        2.34     5.22        8.969          0.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       25.68     5.22       8.969
     2       35.67     9.39       6.143

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     35.67   Tc(MIN.) =    9.39
  TOTAL AREA(ACRES) =     15.30
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    261.00 =  1419.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    263.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   469.00  DOWNSTREAM(FEET) =   442.20
  FLOW LENGTH(FEET) =   493.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.30
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     35.67
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   9.86
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    263.00 =  1912.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    263.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2631.00 TO NODE   2631.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    475.30
  DOWNSTREAM ELEVATION(FEET) =    470.30
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.218
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2631.10 TO NODE    263.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  470.30  DOWNSTREAM ELEVATION(FEET) =  448.20
  STREET LENGTH(FEET) =   401.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.33
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =   3.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.60
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       2.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.60
  FLOW VELOCITY(FEET/SEC.) =  4.35   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE   2631.00 TO NODE    263.00 =   491.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    263.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    264.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    681.00
  DOWNSTREAM ELEVATION(FEET) =    640.10
  ELEVATION DIFFERENCE(FEET) =     40.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    264.10 TO NODE    265.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.10  DOWNSTREAM(FEET) =    455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE =  0.4095
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.28
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =   7.85
  LONGEST FLOWPATH FROM NODE    264.00 TO NODE    265.00 =   552.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.10 TO NODE    265.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.891
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.60   SUBAREA RUNOFF(CFS) =    3.86
  TOTAL AREA(ACRES) =      1.70   TOTAL RUNOFF(CFS) =    4.10
  TC(MIN.) =   7.85

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 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) =   6.89
  TOTAL STREAM AREA(ACRES) =     1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.10

****************************************************************************
  FLOW PROCESS FROM NODE   9002.00 TO NODE   9002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   8.16   RAIN INTENSITY(INCH/HOUR) =  6.72
  TOTAL AREA(ACRES) =     2.00   TOTAL RUNOFF(CFS) =      2.35

****************************************************************************
  FLOW PROCESS FROM NODE   9002.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   455.00  DOWNSTREAM(FEET) =   452.00
  FLOW LENGTH(FEET) =    10.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.35
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.17
  LONGEST FLOWPATH FROM NODE    262.00 TO NODE    265.00 =   528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 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.) =   8.17
  RAINFALL INTENSITY(INCH/HR) =   6.72
  TOTAL STREAM AREA(ACRES) =     2.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.35

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        4.10     7.85        6.891          1.70
     2        2.35     8.17        6.718          2.00

  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        6.36     7.85       6.891
     2        6.35     8.17       6.718

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      6.36   Tc(MIN.) =    7.85
  TOTAL AREA(ACRES) =      3.70
  LONGEST FLOWPATH FROM NODE    264.00 TO NODE    265.00 =   552.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    263.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   452.00  DOWNSTREAM(FEET) =   442.20
  FLOW LENGTH(FEET) =    53.00   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.) =  17.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.36
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   7.91
  LONGEST FLOWPATH FROM NODE    264.00 TO NODE    263.00 =   605.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    263.00 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         6.36     7.91       6.862        3.70
  LONGEST FLOWPATH FROM NODE    264.00 TO NODE    263.00 =   605.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        35.67     9.86       5.951       15.30
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    263.00 =  1912.30 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      34.96       7.91        6.862
     2      41.19       9.86        5.951

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     41.19   Tc(MIN.) =    9.86
  TOTAL AREA(ACRES) =     19.00

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    263.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        41.19     9.86       5.951       19.00
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    263.00 =  1912.30 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1         2.41     3.89       9.222        0.30
  LONGEST FLOWPATH FROM NODE   2631.00 TO NODE    263.00 =   491.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      18.67       3.89        9.222
     2      42.74       9.86        5.951

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     42.74   Tc(MIN.) =    9.86
  TOTAL AREA(ACRES) =     19.30

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    263.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE    263.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    263.00 TO NODE   2661.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   442.20  DOWNSTREAM(FEET) =   428.00
```

```
  FLOW LENGTH(FEET) =   207.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.69
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     42.74
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =  10.04
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2661.20 =  2119.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2661.30 TO NODE   2661.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.04
  RAINFALL INTENSITY(INCH/HR) =   5.88
  TOTAL STREAM AREA(ACRES) =    19.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.74

****************************************************************************
  FLOW PROCESS FROM NODE  10006.00 TO NODE  10006.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.20   RAIN INTENSITY(INCH/HOUR) =  5.48
  TOTAL AREA(ACRES) =    75.00   TOTAL RUNOFF(CFS) =    114.16

****************************************************************************
  FLOW PROCESS FROM NODE  10006.00 TO NODE   2661.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   444.00  DOWNSTREAM(FEET) =   428.00
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.37
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    114.16
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  11.29
  LONGEST FLOWPATH FROM NODE    262.00 TO NODE   2661.30 =   682.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2661.30 TO NODE   2661.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.29
  RAINFALL INTENSITY(INCH/HR) =   5.45
  TOTAL STREAM AREA(ACRES) =    75.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    114.16

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       42.74    10.04        5.883         19.30
     2      114.16    11.29        5.454         75.00

  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       144.25     10.04        5.883
     2       153.78     11.29        5.454

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    153.78   Tc(MIN.) =   11.29
  TOTAL AREA(ACRES) =      94.30
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2661.30 =  2119.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2661.30 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   442.20  DOWNSTREAM(FEET) =   424.00
  FLOW LENGTH(FEET) =   513.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.00
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    153.78
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =  11.69
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    266.00 =  2632.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 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.) =  11.69
  RAINFALL INTENSITY(INCH/HR) =   5.33
  TOTAL STREAM AREA(ACRES) =    94.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    153.78

****************************************************************************
  FLOW PROCESS FROM NODE   2661.00 TO NODE   2661.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    450.00
  DOWNSTREAM ELEVATION(FEET) =    446.60
  ELEVATION DIFFERENCE(FEET) =      3.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.286
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2661.10 TO NODE    266.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  446.60  DOWNSTREAM ELEVATION(FEET) =  430.00
  STREET LENGTH(FEET) =   390.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   1.81   Tc(MIN.) =   4.10
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.60
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       2.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.06
  FLOW VELOCITY(FEET/SEC.) =  3.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
  LONGEST FLOWPATH FROM NODE   2661.00 TO NODE    266.00 =   470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 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.) =   4.10
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.41

****************************************************************************
  FLOW PROCESS FROM NODE  11003.00 TO NODE  11003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.19   RAIN INTENSITY(INCH/HOUR) =  5.48
  TOTAL AREA(ACRES) =    19.90   TOTAL RUNOFF(CFS) =     38.20

****************************************************************************
  FLOW PROCESS FROM NODE  11003.00 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   425.00  DOWNSTREAM(FEET) =   424.00
  FLOW LENGTH(FEET) =    66.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.83
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     38.20
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  11.29
  LONGEST FLOWPATH FROM NODE    246.00 TO NODE    266.00 =  1837.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 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.) =  11.29
  RAINFALL INTENSITY(INCH/HR) =   5.45
  TOTAL STREAM AREA(ACRES) =    19.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     38.20

****************************************************************************
  FLOW PROCESS FROM NODE  12003.00 TO NODE  12003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.66   RAIN INTENSITY(INCH/HOUR) =  5.66
  TOTAL AREA(ACRES) =    25.50   TOTAL RUNOFF(CFS) =     50.50

****************************************************************************
  FLOW PROCESS FROM NODE  12003.00 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   425.00  DOWNSTREAM(FEET) =   424.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.94
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     50.50
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  10.83
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    266.00 =  2339.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 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.) =  10.83
  RAINFALL INTENSITY(INCH/HR) =   5.60
  TOTAL STREAM AREA(ACRES) =    25.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     50.50

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       153.78    11.69        5.331        94.30
     2         2.41     4.10        9.222         0.30
     3        38.20    11.29        5.453        19.90
     4        50.50    10.83        5.602        25.50

  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       124.28     4.10       9.222
     2       234.92    10.83       5.602
     3       239.12    11.29       5.453
     4       240.57    11.69       5.331

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    240.57   Tc(MIN.) =   11.69
  TOTAL AREA(ACRES) =    140.00
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    266.00 =  2632.30 FEET.

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

```
  FLOW PROCESS FROM NODE    266.00 TO NODE    268.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   430.00  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  47.26
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    240.57
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.72
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    268.00 =  2694.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    268.00 TO NODE    269.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =   380.80
  FLOW LENGTH(FEET) =   711.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.28
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    240.57
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  12.17
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    269.00 =  3405.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    269.00 TO NODE    269.00 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.) =  12.17
  RAINFALL INTENSITY(INCH/HR) =   5.20
  TOTAL STREAM AREA(ACRES) =   140.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    240.57

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    271.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    422.50
  DOWNSTREAM ELEVATION(FEET) =    421.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.087
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.364
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    270.10 TO NODE    271.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  421.50  DOWNSTREAM ELEVATION(FEET) =  420.50
  STREET LENGTH(FEET) =    58.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.82
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   7.52
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.086
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.81
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.24
  FLOW VELOCITY(FEET/SEC.) =  2.39   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    271.00 =   128.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    271.00 TO NODE    269.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  420.50  DOWNSTREAM ELEVATION(FEET) =  386.80
  STREET LENGTH(FEET) =   681.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   2.30   Tc(MIN.) =   9.83
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.964
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.16
  TOTAL AREA(ACRES) =      2.70        PEAK FLOW RATE(CFS) =       9.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.34
  FLOW VELOCITY(FEET/SEC.) =  5.60   DEPTH*VELOCITY(FT*FT/SEC.) =   2.09
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    269.00 =   809.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    269.00 TO NODE    269.00 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.) =   9.83
  RAINFALL INTENSITY(INCH/HR) =   5.96
  TOTAL STREAM AREA(ACRES) =     2.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.18

****************************************************************************
  FLOW PROCESS FROM NODE    272.00 TO NODE    272.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    423.30
  DOWNSTREAM ELEVATION(FEET) =    422.20
  ELEVATION DIFFERENCE(FEET) =      1.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.866
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.516
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE    272.10 TO NODE    273.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  422.20  DOWNSTREAM ELEVATION(FEET) =  420.40
  STREET LENGTH(FEET) =   113.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.23
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.45
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =   7.69
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.988
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.59
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.99

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.12
  FLOW VELOCITY(FEET/SEC.) =  2.56   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE    272.00 TO NODE    273.00 =   183.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    273.00 TO NODE    274.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  420.40  DOWNSTREAM ELEVATION(FEET) =  386.80
  STREET LENGTH(FEET) =   674.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.63
  STREET FLOW TRAVEL TIME(MIN.) =   2.24   Tc(MIN.) =   9.93
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.924
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    7.09
  TOTAL AREA(ACRES) =      2.60        PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.08
  FLOW VELOCITY(FEET/SEC.) =  5.56   DEPTH*VELOCITY(FT*FT/SEC.) =   2.05
  LONGEST FLOWPATH FROM NODE    272.00 TO NODE    274.00 =   857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    274.00 TO NODE    269.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   380.80  DOWNSTREAM(FEET) =   380.00
  FLOW LENGTH(FEET) =    46.35   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.78
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  10.03
  LONGEST FLOWPATH FROM NODE    272.00 TO NODE    269.00 =   903.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    269.00 TO NODE    269.00 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.) =  10.03
  RAINFALL INTENSITY(INCH/HR) =   5.89
  TOTAL STREAM AREA(ACRES) =     2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.78

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       240.57    12.17        5.196        140.00
     2         9.18     9.83        5.964          2.70
     3         8.78    10.03        5.887          2.60

  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       227.38     9.83       5.964
     2       230.18    10.03       5.887
     3       256.32    12.17       5.196

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    256.32   Tc(MIN.) =   12.17
  TOTAL AREA(ACRES) =    145.30
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    269.00 =  3405.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    269.00 TO NODE    275.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   380.00  DOWNSTREAM(FEET) =   370.00
  FLOW LENGTH(FEET) =   514.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.64
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    256.32
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =  12.63
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    275.00 =  3920.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    275.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    276.00 TO NODE    276.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    451.00
  DOWNSTREAM ELEVATION(FEET) =    450.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.390
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.168
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE    276.10 TO NODE    277.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  450.40  DOWNSTREAM ELEVATION(FEET) =  449.50
  STREET LENGTH(FEET) =   107.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.78
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    5.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.40
  STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   8.48
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.561
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.75
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.12

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.21
  FLOW VELOCITY(FEET/SEC.) =  1.76   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
  LONGEST FLOWPATH FROM NODE    276.00 TO NODE    277.00 =   167.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    277.00 TO NODE    278.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  449.50  DOWNSTREAM ELEVATION(FEET) =  409.20
  STREET LENGTH(FEET) =   875.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.73
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.26
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.90
  STREET FLOW TRAVEL TIME(MIN.) =   2.77   Tc(MIN.) =  11.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.466
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =   13.40
  TOTAL AREA(ACRES) =      4.60        PEAK FLOW RATE(CFS) =      14.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.98
  FLOW VELOCITY(FEET/SEC.) =  6.07   DEPTH*VELOCITY(FT*FT/SEC.) =   2.58
  LONGEST FLOWPATH FROM NODE    276.00 TO NODE    278.00 =  1042.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    278.00 TO NODE    279.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   403.20  DOWNSTREAM(FEET) =   370.60
  FLOW LENGTH(FEET) =   501.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.82
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.33
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =  11.81
  LONGEST FLOWPATH FROM NODE    276.00 TO NODE    279.00 =  1543.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    279.00 TO NODE    279.00 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.) =  11.81
  RAINFALL INTENSITY(INCH/HR) =   5.30
  TOTAL STREAM AREA(ACRES) =     4.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.33

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    280.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    409.80
  DOWNSTREAM ELEVATION(FEET) =    408.00
  ELEVATION DIFFERENCE(FEET) =      1.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.512
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.777
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE    280.10 TO NODE    281.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  408.00  DOWNSTREAM ELEVATION(FEET) =  405.70
  STREET LENGTH(FEET) =   145.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
```

```
    HALFSTREET FLOOD WIDTH(FEET) =    5.94
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   7.60
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.039
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.20
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.36
  FLOW VELOCITY(FEET/SEC.) =  2.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    281.00 =   225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    281.00 TO NODE    279.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  405.70  DOWNSTREAM ELEVATION(FEET) =  376.60
  STREET LENGTH(FEET) =   405.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.34
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.46
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =   8.84
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.387
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    5.46
  TOTAL AREA(ACRES) =      1.90        PEAK FLOW RATE(CFS) =       6.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.10
  FLOW VELOCITY(FEET/SEC.) =  6.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.99
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    279.00 =   630.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    279.00 TO NODE    279.00 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.) =   8.84
  RAINFALL INTENSITY(INCH/HR) =   6.39
  TOTAL STREAM AREA(ACRES) =     1.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.92
```

```
** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       14.33    11.81        5.297          4.60
    2        6.92     8.84        6.387          1.90

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       17.64     8.84       6.387
    2       20.07    11.81       5.297

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     20.07   Tc(MIN.) =   11.81
TOTAL AREA(ACRES) =      6.50
LONGEST FLOWPATH FROM NODE    276.00 TO NODE    279.00 =  1543.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    279.00 TO NODE    275.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   370.60  DOWNSTREAM(FEET) =   370.00
FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.87
ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     20.07
PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  11.89
LONGEST FLOWPATH FROM NODE    276.00 TO NODE    275.00 =  1587.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    275.00 TO NODE    275.00 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       20.07    11.89       5.273         6.50
LONGEST FLOWPATH FROM NODE    276.00 TO NODE    275.00 =  1587.00 FEET.

** MEMORY BANK #  2 CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1      256.32    12.63       5.073       145.30
LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    275.00 =  3920.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1      261.50    11.89       5.273
    2      275.63    12.63       5.073

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    275.63   Tc(MIN.) =   12.63
TOTAL AREA(ACRES) =    151.80

****************************************************************************
FLOW PROCESS FROM NODE    275.00 TO NODE    275.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 2 <<<<<
```

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

******************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    283.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   370.00  DOWNSTREAM(FEET) =   366.40
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.34
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    275.63
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  12.74
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    283.00 =  4060.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    283.00 TO NODE    283.00 IS CODE =  10
------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE    284.00 TO NODE    284.10 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    451.60
  DOWNSTREAM ELEVATION(FEET) =    450.30
  ELEVATION DIFFERENCE(FEET) =      1.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.494
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.791
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.44

******************************************************************************
  FLOW PROCESS FROM NODE    284.10 TO NODE    285.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  450.30  DOWNSTREAM ELEVATION(FEET) =  448.90
  STREET LENGTH(FEET) =    80.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.24
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =   7.09
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.362
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.84
  TOTAL AREA(ACRES) =       0.30        PEAK FLOW RATE(CFS) =       1.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.35
  FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
  LONGEST FLOWPATH FROM NODE    284.00 TO NODE    285.00 =   150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    285.00 TO NODE    286.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  448.90  DOWNSTREAM ELEVATION(FEET) =  436.00
  STREET LENGTH(FEET) =   176.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.13
  STREET FLOW TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =   7.71
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.973
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     1.59
  TOTAL AREA(ACRES) =       0.70        PEAK FLOW RATE(CFS) =       2.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.60
  FLOW VELOCITY(FEET/SEC.) =  5.03   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE    284.00 TO NODE    286.00 =   326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    286.00 TO NODE    287.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  436.00  DOWNSTREAM ELEVATION(FEET) =  422.00
  STREET LENGTH(FEET) =   256.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.34
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =   8.63
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.483
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.11
  TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =       3.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.12
  FLOW VELOCITY(FEET/SEC.) =  4.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
  LONGEST FLOWPATH FROM NODE    284.00 TO NODE    287.00 =   582.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 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.) =   8.63
  RAINFALL INTENSITY(INCH/HR) =   6.48
  TOTAL STREAM AREA(ACRES) =     1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.70

****************************************************************************
  FLOW PROCESS FROM NODE    288.00 TO NODE    288.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    451.50
  DOWNSTREAM ELEVATION(FEET) =    447.40
  ELEVATION DIFFERENCE(FEET) =      4.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.460
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.713
  SUBAREA RUNOFF(CFS) =      0.50
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.50

****************************************************************************
  FLOW PROCESS FROM NODE    288.10 TO NODE    289.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  447.40  DOWNSTREAM ELEVATION(FEET) =  446.10
  STREET LENGTH(FEET) =    30.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.74
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.19
    HALFSTREET FLOOD WIDTH(FEET) =    3.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
  STREET FLOW TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =   5.61
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.562
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.49
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.98

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.15
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    289.00 =   120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    289.00 TO NODE    290.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  446.10  DOWNSTREAM ELEVATION(FEET) =  440.00
  STREET LENGTH(FEET) =   128.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.92
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
  STREET FLOW TRAVEL TIME(MIN.) =   0.58   Tc(MIN.) =   6.19
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.036
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.70
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.62

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.53
  FLOW VELOCITY(FEET/SEC.) =  3.81   DEPTH*VELOCITY(FT*FT/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    290.00 =   248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    287.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  440.00  DOWNSTREAM ELEVATION(FEET) =  426.00
  STREET LENGTH(FEET) =   444.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =   8.05
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.785
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.587
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    5.80
  TOTAL AREA(ACRES) =      1.80        PEAK FLOW RATE(CFS) =       7.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.19
  FLOW VELOCITY(FEET/SEC.) =  4.47   DEPTH*VELOCITY(FT*FT/SEC.) =   1.65
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    287.00 =   692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 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.) =   8.05
  RAINFALL INTENSITY(INCH/HR) =   6.78
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.16

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        3.70     8.63        6.483          1.00
     2        7.16     8.05        6.785          1.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       10.61     8.05       6.785
     2       10.54     8.63       6.483

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     10.61   Tc(MIN.) =    8.05
  TOTAL AREA(ACRES) =      2.80
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    287.00 =   692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    291.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =    45.50
  FLOW LENGTH(FEET) =    72.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  65.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.61
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.06
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    291.00 =   764.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    291.00 TO NODE    291.00 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.) =   8.06
  RAINFALL INTENSITY(INCH/HR) =   6.77
  TOTAL STREAM AREA(ACRES) =     2.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.61

****************************************************************************
  FLOW PROCESS FROM NODE    292.00 TO NODE    292.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    441.20
  DOWNSTREAM ELEVATION(FEET) =    439.90
  ELEVATION DIFFERENCE(FEET) =      1.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.494
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.791
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE    292.10 TO NODE    293.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  439.90  DOWNSTREAM ELEVATION(FEET) =  437.30
  STREET LENGTH(FEET) =   144.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.08
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.26
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =   7.56
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.064
```

```
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.81
  TOTAL AREA(ACRES) =       0.30        PEAK FLOW RATE(CFS) =       1.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.19
  FLOW VELOCITY(FEET/SEC.) =  2.41   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE    292.00 TO NODE    293.00 =   214.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    293.00 TO NODE    291.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  437.30  DOWNSTREAM ELEVATION(FEET) =  422.00
  STREET LENGTH(FEET) =   393.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   9.16
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.240
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =     4.62
  TOTAL AREA(ACRES) =       1.60        PEAK FLOW RATE(CFS) =       5.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.61
  FLOW VELOCITY(FEET/SEC.) =  4.57   DEPTH*VELOCITY(FT*FT/SEC.) =   1.55
  LONGEST FLOWPATH FROM NODE    292.00 TO NODE    291.00 =   607.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    291.00 TO NODE    291.00 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.) =   9.16
  RAINFALL INTENSITY(INCH/HR) =   6.24
  TOTAL STREAM AREA(ACRES) =     1.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.69

****************************************************************************
  FLOW PROCESS FROM NODE    294.00 TO NODE    294.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    436.90
  DOWNSTREAM ELEVATION(FEET) =    433.80
  ELEVATION DIFFERENCE(FEET) =      3.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.993
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.205
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    294.10 TO NODE    295.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  433.80  DOWNSTREAM ELEVATION(FEET) =  430.90
  STREET LENGTH(FEET) =    85.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.14
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    4.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =   6.45
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.826
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.34
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.40
  FLOW VELOCITY(FEET/SEC.) =  3.38   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
  LONGEST FLOWPATH FROM NODE    294.00 TO NODE    295.00 =   175.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    295.00 TO NODE    291.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  430.90  DOWNSTREAM ELEVATION(FEET) =  422.00
  STREET LENGTH(FEET) =   208.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.33
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =   7.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.257
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    4.14
  TOTAL AREA(ACRES) =      1.40        PEAK FLOW RATE(CFS) =       5.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.46
  FLOW VELOCITY(FEET/SEC.) =  4.78   DEPTH*VELOCITY(FT*FT/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE    294.00 TO NODE    291.00 =   383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    291.00 TO NODE    291.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.25
  RAINFALL INTENSITY(INCH/HR) =   7.26
  TOTAL STREAM AREA(ACRES) =     1.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.79

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       10.61     8.06        6.775          2.80
     2        5.69     9.16        6.240          1.60
     3        5.79     7.25        7.257          1.40

  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       20.20     7.25       7.257
     2       21.02     8.06       6.775
     3       20.44     9.16       6.240

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     21.02   Tc(MIN.) =    8.06
  TOTAL AREA(ACRES) =      5.80
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    291.00 =   764.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    291.00 TO NODE    296.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =   414.00
  FLOW LENGTH(FEET) =    86.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.81
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     21.02
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   8.20
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    296.00 =   850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    296.00 TO NODE    299.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   414.00  DOWNSTREAM(FEET) =   395.00
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.02
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   8.23
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    299.00 =   911.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    299.00 TO NODE    299.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    297.00 TO NODE    297.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    440.50
  DOWNSTREAM ELEVATION(FEET) =    437.50
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.384
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE    297.10 TO NODE    298.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  437.50  DOWNSTREAM ELEVATION(FEET) =  435.00
  STREET LENGTH(FEET) =    66.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.18
    HALFSTREET FLOOD WIDTH(FEET) =    2.73
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.12
```

```
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
 STREET FLOW TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =   2.74
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.05      SUBAREA RUNOFF(CFS) =    0.40
 TOTAL AREA(ACRES) =      0.10        PEAK FLOW RATE(CFS) =       0.80

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   3.71
 FLOW VELOCITY(FEET/SEC.) =  3.13   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
 LONGEST FLOWPATH FROM NODE    297.00 TO NODE    298.00 =   146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    298.00 TO NODE    298.00 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.) =   2.74
 RAINFALL INTENSITY(INCH/HR) =   9.22
 TOTAL STREAM AREA(ACRES) =     0.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.80

****************************************************************************
 FLOW PROCESS FROM NODE   2981.00 TO NODE   2981.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    451.60
 DOWNSTREAM ELEVATION(FEET) =    451.00
 ELEVATION DIFFERENCE(FEET) =      0.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.348
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.906
 SUBAREA RUNOFF(CFS) =      0.45
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
 FLOW PROCESS FROM NODE   2981.10 TO NODE   2982.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  451.00  DOWNSTREAM ELEVATION(FEET) =  446.60
 STREET LENGTH(FEET) =   448.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.46
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    7.87
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
  STREET FLOW TRAVEL TIME(MIN.) =   3.77   Tc(MIN.) =  10.11
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.854
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    2.00
  TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       2.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.75
  FLOW VELOCITY(FEET/SEC.) =  2.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE   2982.00 =   498.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2982.00 TO NODE   2983.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  446.60  DOWNSTREAM ELEVATION(FEET) =  435.00
  STREET LENGTH(FEET) =   178.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
  STREET FLOW TRAVEL TIME(MIN.) =   0.63   Tc(MIN.) =  10.74
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.631
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.607
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.49
  TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFS) =       2.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.75
  FLOW VELOCITY(FEET/SEC.) =  4.77   DEPTH*VELOCITY(FT*FT/SEC.) =   1.25
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE   2983.00 =   676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2983.00 TO NODE    298.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    435.00  DOWNSTREAM(FEET) =    434.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0200
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.74
  FLOW VELOCITY(FEET/SEC.) =   3.52   FLOW DEPTH(FEET) =   0.25
  TRAVEL TIME(MIN.) =   0.24   Tc(MIN.) =  10.98
```

```
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE    298.00 =   726.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    298.00 TO NODE    298.00 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.) =  10.98
  RAINFALL INTENSITY(INCH/HR) =   5.55
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.74

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        0.80     2.74        9.222          0.10
     2        2.74    10.98        5.552          0.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        1.48     2.74       9.222
     2        3.22    10.98       5.552

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      3.22   Tc(MIN.) =   10.98
  TOTAL AREA(ACRES) =      0.90
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE    298.00 =   726.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    298.00 TO NODE    299.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  434.00  DOWNSTREAM ELEVATION(FEET) =  401.00
  STREET LENGTH(FEET) =   650.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.52
  STREET FLOW TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =  13.21
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.928
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    3.09
  TOTAL AREA(ACRES) =      2.00        PEAK FLOW RATE(CFS) =       5.91
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.21
  FLOW VELOCITY(FEET/SEC.) =  5.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.68
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE    299.00 =  1376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    299.00 TO NODE    299.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1         5.91    13.21       4.928        2.00
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE    299.00 =  1376.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        21.02     8.23       6.686        5.80
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    299.00 =   911.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      24.71       8.23        6.686
     2      21.41      13.21        4.928

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     24.71   Tc(MIN.) =    8.23
  TOTAL AREA(ACRES) =      7.80

****************************************************************************
  FLOW PROCESS FROM NODE    299.00 TO NODE    299.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    299.00 TO NODE   2100.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   395.00  DOWNSTREAM(FEET) =   380.00
  FLOW LENGTH(FEET) =   277.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.76
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.71
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   8.52
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE   2100.00 =  1653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2100.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2101.00 TO NODE   2101.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    436.50
  DOWNSTREAM ELEVATION(FEET) =    431.20
  ELEVATION DIFFERENCE(FEET) =      5.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.175
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2101.10 TO NODE   2102.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  431.20  DOWNSTREAM ELEVATION(FEET) =  422.00
  STREET LENGTH(FEET) =   159.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.20
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.95
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
  STREET FLOW TRAVEL TIME(MIN.) =   0.67   Tc(MIN.) =   2.85
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.80
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       1.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.23
  FLOW VELOCITY(FEET/SEC.) =  4.10   DEPTH*VELOCITY(FT*FT/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE   2101.00 TO NODE   2102.00 =   249.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2102.00 TO NODE   2103.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  422.00  DOWNSTREAM ELEVATION(FEET) =  407.00
  STREET LENGTH(FEET) =   387.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.49
  STREET FLOW TRAVEL TIME(MIN.) =   1.44   Tc(MIN.) =   4.29
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.608
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    7.36
  TOTAL AREA(ACRES) =      1.60        PEAK FLOW RATE(CFS) =       8.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.85
  FLOW VELOCITY(FEET/SEC.) =  5.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.94
  LONGEST FLOWPATH FROM NODE   2101.00 TO NODE   2103.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2103.00 TO NODE   2103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   4.29
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     1.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.96

****************************************************************************
  FLOW PROCESS FROM NODE   2104.00 TO NODE   2104.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    422.70
  DOWNSTREAM ELEVATION(FEET) =    420.80
  ELEVATION DIFFERENCE(FEET) =      1.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.396
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.868
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE   2104.10 TO NODE   2105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  420.80  DOWNSTREAM ELEVATION(FEET) =  418.30
  STREET LENGTH(FEET) =   109.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
  STREET FLOW TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   7.09
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.360
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.26
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.85
  FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
  LONGEST FLOWPATH FROM NODE   2104.00 TO NODE   2105.00 =   189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2105.00 TO NODE   2103.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  418.30  DOWNSTREAM ELEVATION(FEET) =  407.00
  STREET LENGTH(FEET) =   313.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.24
  STREET FLOW TRAVEL TIME(MIN.) =   1.29   Tc(MIN.) =   8.38
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.610
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    4.14
  TOTAL AREA(ACRES) =      1.50        PEAK FLOW RATE(CFS) =       5.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.76
  FLOW VELOCITY(FEET/SEC.) =  4.43   DEPTH*VELOCITY(FT*FT/SEC.) =   1.51
  LONGEST FLOWPATH FROM NODE   2104.00 TO NODE   2103.00 =   502.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2103.00 TO NODE   2103.00 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.) =   8.38
  RAINFALL INTENSITY(INCH/HR) =   6.61
  TOTAL STREAM AREA(ACRES) =     1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.65

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.96     4.29        9.222          1.60
      2        5.65     8.38        6.610          1.50

  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       11.85     4.29       9.222
      2       12.08     8.38       6.610

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     12.08   Tc(MIN.) =    8.38
  TOTAL AREA(ACRES) =      3.10
  LONGEST FLOWPATH FROM NODE   2101.00 TO NODE   2103.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2103.00 TO NODE   2100.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   401.00  DOWNSTREAM(FEET) =   380.00
  FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.08
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   8.45
  LONGEST FLOWPATH FROM NODE   2101.00 TO NODE   2100.00 =   732.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2100.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       12.08    8.45       6.573        3.10
  LONGEST FLOWPATH FROM NODE   2101.00 TO NODE   2100.00 =   732.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       24.71    8.52       6.537        7.80
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE   2100.00 =  1653.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      36.57       8.45       6.573
      2      36.72       8.52       6.537

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =     36.72   Tc(MIN.) =    8.52
  TOTAL AREA(ACRES) =     10.90

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2100.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE    283.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   380.00  DOWNSTREAM(FEET) =   366.40
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.40
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     36.72
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   8.82
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE    283.00 =  1943.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    283.00 TO NODE    283.00 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       36.72     8.82       6.395       10.90
  LONGEST FLOWPATH FROM NODE   2981.00 TO NODE    283.00 =  1943.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      275.63    12.74       5.045      151.80
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    283.00 =  4060.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     227.57       8.82        6.395
     2     304.59      12.74        5.045

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    304.59   Tc(MIN.) =   12.74
  TOTAL AREA(ACRES) =    162.70

****************************************************************************
  FLOW PROCESS FROM NODE    283.00 TO NODE    283.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    283.00 TO NODE   2106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   366.40  DOWNSTREAM(FEET) =   350.00
  FLOW LENGTH(FEET) =   268.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.37
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    304.59
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  12.88
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2106.00 =  4328.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2106.00 TO NODE   2106.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2108.00 TO NODE   2108.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    386.00
  DOWNSTREAM ELEVATION(FEET) =    381.20
  ELEVATION DIFFERENCE(FEET) =      4.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.248
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2108.10 TO NODE   2109.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  381.20  DOWNSTREAM ELEVATION(FEET) =  371.90
  STREET LENGTH(FEET) =   173.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   0.67   Tc(MIN.) =   2.92
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    3.21
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       4.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.48
  FLOW VELOCITY(FEET/SEC.) =  4.79   DEPTH*VELOCITY(FT*FT/SEC.) =   1.42
  LONGEST FLOWPATH FROM NODE   2108.00 TO NODE   2109.00 =   263.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2109.00 TO NODE   2109.00 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.) =   2.92
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.01

****************************************************************************
  FLOW PROCESS FROM NODE   2110.00 TO NODE   2110.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    422.00
  DOWNSTREAM ELEVATION(FEET) =    418.40
  ELEVATION DIFFERENCE(FEET) =      3.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.243
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE   2110.10 TO NODE   2111.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  418.40  DOWNSTREAM ELEVATION(FEET) =  411.00
  STREET LENGTH(FEET) =   167.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.17
    HALFSTREET FLOOD WIDTH(FEET) =    2.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.47
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
  STREET FLOW TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =   3.04
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.05      SUBAREA RUNOFF(CFS) =    0.40
  TOTAL AREA(ACRES) =      0.10        PEAK FLOW RATE(CFS) =       0.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   3.50
```

```
  FLOW VELOCITY(FEET/SEC.) =  3.34   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
  LONGEST FLOWPATH FROM NODE   2110.00 TO NODE   2111.00 =   247.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2111.00 TO NODE   2109.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  411.00  DOWNSTREAM ELEVATION(FEET) =  371.90
  STREET LENGTH(FEET) =   691.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.76
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.90
  STREET FLOW TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =   5.11
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.090
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.582
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =   12.44
  TOTAL AREA(ACRES) =      2.50        PEAK FLOW RATE(CFS) =      13.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.91
  FLOW VELOCITY(FEET/SEC.) =  6.44   DEPTH*VELOCITY(FT*FT/SEC.) =   2.61
  LONGEST FLOWPATH FROM NODE   2110.00 TO NODE   2109.00 =   938.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2109.00 TO NODE   2109.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.11
  RAINFALL INTENSITY(INCH/HR) =   9.09
  TOTAL STREAM AREA(ACRES) =     2.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.23

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        4.01     2.92        9.222          0.50
     2       13.23     5.11        9.090          2.50

  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       11.56     2.92       9.222
```

```
    2       17.18     5.11       9.090

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     17.18   Tc(MIN.) =    5.11
  TOTAL AREA(ACRES) =      3.00
  LONGEST FLOWPATH FROM NODE   2110.00 TO NODE   2109.00 =   938.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2109.00 TO NODE   2112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    371.90  DOWNSTREAM(FEET) =    371.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0180
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     17.18
  FLOW VELOCITY(FEET/SEC.) =   5.38   FLOW DEPTH(FEET) =   0.52
  TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =   5.27
  LONGEST FLOWPATH FROM NODE   2110.00 TO NODE   2112.00 =   988.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2112.00 TO NODE   2112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.27
  RAINFALL INTENSITY(INCH/HR) =   8.92
  TOTAL STREAM AREA(ACRES) =     3.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.18

****************************************************************************
  FLOW PROCESS FROM NODE  21121.00 TO NODE  21121.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    388.80
  DOWNSTREAM ELEVATION(FEET) =    387.10
  ELEVATION DIFFERENCE(FEET) =      1.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.637
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.682
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE  21121.10 TO NODE  21122.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  387.10  DOWNSTREAM ELEVATION(FEET) =  385.30
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.64
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.21
   HALFSTREET FLOOD WIDTH(FEET) =    4.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
 STREET FLOW TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   7.29
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.229
 RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
 SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.41
 TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.82

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.81
 FLOW VELOCITY(FEET/SEC.) =  2.36   DEPTH*VELOCITY(FT*FT/SEC.) =   0.52
 LONGEST FLOWPATH FROM NODE  21121.00 TO NODE  21122.00 =   170.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  21122.00 TO NODE  21123.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  385.30  DOWNSTREAM ELEVATION(FEET) =  376.60
 STREET LENGTH(FEET) =   521.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.53
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =   11.53
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.13
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
 STREET FLOW TRAVEL TIME(MIN.) =   2.77   Tc(MIN.) =  10.06
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.873
 RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
 SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    7.36
 TOTAL AREA(ACRES) =      2.40        PEAK FLOW RATE(CFS) =       8.03

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.52
 FLOW VELOCITY(FEET/SEC.) =  3.61   DEPTH*VELOCITY(FT*FT/SEC.) =   1.50
 LONGEST FLOWPATH FROM NODE  21121.00 TO NODE  21123.00 =   691.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  21123.00 TO NODE   2112.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  376.60  DOWNSTREAM ELEVATION(FEET) =  371.00
```

```
  STREET LENGTH(FEET) =   136.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.89
  STREET FLOW TRAVEL TIME(MIN.) =   0.45   Tc(MIN.) =  10.51
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.711
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.582
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.50
  TOTAL AREA(ACRES) =      2.50        PEAK FLOW RATE(CFS) =       8.31

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.29
  FLOW VELOCITY(FEET/SEC.) =  5.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.90
  LONGEST FLOWPATH FROM NODE  21121.00 TO NODE   2112.00 =   827.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2112.00 TO NODE   2112.00 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.) =  10.51
  RAINFALL INTENSITY(INCH/HR) =   5.71
  TOTAL STREAM AREA(ACRES) =     2.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.31

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       17.18     5.27        8.917         3.00
      2        8.31    10.51        5.711         2.50

  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       21.35     5.27       8.917
      2       19.31    10.51       5.711

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     21.35   Tc(MIN.) =    5.27
  TOTAL AREA(ACRES) =      5.50
  LONGEST FLOWPATH FROM NODE   2110.00 TO NODE   2112.00 =   988.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2112.00 TO NODE   2106.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  371.00  DOWNSTREAM ELEVATION(FEET) =  356.00
  STREET LENGTH(FEET) =   260.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.16
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   17.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.51
  STREET FLOW TRAVEL TIME(MIN.) =   0.58   Tc(MIN.) =   5.85
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.333
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    3.62
  TOTAL AREA(ACRES) =      6.00        PEAK FLOW RATE(CFS) =      31.50

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  7.62   DEPTH*VELOCITY(FT*FT/SEC.) =   3.71
  LONGEST FLOWPATH FROM NODE   2110.00 TO NODE   2106.00 =  1248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2106.00 TO NODE   2106.00 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       31.50     5.85       8.333        6.00
  LONGEST FLOWPATH FROM NODE   2110.00 TO NODE   2106.00 =  1248.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      304.59    12.88       5.008      162.70
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2106.00 =  4328.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     169.81       5.85        8.333
     2     323.52      12.88        5.008

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    323.52   Tc(MIN.) =   12.88
  TOTAL AREA(ACRES) =    168.70

****************************************************************************
  FLOW PROCESS FROM NODE   2106.00 TO NODE   2106.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
```

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

******************************************************************************
  FLOW PROCESS FROM NODE   2106.00 TO NODE   2113.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   350.00  DOWNSTREAM(FEET) =   330.00
  FLOW LENGTH(FEET) =   439.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.42
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    323.52
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =  13.15
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2113.00 =  4767.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2106.00 TO NODE   2113.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.942
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3653
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    2.58
  TOTAL AREA(ACRES) =    169.30   TOTAL RUNOFF(CFS) =  323.52
  TC(MIN.) =  13.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

******************************************************************************
  FLOW PROCESS FROM NODE   2113.00 TO NODE   2113.00 IS CODE =  10
------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE   2114.00 TO NODE   2114.10 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    424.80
  DOWNSTREAM ELEVATION(FEET) =    422.00
  ELEVATION DIFFERENCE(FEET) =      2.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.200
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.027
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.46

******************************************************************************
  FLOW PROCESS FROM NODE   2114.10 TO NODE   2115.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  422.00  DOWNSTREAM ELEVATION(FEET) =  418.90
  STREET LENGTH(FEET) =   100.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.15
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   6.73
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.615
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    2.17
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       2.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.92
  FLOW VELOCITY(FEET/SEC.) =  3.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2115.00 =   190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2115.00 TO NODE   2116.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  418.90  DOWNSTREAM ELEVATION(FEET) =  396.20
  STREET LENGTH(FEET) =   590.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.64
  STREET FLOW TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   8.83
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.390
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    7.65
  TOTAL AREA(ACRES) =      2.70        PEAK FLOW RATE(CFS) =       9.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.35
  FLOW VELOCITY(FEET/SEC.) =  5.17   DEPTH*VELOCITY(FT*FT/SEC.) =   2.03
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2116.00 =   780.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2116.00 TO NODE   2117.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   390.00  DOWNSTREAM(FEET) =   389.50
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.53
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.83
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   8.91
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2117.00 =   815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2117.00 TO NODE   2117.00 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.) =   8.91
  RAINFALL INTENSITY(INCH/HR) =   6.35
  TOTAL STREAM AREA(ACRES) =     2.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.83

****************************************************************************
  FLOW PROCESS FROM NODE   2118.00 TO NODE   2118.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    425.60
  DOWNSTREAM ELEVATION(FEET) =    423.60
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.287
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.955
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE   2118.10 TO NODE   2119.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  423.60  DOWNSTREAM ELEVATION(FEET) =  419.60
  STREET LENGTH(FEET) =   167.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   1.01   Tc(MIN.) =   7.30
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.224
```

```
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     1.65
  TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS) =       2.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.51
  FLOW VELOCITY(FEET/SEC.) =  3.02   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
  LONGEST FLOWPATH FROM NODE   2118.00 TO NODE   2119.00 =   247.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2119.00 TO NODE   2117.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  419.60  DOWNSTREAM ELEVATION(FEET) =  396.20
  STREET LENGTH(FEET) =   469.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.36
  STREET FLOW TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   8.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.314
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     1.00      SUBAREA RUNOFF(CFS) =     3.60
  TOTAL AREA(ACRES) =       1.50        PEAK FLOW RATE(CFS) =       5.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.85
  FLOW VELOCITY(FEET/SEC.) =  4.96   DEPTH*VELOCITY(FT*FT/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE   2118.00 TO NODE   2117.00 =   716.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2117.00 TO NODE   2117.00 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.) =   8.99
  RAINFALL INTENSITY(INCH/HR) =   6.31
  TOTAL STREAM AREA(ACRES) =     1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.40

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         9.83     8.91        6.354         2.70
```

```
    2        5.40     8.99        6.314          1.50

  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       15.18     8.91       6.354
     2       15.17     8.99       6.314

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     15.18   Tc(MIN.) =    8.91
  TOTAL AREA(ACRES) =      4.20
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2117.00 =   815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2117.00 TO NODE  21171.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   390.00  DOWNSTREAM(FEET) =   380.00
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     15.18
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   9.47
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE  21171.00 =  1175.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  21171.00 TO NODE  21171.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2120.00 TO NODE   2120.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    447.20
  DOWNSTREAM ELEVATION(FEET) =    442.00
  ELEVATION DIFFERENCE(FEET) =      5.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.189
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2120.10 TO NODE   2121.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  442.00  DOWNSTREAM ELEVATION(FEET) =  422.00
  STREET LENGTH(FEET) =   344.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.40
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.13
  STREET FLOW TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =   3.49
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    3.21
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       4.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.33
  FLOW VELOCITY(FEET/SEC.) =  4.94   DEPTH*VELOCITY(FT*FT/SEC.) =   1.45
  LONGEST FLOWPATH FROM NODE   2120.00 TO NODE   2121.00 =   434.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2121.00 TO NODE   2122.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  422.00  DOWNSTREAM ELEVATION(FEET) =  395.00
  STREET LENGTH(FEET) =   405.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.76
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.02
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   4.61
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.649
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    7.36
  TOTAL AREA(ACRES) =      1.90        PEAK FLOW RATE(CFS) =      11.37

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.64
  FLOW VELOCITY(FEET/SEC.) =  6.62   DEPTH*VELOCITY(FT*FT/SEC.) =   2.51
  LONGEST FLOWPATH FROM NODE   2120.00 TO NODE   2122.00 =   839.00 FEET.

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

```
  FLOW PROCESS FROM NODE   2122.00 TO NODE   2123.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    395.00  DOWNSTREAM(FEET) =    394.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0100
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     11.37
  FLOW VELOCITY(FEET/SEC.) =   3.90   FLOW DEPTH(FEET) =   0.49
  TRAVEL TIME(MIN.) =   0.21   Tc(MIN.) =   4.83
  LONGEST FLOWPATH FROM NODE   2120.00 TO NODE   2123.00 =   889.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2123.00 TO NODE   2123.00 IS CODE =   1
-------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
===============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   4.83
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     1.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.37

****************************************************************************
  FLOW PROCESS FROM NODE   2124.00 TO NODE   2124.10 IS CODE =  21
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    422.80
  DOWNSTREAM ELEVATION(FEET) =    420.20
  ELEVATION DIFFERENCE(FEET) =      2.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.355
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.900
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE   2124.10 TO NODE   2125.00 IS CODE =  62
-------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
===============================================================================
  UPSTREAM ELEVATION(FEET) =  420.20  DOWNSTREAM ELEVATION(FEET) =  418.10
  STREET LENGTH(FEET) =    72.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.88
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =   6.78
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.576
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.86
  TOTAL AREA(ACRES) =       0.30        PEAK FLOW RATE(CFS) =       1.30

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.63
  FLOW VELOCITY(FEET/SEC.) =  2.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.71
  LONGEST FLOWPATH FROM NODE   2124.00 TO NODE   2125.00 =   162.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2125.00 TO NODE   2123.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  418.10  DOWNSTREAM ELEVATION(FEET) =  394.50
  STREET LENGTH(FEET) =   314.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.17
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.37
  STREET FLOW TRAVEL TIME(MIN.) =   1.01   Tc(MIN.) =   7.80
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.925
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =     0.90      SUBAREA RUNOFF(CFS) =     3.55
  TOTAL AREA(ACRES) =       1.20        PEAK FLOW RATE(CFS) =       4.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.48
  FLOW VELOCITY(FEET/SEC.) =  5.66   DEPTH*VELOCITY(FT*FT/SEC.) =   1.67
  LONGEST FLOWPATH FROM NODE   2124.00 TO NODE   2123.00 =   476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2123.00 TO NODE   2123.00 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.) =   7.80
  RAINFALL INTENSITY(INCH/HR) =   6.92
  TOTAL STREAM AREA(ACRES) =     1.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.74

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
```

```
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        11.37      4.83         9.222          1.90
     2         4.74      7.80         6.925          1.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1        14.30      4.83        9.222
     2        13.28      7.80        6.925

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     14.30   Tc(MIN.) =    4.83
  TOTAL AREA(ACRES) =      3.10
  LONGEST FLOWPATH FROM NODE   2120.00 TO NODE   2123.00 =   889.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2123.00 TO NODE  21171.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  394.50  DOWNSTREAM ELEVATION(FEET) =  386.00
  STREET LENGTH(FEET) =   235.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   15.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.63
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.51
  STREET FLOW TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   5.52
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.649
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.634
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.50
  TOTAL AREA(ACRES) =      3.30        PEAK FLOW RATE(CFS) =      18.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.21
  FLOW VELOCITY(FEET/SEC.) =  5.87   DEPTH*VELOCITY(FT*FT/SEC.) =   2.76
  LONGEST FLOWPATH FROM NODE   2120.00 TO NODE  21171.00 =  1124.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  21171.00 TO NODE  21171.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
     1        18.08     5.52        8.649        3.30
  LONGEST FLOWPATH FROM NODE   2120.00 TO NODE  21171.00 =  1124.00 FEET.
```

```
** MEMORY BANK #  3 CONFLUENCE DATA **
STREAM     RUNOFF     Tc      INTENSITY     AREA
NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
    1       15.18     9.47       6.108        4.20
LONGEST FLOWPATH FROM NODE   2114.00 TO NODE  21171.00 =  1175.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc      INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1      26.94       5.52        8.649
    2      27.95       9.47        6.108

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     27.95   Tc(MIN.) =    9.47
TOTAL AREA(ACRES) =      7.50

****************************************************************************
FLOW PROCESS FROM NODE  21171.00 TO NODE  21171.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE   2123.00 TO NODE  21171.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.108
RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  87
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5926
SUBAREA AREA(ACRES) =    1.80   SUBAREA RUNOFF(CFS) =    6.27
TOTAL AREA(ACRES) =      9.30   TOTAL RUNOFF(CFS) =   33.66
TC(MIN.) =   9.47

****************************************************************************
FLOW PROCESS FROM NODE  21171.00 TO NODE   2128.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   380.00  DOWNSTREAM(FEET) =   372.00
FLOW LENGTH(FEET) =   283.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  13.05
ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     33.66
PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   9.83
LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2128.00 =  1458.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2128.00 TO NODE   2128.00 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.) =   9.83
RAINFALL INTENSITY(INCH/HR) =   5.96
TOTAL STREAM AREA(ACRES) =     9.30
PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.66

****************************************************************************
FLOW PROCESS FROM NODE   2129.00 TO NODE   2129.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    420.00
  DOWNSTREAM ELEVATION(FEET) =    408.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.428
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.53

******************************************************************************
  FLOW PROCESS FROM NODE   2129.10 TO NODE   2130.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  408.30  DOWNSTREAM ELEVATION(FEET) =  394.20
  STREET LENGTH(FEET) =   120.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    3.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.47
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.07
  STREET FLOW TRAVEL TIME(MIN.) =   0.37   Tc(MIN.) =   4.79
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.58
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       2.10

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   4.97
  FLOW VELOCITY(FEET/SEC.) =  5.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE   2129.00 TO NODE   2130.00 =   220.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2130.00 TO NODE   2131.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  394.20  DOWNSTREAM ELEVATION(FEET) =  385.00
  STREET LENGTH(FEET) =   303.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.54
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.32   Tc(MIN.) =   6.11
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.103
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    3.70
  TOTAL AREA(ACRES) =      1.20        PEAK FLOW RATE(CFS) =       5.54

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.07
  FLOW VELOCITY(FEET/SEC.) =  4.13   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
  LONGEST FLOWPATH FROM NODE   2129.00 TO NODE   2131.00 =   523.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2131.00 TO NODE   2128.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  385.00  DOWNSTREAM ELEVATION(FEET) =  379.00
  STREET LENGTH(FEET) =   220.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.83
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.48
  STREET FLOW TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =   7.01
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.417
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.613
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.29
  TOTAL AREA(ACRES) =      1.40        PEAK FLOW RATE(CFS) =       6.36

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.98
  FLOW VELOCITY(FEET/SEC.) =  4.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE   2129.00 TO NODE   2128.00 =   743.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2128.00 TO NODE   2128.00 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.) =   7.01
  RAINFALL INTENSITY(INCH/HR) =   7.42
  TOTAL STREAM AREA(ACRES) =     1.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.36

****************************************************************************
  FLOW PROCESS FROM NODE   2132.00 TO NODE   2132.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    397.00
  DOWNSTREAM ELEVATION(FEET) =    395.40
  ELEVATION DIFFERENCE(FEET) =      1.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.773
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.582
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE   2132.10 TO NODE   2133.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  395.40  DOWNSTREAM ELEVATION(FEET) =  393.80
  STREET LENGTH(FEET) =    80.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.26
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =   7.36
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.185
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.41
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.81
  FLOW VELOCITY(FEET/SEC.) =  2.34   DEPTH*VELOCITY(FT*FT/SEC.) =   0.52
  LONGEST FLOWPATH FROM NODE   2132.00 TO NODE   2133.00 =   160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2133.00 TO NODE   2134.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  393.80  DOWNSTREAM ELEVATION(FEET) =  378.40
  STREET LENGTH(FEET) =   481.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =   9.51
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.093
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    4.86
  TOTAL AREA(ACRES) =      1.60        PEAK FLOW RATE(CFS) =       5.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.97
  FLOW VELOCITY(FEET/SEC.) =  4.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.45
  LONGEST FLOWPATH FROM NODE   2132.00 TO NODE   2134.00 =   641.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2134.00 TO NODE   2128.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.00  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.56
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   9.58
  LONGEST FLOWPATH FROM NODE   2132.00 TO NODE   2128.00 =   677.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2128.00 TO NODE   2128.00 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.) =   9.58
  RAINFALL INTENSITY(INCH/HR) =   6.06
  TOTAL STREAM AREA(ACRES) =     1.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.56

****************************************************************************
  FLOW PROCESS FROM NODE   2136.00 TO NODE   2136.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    422.60
  DOWNSTREAM ELEVATION(FEET) =    417.90
  ELEVATION DIFFERENCE(FEET) =      4.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.264
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2136.10 TO NODE   2137.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  417.90  DOWNSTREAM ELEVATION(FEET) =  396.00
  STREET LENGTH(FEET) =   422.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.02
  STREET FLOW TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   3.98
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    2.41
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       3.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.72
  FLOW VELOCITY(FEET/SEC.) =  4.50   DEPTH*VELOCITY(FT*FT/SEC.) =   1.26
  LONGEST FLOWPATH FROM NODE   2136.00 TO NODE   2137.00 =   512.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2137.00 TO NODE   2128.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  396.00  DOWNSTREAM ELEVATION(FEET) =  379.00
  STREET LENGTH(FEET) =   586.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.67
  STREET FLOW TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   6.21
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.020
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.622
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    8.69
  TOTAL AREA(ACRES) =      2.30        PEAK FLOW RATE(CFS) =      11.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.03
  FLOW VELOCITY(FEET/SEC.) =  4.83   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE   2136.00 TO NODE   2128.00 =  1098.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2128.00 TO NODE   2128.00 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.) =   6.21
  RAINFALL INTENSITY(INCH/HR) =   8.02
  TOTAL STREAM AREA(ACRES) =     2.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.48

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       33.66     9.83        5.962         9.30
      2        6.36     7.01        7.417         1.40
      3        5.56     9.58        6.063         1.60
      4       11.48     6.21        8.020         2.30

  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       41.97     6.21       8.020
      2       45.04     7.01       7.417
      3       52.23     9.58       6.063
      4       52.77     9.83       5.962

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     52.77   Tc(MIN.) =    9.83
  TOTAL AREA(ACRES) =     14.60
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2128.00 =  1458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2128.00 TO NODE   2135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   350.00
  FLOW LENGTH(FEET) =   427.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.60
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     52.77
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  10.21
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2135.00 =  1885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2135.00 TO NODE   2135.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2140.00 TO NODE   2140.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    391.10
  DOWNSTREAM ELEVATION(FEET) =    387.80
  ELEVATION DIFFERENCE(FEET) =      3.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.309
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE   2140.10 TO NODE   2141.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  387.80  DOWNSTREAM ELEVATION(FEET) =  381.40
  STREET LENGTH(FEET) =   159.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.18
    HALFSTREET FLOOD WIDTH(FEET) =    2.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.58
  STREET FLOW TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   3.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.05      SUBAREA RUNOFF(CFS) =    0.40
  TOTAL AREA(ACRES) =      0.10        PEAK FLOW RATE(CFS) =       0.80
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   3.66
  FLOW VELOCITY(FEET/SEC.) =  3.18   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
  LONGEST FLOWPATH FROM NODE   2140.00 TO NODE   2141.00 =   239.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2141.00 TO NODE   2141.00 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.) =   3.12
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     0.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2142.00 TO NODE   2143.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    384.00
  DOWNSTREAM ELEVATION(FEET) =    382.70
  ELEVATION DIFFERENCE(FEET) =      1.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.494
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.791
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE   2143.00 TO NODE   2141.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  382.70  DOWNSTREAM ELEVATION(FEET) =  381.40
  STREET LENGTH(FEET) =   119.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.72
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
  STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   7.46
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.122
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    2.03
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       2.44
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.70
  FLOW VELOCITY(FEET/SEC.) =  2.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE   2142.00 TO NODE   2141.00 =   189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2141.00 TO NODE   2141.00 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.) =   7.46
  RAINFALL INTENSITY(INCH/HR) =   7.12
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.44

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        0.80     3.12        9.222          0.10
     2        2.44     7.46        7.122          0.60

  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        1.82     3.12       9.222
     2        3.06     7.46       7.122

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      3.06   Tc(MIN.) =    7.46
  TOTAL AREA(ACRES) =      0.70
  LONGEST FLOWPATH FROM NODE   2140.00 TO NODE   2141.00 =   239.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2141.00 TO NODE   2144.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    381.40  DOWNSTREAM(FEET) =    381.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0080
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.06
  FLOW VELOCITY(FEET/SEC.) =   2.56   FLOW DEPTH(FEET) =   0.32
  TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =   7.79
  LONGEST FLOWPATH FROM NODE   2140.00 TO NODE   2144.00 =   289.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2144.00 TO NODE   2144.00 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.) =   7.79
  RAINFALL INTENSITY(INCH/HR) =   6.93
  TOTAL STREAM AREA(ACRES) =     0.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.06

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2145.10 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    383.70
  DOWNSTREAM ELEVATION(FEET) =    382.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.087
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.364
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

******************************************************************************
  FLOW PROCESS FROM NODE   2145.10 TO NODE   2146.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  382.70  DOWNSTREAM ELEVATION(FEET) =  381.70
  STREET LENGTH(FEET) =    66.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.63
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.43
  STREET FLOW TRAVEL TIME(MIN.) =   0.55   Tc(MIN.) =   7.64
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.018
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.585
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.42
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.23
  FLOW VELOCITY(FEET/SEC.) =  2.10   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
  LONGEST FLOWPATH FROM NODE   2145.00 TO NODE   2146.00 =   136.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2146.00 TO NODE   2144.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  381.70  DOWNSTREAM ELEVATION(FEET) =  381.00
  STREET LENGTH(FEET) =   119.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.54
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.53
  STREET FLOW TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =   8.81
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.398
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.574
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.82
  TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       2.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.32
  FLOW VELOCITY(FEET/SEC.) =  1.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
  LONGEST FLOWPATH FROM NODE   2145.00 TO NODE   2144.00 =   255.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2144.00 TO NODE   2144.00 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.) =   8.81
  RAINFALL INTENSITY(INCH/HR) =   6.40
  TOTAL STREAM AREA(ACRES) =     0.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.57

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.06     7.79        6.929         0.70
      2        2.57     8.81        6.398         0.70

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.33     7.79       6.929
      2        5.39     8.81       6.398

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      5.39   Tc(MIN.) =    8.81
  TOTAL AREA(ACRES) =      1.40
  LONGEST FLOWPATH FROM NODE   2140.00 TO NODE   2144.00 =   289.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2144.00 TO NODE   2139.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  381.00  DOWNSTREAM ELEVATION(FEET) =  376.60
  STREET LENGTH(FEET) =   139.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
```

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.55   Tc(MIN.) =   9.36
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.153
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.612
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.54
  TOTAL AREA(ACRES) =      1.50        PEAK FLOW RATE(CFS) =       5.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.07
  FLOW VELOCITY(FEET/SEC.) =  4.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.46
  LONGEST FLOWPATH FROM NODE   2140.00 TO NODE   2139.00 =   428.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2139.00 TO NODE   2135.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  376.60  DOWNSTREAM ELEVATION(FEET) =  357.00
  STREET LENGTH(FEET) =   367.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.12
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.92
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.87
  STREET FLOW TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =  10.49
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.719
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.596
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.93
  TOTAL AREA(ACRES) =      2.40        PEAK FLOW RATE(CFS) =       8.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.58
  FLOW VELOCITY(FEET/SEC.) =  5.61   DEPTH*VELOCITY(FT*FT/SEC.) =   2.01
  LONGEST FLOWPATH FROM NODE   2140.00 TO NODE   2135.00 =   795.00 FEET.

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

```
  FLOW PROCESS FROM NODE   2135.00 TO NODE   2135.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        8.18    10.49       5.719        2.40
  LONGEST FLOWPATH FROM NODE   2140.00 TO NODE   2135.00 =   795.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       52.77    10.21       5.817       14.60
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2135.00 =  1885.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      60.74      10.21        5.817
     2      60.06      10.49        5.719

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     60.74   Tc(MIN.) =   10.21
  TOTAL AREA(ACRES) =     17.00

****************************************************************************
  FLOW PROCESS FROM NODE   2135.00 TO NODE   2135.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2139.00 TO NODE   2135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.817
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5941
  SUBAREA AREA(ACRES) =    1.80   SUBAREA RUNOFF(CFS) =    5.97
  TOTAL AREA(ACRES) =     18.80   TOTAL RUNOFF(CFS) =   64.97
  TC(MIN.) =  10.21

****************************************************************************
  FLOW PROCESS FROM NODE   2135.00 TO NODE   2149.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   350.00  DOWNSTREAM(FEET) =   349.30
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.00
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     64.97
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  10.31
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2149.00 =  1945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2149.00 TO NODE   2149.00 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.) =  10.31
  RAINFALL INTENSITY(INCH/HR) =   5.78
  TOTAL STREAM AREA(ACRES) =    18.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     64.97

****************************************************************************
  FLOW PROCESS FROM NODE   2150.00 TO NODE   2150.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    380.40
  DOWNSTREAM ELEVATION(FEET) =    377.40
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.059
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.147
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE   2150.10 TO NODE   2151.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  377.40  DOWNSTREAM ELEVATION(FEET) =  376.30
  STREET LENGTH(FEET) =    45.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    3.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.52
  STREET FLOW TRAVEL TIME(MIN.) =   0.30   Tc(MIN.) =   6.36
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.900
  RESIDENTAIL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.585
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.47
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.86
  FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.58
  LONGEST FLOWPATH FROM NODE   2150.00 TO NODE   2151.00 =   135.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2151.00 TO NODE   2149.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =  376.30  DOWNSTREAM ELEVATION(FEET) =  357.00
  STREET LENGTH(FEET) =   433.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   1.63   Tc(MIN.) =   7.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.816
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.572
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    5.83
  TOTAL AREA(ACRES) =      1.70        PEAK FLOW RATE(CFS) =       6.62

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.02
  FLOW VELOCITY(FEET/SEC.) =  4.97   DEPTH*VELOCITY(FT*FT/SEC.) =   1.72
  LONGEST FLOWPATH FROM NODE   2150.00 TO NODE   2149.00 =   568.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2149.00 TO NODE   2149.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.99
  RAINFALL INTENSITY(INCH/HR) =   6.82
  TOTAL STREAM AREA(ACRES) =     1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.62

****************************************************************************
  FLOW PROCESS FROM NODE   2153.00 TO NODE   2153.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    391.50
  DOWNSTREAM ELEVATION(FEET) =    388.70
  ELEVATION DIFFERENCE(FEET) =      2.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.200
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.027
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE   2153.10 TO NODE   2154.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =  388.70  DOWNSTREAM ELEVATION(FEET) =  386.30
  STREET LENGTH(FEET) =    76.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.12
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.68
  STREET FLOW TRAVEL TIME(MIN.) =   0.42   Tc(MIN.) =   6.62
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.694
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.32
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.50
  FLOW VELOCITY(FEET/SEC.) =  3.25   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
  LONGEST FLOWPATH FROM NODE   2153.00 TO NODE   2154.00 =   166.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2154.00 TO NODE   2149.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  386.30  DOWNSTREAM ELEVATION(FEET) =  357.00
  STREET LENGTH(FEET) =   727.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.58
  STREET FLOW TRAVEL TIME(MIN.) =   2.60   Tc(MIN.) =   9.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.215
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    8.15
  TOTAL AREA(ACRES) =      2.70        PEAK FLOW RATE(CFS) =       9.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.05
  FLOW VELOCITY(FEET/SEC.) =  5.25   DEPTH*VELOCITY(FT*FT/SEC.) =   2.03
  LONGEST FLOWPATH FROM NODE   2153.00 TO NODE   2149.00 =   893.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2149.00 TO NODE   2149.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.22
  RAINFALL INTENSITY(INCH/HR) =   6.21
  TOTAL STREAM AREA(ACRES) =     2.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.56

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       64.97    10.31        5.784         18.80
     2        6.62     7.99        6.816          1.70
     3        9.56     9.22        6.215          2.70

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       65.28     7.99       6.816
     2       73.73     9.22       6.215
     3       79.49    10.31       5.784

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     79.49   Tc(MIN.) =   10.31
  TOTAL AREA(ACRES) =     23.20
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2149.00 =  1945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2149.00 TO NODE   2155.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   349.30  DOWNSTREAM(FEET) =   330.50
  FLOW LENGTH(FEET) =   147.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.01
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     79.49
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  10.39
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2155.00 =  2092.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2155.00 TO NODE   2155.00 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.) =  10.39
  RAINFALL INTENSITY(INCH/HR) =   5.75
  TOTAL STREAM AREA(ACRES) =    23.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     79.49

****************************************************************************
  FLOW PROCESS FROM NODE   2156.00 TO NODE   2157.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    396.20
  DOWNSTREAM ELEVATION(FEET) =    391.00
  ELEVATION DIFFERENCE(FEET) =      5.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.189
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2157.00 TO NODE   2155.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  391.00  DOWNSTREAM ELEVATION(FEET) =  336.00
  STREET LENGTH(FEET) =   967.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.73
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.51
  STREET FLOW TRAVEL TIME(MIN.) =   3.22   Tc(MIN.) =   5.41
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.765
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.590
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    6.99
  TOTAL AREA(ACRES) =      1.50        PEAK FLOW RATE(CFS) =       7.76

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.17
  FLOW VELOCITY(FEET/SEC.) =  5.68   DEPTH*VELOCITY(FT*FT/SEC.) =   1.99
  LONGEST FLOWPATH FROM NODE   2156.00 TO NODE   2155.00 =  1057.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2155.00 TO NODE   2155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.41
  RAINFALL INTENSITY(INCH/HR) =   8.76
  TOTAL STREAM AREA(ACRES) =     1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.76
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       79.49    10.39        5.753         23.20
     2        7.76     5.41        8.765          1.50

  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       59.94     5.41       8.765
     2       84.58    10.39       5.753

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     84.58   Tc(MIN.) =   10.39
  TOTAL AREA(ACRES) =     24.70
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2155.00 =  2092.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2155.00 TO NODE   2113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   330.50  DOWNSTREAM(FEET) =   330.00
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.17
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     84.58
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  10.44
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2113.00 =  2131.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2113.00 TO NODE   2113.00 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       84.58    10.44       5.734       24.70
  LONGEST FLOWPATH FROM NODE   2114.00 TO NODE   2113.00 =  2131.50 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      323.52    13.15       4.942      169.30
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2113.00 =  4767.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     341.51      10.44        5.734
     2     396.42      13.15        4.942

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    396.42   Tc(MIN.) =   13.15
  TOTAL AREA(ACRES) =    194.00

****************************************************************************
  FLOW PROCESS FROM NODE   2113.00 TO NODE   2113.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2113.00 TO NODE   2158.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   330.00  DOWNSTREAM(FEET) =   311.50
  FLOW LENGTH(FEET) =   447.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.00
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    396.42
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =  13.42
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2158.00 =  5214.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2158.00 TO NODE   2158.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2159.00 TO NODE   2160.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    62.00
  UPSTREAM ELEVATION(FEET) =    337.00
  DOWNSTREAM ELEVATION(FEET) =    336.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.064
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.283
  SUBAREA RUNOFF(CFS) =      0.66
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
  FLOW PROCESS FROM NODE   2160.00 TO NODE   2161.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =    328.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   656.00   CHANNEL SLOPE =  0.0122
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.719
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.16
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   5.06
  Tc(MIN.) =  14.13
  SUBAREA AREA(ACRES) =     4.00       SUBAREA RUNOFF(CFS) =    6.61
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      4.30         PEAK FLOW RATE(CFS) =       7.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   2.57
  LONGEST FLOWPATH FROM NODE   2159.00 TO NODE   2161.00 =   718.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2161.00 TO NODE   2162.00 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) =   313.00
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.55
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.10
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  14.23
  LONGEST FLOWPATH FROM NODE   2159.00 TO NODE   2162.00 =   801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2162.00 TO NODE   2162.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.23
  RAINFALL INTENSITY(INCH/HR) =   4.70
  TOTAL STREAM AREA(ACRES) =     4.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.10

****************************************************************************
  FLOW PROCESS FROM NODE   2163.00 TO NODE   2163.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    349.00
  DOWNSTREAM ELEVATION(FEET) =    347.30
  ELEVATION DIFFERENCE(FEET) =      1.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.577
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2163.10 TO NODE   2164.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  347.30  DOWNSTREAM ELEVATION(FEET) =  340.00
  STREET LENGTH(FEET) =   301.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =   4.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    4.01
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       4.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.92
  FLOW VELOCITY(FEET/SEC.) =  3.68   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE   2163.00 TO NODE   2164.00 =   371.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2164.00 TO NODE   2162.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  340.00  DOWNSTREAM ELEVATION(FEET) =  319.00
  STREET LENGTH(FEET) =   627.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.13
  STREET FLOW TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =   6.17
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.052
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =   13.31
  TOTAL AREA(ACRES) =      2.50        PEAK FLOW RATE(CFS) =      17.51

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.26
  FLOW VELOCITY(FEET/SEC.) =  5.65   DEPTH*VELOCITY(FT*FT/SEC.) =   2.67
  LONGEST FLOWPATH FROM NODE   2163.00 TO NODE   2162.00 =   998.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2162.00 TO NODE   2162.00 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.) =   6.17
  RAINFALL INTENSITY(INCH/HR) =   8.05
  TOTAL STREAM AREA(ACRES) =     2.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.51

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         7.10    14.23        4.697         4.30
     2        17.51     6.17        8.052         2.50

  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        20.59     6.17       8.052
     2        17.32    14.23       4.697

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     20.59   Tc(MIN.) =    6.17
  TOTAL AREA(ACRES) =      6.80
  LONGEST FLOWPATH FROM NODE   2163.00 TO NODE   2162.00 =   998.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2162.00 TO NODE   2158.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   313.00  DOWNSTREAM(FEET) =   311.50
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.81
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.59
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   6.24
  LONGEST FLOWPATH FROM NODE   2163.00 TO NODE   2158.00 =  1050.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2158.00 TO NODE   2158.00 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        20.59     6.24       7.991         6.80
  LONGEST FLOWPATH FROM NODE   2163.00 TO NODE   2158.00 =  1050.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       396.42    13.42       4.879       194.00
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2158.00 =  5214.30 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       205.06     6.24       7.991
     2       409.00    13.42       4.879

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    409.00   Tc(MIN.) =   13.42
  TOTAL AREA(ACRES) =    200.80

****************************************************************************
  FLOW PROCESS FROM NODE   2158.00 TO NODE   2158.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2158.00 TO NODE    258.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   311.50  DOWNSTREAM(FEET) =   311.00
  FLOW LENGTH(FEET) =    88.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  65.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.21
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    409.00
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  13.53
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    258.00 =  5302.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    258.00 TO NODE    258.00 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      409.00    13.53       4.853      200.80
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE    258.00 =  5302.30 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      147.35    10.25       5.805       33.00
  LONGEST FLOWPATH FROM NODE    241.00 TO NODE    258.00 =  4120.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     457.18      10.25        5.805
     2     532.18      13.53        4.853

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    532.18   Tc(MIN.) =   13.53
  TOTAL AREA(ACRES) =    233.80

****************************************************************************
  FLOW PROCESS FROM NODE    258.00 TO NODE    258.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    258.00 TO NODE   2165.00 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) =   306.00
  FLOW LENGTH(FEET) =   552.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.01
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    532.18
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =  14.07
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2165.00 =  5854.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2165.00 TO NODE   2165.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.07
  RAINFALL INTENSITY(INCH/HR) =   4.73
  TOTAL STREAM AREA(ACRES) =   233.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    532.18

****************************************************************************
  FLOW PROCESS FROM NODE   2166.00 TO NODE   2167.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  95
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    324.00
  DOWNSTREAM ELEVATION(FEET) =    323.30
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.708
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.76
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
  FLOW PROCESS FROM NODE   2167.00 TO NODE   2168.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    323.30  DOWNSTREAM(FEET) =    313.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   582.00   CHANNEL SLOPE =  0.0177
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.915
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  95
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     15.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.22
  AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   1.56
  Tc(MIN.) =   5.27
  SUBAREA AREA(ACRES) =     3.90       SUBAREA RUNOFF(CFS) =   28.51
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  TOTAL AREA(ACRES) =      4.00         PEAK FLOW RATE(CFS) =      29.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   7.52
  LONGEST FLOWPATH FROM NODE   2166.00 TO NODE   2168.00 =   642.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2168.00 TO NODE   2165.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   308.00  DOWNSTREAM(FEET) =   306.00
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.39
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.24
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   5.47
  LONGEST FLOWPATH FROM NODE   2166.00 TO NODE   2165.00 =   766.00 FEET.

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

```
  FLOW PROCESS FROM NODE   2165.00 TO NODE   2165.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.47
  RAINFALL INTENSITY(INCH/HR) =   8.70
  TOTAL STREAM AREA(ACRES) =     4.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.24

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      532.18    14.07        4.732        233.80
     2       29.24     5.47        8.705          4.00

  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      236.07     5.47       8.705
     2      548.08    14.07       4.732

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    548.08   Tc(MIN.) =   14.07
  TOTAL AREA(ACRES) =    237.80
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2165.00 =  5854.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2165.00 TO NODE   2169.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   306.00  DOWNSTREAM(FEET) =   303.20
  FLOW LENGTH(FEET) =   372.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  87.0 INCH PIPE IS  67.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.91
  ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    548.08
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =  14.46
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2169.00 =  6226.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2169.00 TO NODE   2169.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.46
  RAINFALL INTENSITY(INCH/HR) =   4.65
  TOTAL STREAM AREA(ACRES) =   237.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    548.08

****************************************************************************
  FLOW PROCESS FROM NODE   2170.00 TO NODE   2170.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
```

```
  UPSTREAM ELEVATION(FEET) =    335.80
  DOWNSTREAM ELEVATION(FEET) =    332.70
  ELEVATION DIFFERENCE(FEET) =      3.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.358
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2170.10 TO NODE   2171.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  332.70  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.26
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
  STREET FLOW TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   4.08
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    3.21
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       4.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.14
  FLOW VELOCITY(FEET/SEC.) =  4.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE   2170.00 TO NODE   2171.00 =   465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2171.00 TO NODE   2172.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  318.00  DOWNSTREAM ELEVATION(FEET) =  308.80
  STREET LENGTH(FEET) =   921.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.13
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.45
  HALFSTREET FLOOD WIDTH(FEET) =   16.20
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.97
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.34
 STREET FLOW TRAVEL TIME(MIN.) =   5.17   Tc(MIN.) =   9.25
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.201
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    8.09
 TOTAL AREA(ACRES) =      2.00        PEAK FLOW RATE(CFS) =      10.79

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  3.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.54
 LONGEST FLOWPATH FROM NODE   2170.00 TO NODE   2172.00 =  1386.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2172.00 TO NODE   2169.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   304.00  DOWNSTREAM(FEET) =   303.20
 FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.79
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   9.45
 LONGEST FLOWPATH FROM NODE   2170.00 TO NODE   2169.00 =  1466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2169.00 TO NODE   2169.00 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.) =   9.45
 RAINFALL INTENSITY(INCH/HR) =   6.12
 TOTAL STREAM AREA(ACRES) =     2.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.79

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       548.08    14.46        4.649        237.80
    2        10.79     9.45        6.117          2.00

 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       427.30     9.45       6.117
    2       556.28    14.46       4.649

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    556.28   Tc(MIN.) =   14.46
 TOTAL AREA(ACRES) =    239.80
 LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2169.00 =  6226.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2169.00 TO NODE   2174.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   303.20  DOWNSTREAM(FEET) =   299.72
  FLOW LENGTH(FEET) =   348.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.86
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    556.28
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =  14.78
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2174.00 =  6574.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2174.00 TO NODE   2174.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2176.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6300
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    356.00
  DOWNSTREAM ELEVATION(FEET) =    354.10
  ELEVATION DIFFERENCE(FEET) =      1.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.672
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.502
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.54

****************************************************************************
  FLOW PROCESS FROM NODE   2176.00 TO NODE   2177.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    354.10  DOWNSTREAM(FEET) =    333.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1061.00   CHANNEL SLOPE =  0.0199
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.172
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6300
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     43.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.33
  AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   1.71
  Tc(MIN.) =   7.38
  SUBAREA AREA(ACRES) =    18.90       SUBAREA RUNOFF(CFS) =   85.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =     19.00         PEAK FLOW RATE(CFS) =      85.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.43   FLOW VELOCITY(FEET/SEC.) =  12.33
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2177.00 =  1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2177.00 TO NODE   2178.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   328.00  DOWNSTREAM(FEET) =   302.00
  FLOW LENGTH(FEET) =   291.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.17
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     85.85
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   7.58
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2178.00 =  1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2178.00 TO NODE   2178.00 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.) =   7.58
  RAINFALL INTENSITY(INCH/HR) =   7.05
  TOTAL STREAM AREA(ACRES) =    19.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     85.85

****************************************************************************
  FLOW PROCESS FROM NODE  21781.00 TO NODE   2179.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  95
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    316.00
  DOWNSTREAM ELEVATION(FEET) =    315.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.293
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.76
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
  FLOW PROCESS FROM NODE   2179.00 TO NODE   2180.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    308.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   488.00   CHANNEL SLOPE =  0.0143
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  95
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     14.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.02
  AVERAGE FLOW DEPTH(FEET) =   0.56   TRAVEL TIME(MIN.) =   1.35
  Tc(MIN.) =   4.64
  SUBAREA AREA(ACRES) =     3.60       SUBAREA RUNOFF(CFS) =   27.22
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  TOTAL AREA(ACRES) =      3.70         PEAK FLOW RATE(CFS) =      27.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   7.19
  LONGEST FLOWPATH FROM NODE  21781.00 TO NODE   2180.00 =   548.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2180.00 TO NODE   2178.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   303.00  DOWNSTREAM(FEET) =   302.00
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.04
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.98
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   4.80
  LONGEST FLOWPATH FROM NODE  21781.00 TO NODE   2178.00 =   633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2178.00 TO NODE   2178.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   4.80
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     3.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.98

****************************************************************************
  FLOW PROCESS FROM NODE  13010.00 TO NODE  13010.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.68   RAIN INTENSITY(INCH/HOUR) =  5.06
  TOTAL AREA(ACRES) =    79.20   TOTAL RUNOFF(CFS) =    140.24

****************************************************************************
  FLOW PROCESS FROM NODE  13010.00 TO NODE  13011.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    310.00  DOWNSTREAM(FEET) =    309.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0100
  CHANNEL FLOW THRU SUBAREA(CFS) =    140.24
  FLOW VELOCITY(FEET/SEC) =   5.26
  TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =  12.84
  LONGEST FLOWPATH FROM NODE   2153.00 TO NODE  13011.00 =   943.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13011.00 TO NODE   2178.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   303.00  DOWNSTREAM(FEET) =   302.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.73
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    140.24
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  12.97
  LONGEST FLOWPATH FROM NODE   2153.00 TO NODE   2178.00 =  1043.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2178.00 TO NODE   2178.00 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.) =  12.97
  RAINFALL INTENSITY(INCH/HR) =   4.99
  TOTAL STREAM AREA(ACRES) =    79.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    140.24

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       85.85     7.58        7.054         19.00
     2       27.98     4.80        9.222          3.70
     3      140.24    12.97        4.987         79.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      134.27     4.80       9.222
     2      189.16     7.58       7.054
     3      216.06    12.97       4.987

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    216.06   Tc(MIN.) =   12.97
  TOTAL AREA(ACRES) =    101.90
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2178.00 =  1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2178.00 TO NODE   2174.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   302.00  DOWNSTREAM(FEET) =   299.72
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.45
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    216.06
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  13.09
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2174.00 =  1556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2174.00 TO NODE   2174.00 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      216.06    13.09       4.957       101.90
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2174.00 =  1556.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      556.28    14.78       4.583       239.80
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2174.00 =  6574.30 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      708.54    13.09       4.957
```

```
    2     756.01      14.78        4.583

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    756.01   Tc(MIN.) =   14.78
  TOTAL AREA(ACRES) =    341.70

****************************************************************************
  FLOW PROCESS FROM NODE   2174.00 TO NODE   2174.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2174.00 TO NODE   2181.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   299.72  DOWNSTREAM(FEET) =   292.20
  FLOW LENGTH(FEET) =   748.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  72.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.23
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    756.01
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =  15.43
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2181.00 =  7322.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2181.00 TO NODE   2181.00 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.) =  15.43
  RAINFALL INTENSITY(INCH/HR) =   4.46
  TOTAL STREAM AREA(ACRES) =   341.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    756.01

****************************************************************************
  FLOW PROCESS FROM NODE   2182.00 TO NODE   2183.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    322.00
  DOWNSTREAM ELEVATION(FEET) =    320.50
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.556
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.65
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.65

****************************************************************************
  FLOW PROCESS FROM NODE   2183.00 TO NODE   2184.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    320.50  DOWNSTREAM(FEET) =    308.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   936.00   CHANNEL SLOPE =  0.0134
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.429
```

```
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.41
  AVERAGE FLOW DEPTH(FEET) =   0.61   TRAVEL TIME(MIN.) =   2.44
  Tc(MIN.) =   6.99
  SUBAREA AREA(ACRES) =     4.50       SUBAREA RUNOFF(CFS) =   23.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  TOTAL AREA(ACRES) =      4.60         PEAK FLOW RATE(CFS) =      24.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.86   FLOW VELOCITY(FEET/SEC.) =   7.62
  LONGEST FLOWPATH FROM NODE   2182.00 TO NODE   2184.00 =  1006.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2184.00 TO NODE   2181.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   303.00  DOWNSTREAM(FEET) =   292.20
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.59
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.26
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   7.10
  LONGEST FLOWPATH FROM NODE   2182.00 TO NODE   2181.00 =  1130.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2181.00 TO NODE   2181.00 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) =   7.35
  TOTAL STREAM AREA(ACRES) =     4.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.26

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       756.01    15.43        4.458        341.70
     2        24.26     7.10        7.354          4.60

  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       372.20     7.10       7.354
     2       770.72    15.43       4.458

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    770.72   Tc(MIN.) =   15.43
  TOTAL AREA(ACRES) =    346.30
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2181.00 =  7322.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2181.00 TO NODE   2185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   292.20  DOWNSTREAM(FEET) =   288.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.10
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    770.72
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  15.48
  LONGEST FLOWPATH FROM NODE   2601.00 TO NODE   2185.00 =  7422.30 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    346.30  TC(MIN.) =     15.48
  PEAK FLOW RATE(CFS)    =    770.72
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

SECTION 6D:
BASIN 500

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                              Analysis prepared by:

                               LANDMARK CONSULTING
                          9555 GENESEE AVENUE, SUITE 200
                               SAN DEIGO, CA 92121
                                TEL:  858-587-8070

 ************************** DESCRIPTION OF STUDY **************************
* CAMPUS PARK, BASIN 500                                                  *
* POST-DEVELOPMENT CONDITIONS                                             *
* 100-YEAR STORM                                                          *
 **************************************************************************

  FILE NAME: 614P5C.DAT
  TIME/DATE OF STUDY: 16:03 02/28/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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   18.0     13.0    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 =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    508.00 TO NODE    508.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    285.00
  DOWNSTREAM ELEVATION(FEET) =    284.55
  ELEVATION DIFFERENCE(FEET) =      0.45
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.032
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

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

```
  FLOW PROCESS FROM NODE    508.10 TO NODE    507.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  284.55  DOWNSTREAM ELEVATION(FEET) =  274.50
  STREET LENGTH(FEET) =  1116.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.38
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   16.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.33
  STREET FLOW TRAVEL TIME(MIN.) =   6.46   Tc(MIN.) =   9.49
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.099
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    2.80      SUBAREA RUNOFF(CFS) =   14.86
  TOTAL AREA(ACRES) =      2.90        PEAK FLOW RATE(CFS) =      15.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  3.01   DEPTH*VELOCITY(FT*FT/SEC.) =   1.46
  LONGEST FLOWPATH FROM NODE    508.00 TO NODE    507.00 =  1166.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    507.00 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.) =   9.49
  RAINFALL INTENSITY(INCH/HR) =   6.10
  TOTAL STREAM AREA(ACRES) =     2.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.39

****************************************************************************
  FLOW PROCESS FROM NODE  20003.00 TO NODE  20003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.57   RAIN INTENSITY(INCH/HOUR) =  5.37
  TOTAL AREA(ACRES) =    20.80   TOTAL RUNOFF(CFS) =     39.07

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM ANALYSIS IN SECTION 4                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  20003.00 TO NODE    507.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   269.60  DOWNSTREAM(FEET) =   269.00
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.61
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.07
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  11.64
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    507.00 =    42.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    507.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.64
  RAINFALL INTENSITY(INCH/HR) =   5.35
  TOTAL STREAM AREA(ACRES) =    20.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.07

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       15.39     9.49        6.099         2.90
     2       39.07    11.64        5.348        20.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       47.26     9.49       6.099
     2       52.56    11.64       5.348

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     52.56   Tc(MIN.) =   11.64
  TOTAL AREA(ACRES) =     23.70
  LONGEST FLOWPATH FROM NODE    508.00 TO NODE    507.00 =  1166.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    509.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   269.00  DOWNSTREAM(FEET) =   268.20
  FLOW LENGTH(FEET) =    76.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.23
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     52.56
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  11.76
  LONGEST FLOWPATH FROM NODE    508.00 TO NODE    509.00 =  1242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    509.00 TO NODE    509.00 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.) =  11.76
```

```
  RAINFALL INTENSITY(INCH/HR) =   5.31
  TOTAL STREAM AREA(ACRES) =    23.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     52.56

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    510.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    285.00
  DOWNSTREAM ELEVATION(FEET) =    284.55
  ELEVATION DIFFERENCE(FEET) =      0.45
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.032
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    510.10 TO NODE    509.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  284.55  DOWNSTREAM ELEVATION(FEET) =  274.50
  STREET LENGTH(FEET) =  1115.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.04
  STREET FLOW TRAVEL TIME(MIN.) =   7.24   Tc(MIN.) =  10.28
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.795
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =    8.57
  TOTAL AREA(ACRES) =      1.80        PEAK FLOW RATE(CFS) =       9.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.26
  FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.38
  LONGEST FLOWPATH FROM NODE    510.00 TO NODE    509.00 =  1165.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    509.00 TO NODE    509.00 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.) =  10.28
  RAINFALL INTENSITY(INCH/HR) =   5.79
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.07

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       52.56    11.76        5.312        23.70
      2        9.07    10.28        5.795         1.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       57.26    10.28       5.795
      2       60.88    11.76       5.312

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     60.88   Tc(MIN.) =   11.76
  TOTAL AREA(ACRES) =     25.50
  LONGEST FLOWPATH FROM NODE    508.00 TO NODE    509.00 =  1242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    509.00 TO NODE    511.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   268.20  DOWNSTREAM(FEET) =   267.90
  FLOW LENGTH(FEET) =   152.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.64
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     60.88
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  12.21
  LONGEST FLOWPATH FROM NODE    508.00 TO NODE    511.00 =  1394.00 FEET.

+--------------------------------------------------------------------------+
| FLOW DISCHARGES ONTO EXISTING NATURAL TERRAIN                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     25.50  TC(MIN.) =     12.21
  PEAK FLOW RATE(CFS)   =     60.88
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

SECTION 6E:
BASIN 300

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                          Analysis prepared by:

                           LANDMARK CONSULTING
                     9555 GENESEE AVENUE, SUITE 200
                           SAN DEIGO, CA 92121
                            TEL:  858-587-8070

 ************************* DESCRIPTION OF STUDY *************************
* CAMPUS PARK, BASIN 300                                                 *
* POST-DEVELOPMENT CONDITIONS                                            *
* 100-YEAR STORM                                                         *
 ************************************************************************

  FILE NAME: 614P3C.DAT
  TIME/DATE OF STUDY: 16:15 05/06/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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   18.0     13.0    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 =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   2181.00 TO NODE   2181.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  15.48   RAIN INTENSITY(INCH/HOUR) =  4.45
  TOTAL AREA(ACRES) =   346.30   TOTAL RUNOFF(CFS) =    770.72

+--------------------------------------------------------------------------+
| DATA PER BSIN 200 ANALYSIS IN THIS REPORT                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   2181.00 TO NODE    301.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   298.00  DOWNSTREAM(FEET) =   294.88
  FLOW LENGTH(FEET) =   311.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  73.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.22
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    770.72
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =  15.75
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    301.00 =   311.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 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.) =  15.75
  RAINFALL INTENSITY(INCH/HR) =   4.40
  TOTAL STREAM AREA(ACRES) =   346.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    770.72

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    312.70
  DOWNSTREAM ELEVATION(FEET) =    312.10
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.207
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  312.10  DOWNSTREAM ELEVATION(FEET) =  303.60
  STREET LENGTH(FEET) =   996.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.67
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   17.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.92
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.41
  STREET FLOW TRAVEL TIME(MIN.) =   5.69   Tc(MIN.) =   8.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.361
```

```
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =   17.71
  TOTAL AREA(ACRES) =       3.30        PEAK FLOW RATE(CFS) =      18.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  996.0 FT WITH ELEVATION-DROP =   8.5 FT, IS   25.7 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    304.00
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    304.00 =  1056.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    301.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   298.10  DOWNSTREAM(FEET) =   294.88
  FLOW LENGTH(FEET) =    76.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     18.26
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   8.99
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    301.00 =  1132.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 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.) =   8.99
  RAINFALL INTENSITY(INCH/HR) =   6.32
  TOTAL STREAM AREA(ACRES) =     3.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.26

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      770.72    15.75        4.399        346.30
     2       18.26     8.99        6.317          3.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      458.14     8.99       6.317
     2      783.44    15.75       4.399

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    783.44   Tc(MIN.) =   15.75
  TOTAL AREA(ACRES) =    349.60
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    301.00 =  1132.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    305.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   294.88  DOWNSTREAM(FEET) =   291.90
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  74.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.47
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    783.44
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =  16.00
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    305.00 =  1422.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 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.) =  16.00
  RAINFALL INTENSITY(INCH/HR) =   4.36
  TOTAL STREAM AREA(ACRES) =   349.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    783.44

****************************************************************************
  FLOW PROCESS FROM NODE  15002.00 TO NODE  15002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.71   RAIN INTENSITY(INCH/HOUR) =  6.01
  TOTAL AREA(ACRES) =     4.80   TOTAL RUNOFF(CFS) =     10.10

+---------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM ANALYSIS IN SECION 4 OF THIS REPORT                |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  15002.00 TO NODE    305.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   302.00  DOWNSTREAM(FEET) =   291.90
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.55
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.10
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   9.80
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    305.00 =  1222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 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.) =   9.80
  RAINFALL INTENSITY(INCH/HR) =   5.97
  TOTAL STREAM AREA(ACRES) =     4.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
```

```
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1       783.44     16.00         4.355         349.60
     2        10.10      9.80         5.974           4.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1       581.23      9.80        5.974
     2       790.80     16.00        4.355

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    790.80   Tc(MIN.) =   16.00
  TOTAL AREA(ACRES) =    354.40
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    305.00 =  1422.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   291.90  DOWNSTREAM(FEET) =   285.80
  FLOW LENGTH(FEET) =   610.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  75.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.21
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    790.80
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =  16.53
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    306.00 =  2032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.53
  RAINFALL INTENSITY(INCH/HR) =   4.26
  TOTAL STREAM AREA(ACRES) =   354.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    790.80

****************************************************************************
  FLOW PROCESS FROM NODE  16002.00 TO NODE  16002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.19   RAIN INTENSITY(INCH/HOUR) =  6.23
  TOTAL AREA(ACRES) =     4.20   TOTAL RUNOFF(CFS) =      9.15

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM ANALYSIS IN SECTION 4                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  16002.00 TO NODE    306.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   304.00  DOWNSTREAM(FEET) =   285.80
  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   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.18
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.15
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   9.28
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    306.00 =  1322.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.28
  RAINFALL INTENSITY(INCH/HR) =   6.19
  TOTAL STREAM AREA(ACRES) =     4.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.15

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      790.80    16.53        4.265        354.40
     2        9.15     9.28        6.190          4.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      554.03     9.28       6.190
     2      797.11    16.53       4.265

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    797.11   Tc(MIN.) =   16.53
  TOTAL AREA(ACRES) =    358.60
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    306.00 =  2032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   285.80  DOWNSTREAM(FEET) =   283.50
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  73.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.68
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    797.11
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  16.68
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    307.00 =  2222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =  16.68
  RAINFALL INTENSITY(INCH/HR) =   4.24
  TOTAL STREAM AREA(ACRES) =   358.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    797.11
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    300.00
  DOWNSTREAM ELEVATION(FEET) =    299.10
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.801
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    307.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  299.10  DOWNSTREAM ELEVATION(FEET) =  291.00
  STREET LENGTH(FEET) =   641.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   4.14   Tc(MIN.) =   6.94
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.465
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    4.55
  TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFS) =       5.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.90
  FLOW VELOCITY(FEET/SEC.) =  2.92   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =   701.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   6.94
  RAINFALL INTENSITY(INCH/HR) =   7.47
  TOTAL STREAM AREA(ACRES) =     0.80
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       797.11    16.68        4.239        358.60
     2         5.20     6.94        7.465          0.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       457.86     6.94       7.465
     2       800.06    16.68       4.239

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    800.06   Tc(MIN.) =   16.68
  TOTAL AREA(ACRES) =    359.40
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    307.00 =  2222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    311.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   283.10  DOWNSTREAM(FEET) =   281.90
  FLOW LENGTH(FEET) =   117.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  75.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.43
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    800.06
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  16.78
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    311.00 =  2339.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 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.) =  16.78
  RAINFALL INTENSITY(INCH/HR) =   4.22
  TOTAL STREAM AREA(ACRES) =   359.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    800.06

****************************************************************************
  FLOW PROCESS FROM NODE  17002.00 TO NODE  17002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.36   RAIN INTENSITY(INCH/HOUR) =  5.76
  TOTAL AREA(ACRES) =     2.00   TOTAL RUNOFF(CFS) =      4.04

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM ANALYSIS IN SECTION 4                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  17002.00 TO NODE    311.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   306.00  DOWNSTREAM(FEET) =   281.90
  FLOW LENGTH(FEET) =   112.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.04
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  10.48
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =   813.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 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.) =  10.48
  RAINFALL INTENSITY(INCH/HR) =   5.72
  TOTAL STREAM AREA(ACRES) =     2.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.04

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      800.06    16.78        4.223        359.40
     2        4.04    10.48        5.723          2.00

  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      594.42    10.48       5.723
     2      803.04    16.78       4.223

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    803.04   Tc(MIN.) =   16.78
  TOTAL AREA(ACRES) =    361.40
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    311.00 =  2339.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   281.90  DOWNSTREAM(FEET) =   275.50
  FLOW LENGTH(FEET) =   544.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  71.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.75
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    803.04
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  17.22
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    312.00 =  2884.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    312.00 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.) =  17.22
```

```
  RAINFALL INTENSITY(INCH/HR) =   4.15
  TOTAL STREAM AREA(ACRES) =   361.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    803.04

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    291.20
  DOWNSTREAM ELEVATION(FEET) =    289.80
  ELEVATION DIFFERENCE(FEET) =      1.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.418
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    315.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  289.80  DOWNSTREAM ELEVATION(FEET) =  284.00
  STREET LENGTH(FEET) =   566.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   13.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.63
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.02
  STREET FLOW TRAVEL TIME(MIN.) =   3.59   Tc(MIN.) =   6.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.195
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    7.84
  TOTAL AREA(ACRES) =      1.20        PEAK FLOW RATE(CFS) =       8.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.45
  FLOW VELOCITY(FEET/SEC.) =  3.03   DEPTH*VELOCITY(FT*FT/SEC.) =   1.38
  LONGEST FLOWPATH FROM NODE    313.00 TO NODE    315.00 =   626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    312.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   278.00  DOWNSTREAM(FEET) =   275.50
```

```
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.19
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.56
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   6.13
  LONGEST FLOWPATH FROM NODE    313.00 TO NODE    312.00 =   700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    312.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.13
  RAINFALL INTENSITY(INCH/HR) =   8.09
  TOTAL STREAM AREA(ACRES) =     1.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.56

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    291.20
  DOWNSTREAM ELEVATION(FEET) =    289.00
  ELEVATION DIFFERENCE(FEET) =      2.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.365
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    312.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  289.00  DOWNSTREAM ELEVATION(FEET) =  284.00
  STREET LENGTH(FEET) =   566.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.26
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   4.17   Tc(MIN.) =   6.54
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.757
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =     0.70      SUBAREA RUNOFF(CFS) =     4.72
  TOTAL AREA(ACRES) =       0.80        PEAK FLOW RATE(CFS) =       5.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.12
  FLOW VELOCITY(FEET/SEC.) =  2.56   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    312.00 =   636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    312.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.54
  RAINFALL INTENSITY(INCH/HR) =   7.76
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.40

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      803.04    17.22        4.154        361.40
     2        8.56     6.13        8.090          1.20
     3        5.40     6.54        7.757          0.80

  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      425.91     6.13       8.090
     2      443.60     6.54       7.757
     3      810.32    17.22       4.154

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    810.32   Tc(MIN.) =   17.22
  TOTAL AREA(ACRES) =    363.40
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    312.00 =  2884.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    318.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   275.10  DOWNSTREAM(FEET) =   269.50
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  45.16
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    810.32
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  17.24
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    318.00 =  2944.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    318.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.24
```

```
  RAINFALL INTENSITY(INCH/HR) =   4.15
  TOTAL STREAM AREA(ACRES) =   363.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    810.32

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    300.00
  DOWNSTREAM ELEVATION(FEET) =    299.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.903
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      3.27
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      3.27

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    321.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    299.00  DOWNSTREAM(FEET) =    287.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1417.00   CHANNEL SLOPE =  0.0085
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.821
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     25.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.46
  AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   5.30
  Tc(MIN.) =  10.20
  SUBAREA AREA(ACRES) =    10.20       SUBAREA RUNOFF(CFS) =   42.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  TOTAL AREA(ACRES) =     10.70         PEAK FLOW RATE(CFS) =      44.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.85   FLOW VELOCITY(FEET/SEC.) =   5.10
  LONGEST FLOWPATH FROM NODE    319.00 TO NODE    321.00 =  1482.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    318.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   281.00  DOWNSTREAM(FEET) =   269.50
  FLOW LENGTH(FEET) =   118.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.19
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     44.22
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  10.29
  LONGEST FLOWPATH FROM NODE    319.00 TO NODE    318.00 =  1600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    318.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.29
  RAINFALL INTENSITY(INCH/HR) =   5.79
  TOTAL STREAM AREA(ACRES) =    10.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     44.22

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      810.32    17.24        4.150        363.40
     2       44.22    10.29        5.789         10.70

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      625.14    10.29       5.789
     2      842.03    17.24       4.150

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    842.03   Tc(MIN.) =   17.24
  TOTAL AREA(ACRES) =    374.10
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    318.00 =  2944.20 FEET.

+----------------------------------------------------------------------------+
| FLOW ENTERS PROPOSED DETENTION BASIN                                       |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    322.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    269.50  DOWNSTREAM(FEET) =    263.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   520.00   CHANNEL SLOPE =  0.0125
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.992
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    843.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.10
  AVERAGE FLOW DEPTH(FEET) =   1.93   TRAVEL TIME(MIN.) =   1.07
  Tc(MIN.) =  18.31
  SUBAREA AREA(ACRES) =     2.20       SUBAREA RUNOFF(CFS) =    3.07
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.507
  TOTAL AREA(ACRES) =    376.30         PEAK FLOW RATE(CFS) =     842.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.93   FLOW VELOCITY(FEET/SEC.) =   8.11
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    322.00 =  3464.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    323.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   263.00  DOWNSTREAM(FEET) =   262.70
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  96.0 INCH PIPE IS  76.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.62
  ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    842.03
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  18.34
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    323.00 =  3494.20 FEET.

+----------------------------------------------------------------------+
| FLOW ENTERS HORSE RANCH CREEK FLOOD PLAIN                            |
| SEE PONDPACK ANALYSIS                                                |
|                                                                      |
+----------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  18009.00 TO NODE  18009.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  14.10   RAIN INTENSITY(INCH/HOUR) =  4.72
  TOTAL AREA(ACRES) =   102.80   TOTAL RUNOFF(CFS) =    169.97

+----------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM ANALYSIS IN SECTION 4                         |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  18009.00 TO NODE    324.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   274.00  DOWNSTREAM(FEET) =   271.00
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.38
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    169.97
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  14.27
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    324.00 =  3664.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    345.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    271.00  DOWNSTREAM(FEET) =    264.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00   CHANNEL SLOPE =  0.0113
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.205
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    172.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.94
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   2.62
  Tc(MIN.) =  16.90
  SUBAREA AREA(ACRES) =     4.00       SUBAREA RUNOFF(CFS) =    5.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =    106.80         PEAK FLOW RATE(CFS) =     169.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.74   FLOW VELOCITY(FEET/SEC.) =   3.92
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    345.00 =  4284.20 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE  19003.00 TO NODE  19003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.86   RAIN INTENSITY(INCH/HOUR) =  5.95
  TOTAL AREA(ACRES) =    12.70   TOTAL RUNOFF(CFS) =     31.03

+---------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM ANALYSIS IN SECTION 4                              |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  19003.00 TO NODE    338.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   278.00  DOWNSTREAM(FEET) =   269.00
  FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     31.03
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   9.91
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    338.00 =  4357.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    338.00 TO NODE    338.00 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.) =   9.91
  RAINFALL INTENSITY(INCH/HR) =   5.93
  TOTAL STREAM AREA(ACRES) =    12.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.03

****************************************************************************
  FLOW PROCESS FROM NODE    339.00 TO NODE    340.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    284.40
  DOWNSTREAM ELEVATION(FEET) =    283.80
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.755
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

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

```
  FLOW PROCESS FROM NODE    340.00 TO NODE    338.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  283.80  DOWNSTREAM ELEVATION(FEET) =  276.40
  STREET LENGTH(FEET) =   170.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
    HALFSTREET FLOOD WIDTH(FEET) =   15.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.67
  STREET FLOW TRAVEL TIME(MIN.) =   0.47   Tc(MIN.) =   3.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =   29.68
  TOTAL AREA(ACRES) =      3.80        PEAK FLOW RATE(CFS) =      30.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  6.62   DEPTH*VELOCITY(FT*FT/SEC.) =   3.22
  LONGEST FLOWPATH FROM NODE    339.00 TO NODE    338.00 =   220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    338.00 TO NODE    338.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   3.22
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     3.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     30.49

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       31.03     9.91        5.930         12.70
     2       30.49     3.22        9.222          3.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       40.57     3.22       9.222
     2       50.63     9.91       5.930

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =     50.63   Tc(MIN.) =    9.91
  TOTAL AREA(ACRES) =     16.50
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    338.00 =  4357.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    338.00 TO NODE    341.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   269.00  DOWNSTREAM(FEET) =   268.20
  FLOW LENGTH(FEET) =    78.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.01
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     50.63
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  10.05
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    341.00 =  4435.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    341.00 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.) =  10.05
  RAINFALL INTENSITY(INCH/HR) =   5.88
  TOTAL STREAM AREA(ACRES) =    16.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     50.63

****************************************************************************
  FLOW PROCESS FROM NODE    342.00 TO NODE    343.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    284.40
  DOWNSTREAM ELEVATION(FEET) =    283.80
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.755
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    341.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  283.80  DOWNSTREAM ELEVATION(FEET) =  276.40
  STREET LENGTH(FEET) =   170.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   11.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.89
  STREET FLOW TRAVEL TIME(MIN.) =   0.55   Tc(MIN.) =   3.30
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =   14.44
  TOTAL AREA(ACRES) =      1.90        PEAK FLOW RATE(CFS) =      15.24

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.54
  FLOW VELOCITY(FEET/SEC.) =  6.02   DEPTH*VELOCITY(FT*FT/SEC.) =   2.63
  LONGEST FLOWPATH FROM NODE    342.00 TO NODE    341.00 =   220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    341.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   3.30
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     1.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.24

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       50.63    10.05        5.880        16.50
      2       15.24     3.30        9.222         1.90

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       47.53     3.30       9.222
      2       60.35    10.05       5.880

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     60.35   Tc(MIN.) =   10.05
  TOTAL AREA(ACRES) =     18.40
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    341.00 =  4435.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    344.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   267.80  DOWNSTREAM(FEET) =   265.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.60
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     60.35
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  10.08
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    344.00 =  4475.90 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    344.00 TO NODE    345.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    265.00  DOWNSTREAM(FEET) =    264.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   115.00   CHANNEL SLOPE =  0.0087
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     60.35
  FLOW VELOCITY(FEET/SEC.) =   2.84   FLOW DEPTH(FEET) =   0.58
  TRAVEL TIME(MIN.) =   0.67   Tc(MIN.) =  10.75
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    345.00 =  4590.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.00 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       60.35    10.75       5.628       18.40
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    345.00 =  4590.90 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      169.97    16.90       4.205      106.80
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    345.00 =  4284.20 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     168.50      10.75        5.628
     2     215.06      16.90        4.205

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    215.06   Tc(MIN.) =   16.90
  TOTAL AREA(ACRES) =    125.20

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    264.00  DOWNSTREAM(FEET) =    262.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0034
  CHANNEL BASE(FEET) =  100.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.679
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    217.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.39
  AVERAGE FLOW DEPTH(FEET) =   0.83   TRAVEL TIME(MIN.) =   3.89
  Tc(MIN.) =  20.78
```

```
  SUBAREA AREA(ACRES) =     3.60       SUBAREA RUNOFF(CFS) =    4.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.379
  TOTAL AREA(ACRES) =    128.80         PEAK FLOW RATE(CFS) =     215.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.82   FLOW VELOCITY(FEET/SEC.) =   2.39
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    345.10 =  5148.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.10 TO NODE    349.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   262.10  DOWNSTREAM(FEET) =   262.00
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  51.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.79
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    215.06
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  20.82
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    349.10 =  5168.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    349.10 TO NODE    349.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    346.00 TO NODE    347.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    278.50
  DOWNSTREAM ELEVATION(FEET) =    277.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.363
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    347.00 TO NODE    348.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  277.00  DOWNSTREAM ELEVATION(FEET) =  269.30
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   2.52   Tc(MIN.) =   4.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    2.41
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       3.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.70
  FLOW VELOCITY(FEET/SEC.) =  3.03   DEPTH*VELOCITY(FT*FT/SEC.) =   0.97
  LONGEST FLOWPATH FROM NODE    346.00 TO NODE    348.00 =   472.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    348.00 TO NODE    349.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   269.30  DOWNSTREAM(FEET) =   263.40
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.21
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   4.94
  LONGEST FLOWPATH FROM NODE    346.00 TO NODE    349.00 =   512.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    349.00 TO NODE    349.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   4.94
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.21

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    351.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    278.50
  DOWNSTREAM ELEVATION(FEET) =    277.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.363
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    351.00 TO NODE    349.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
UPSTREAM ELEVATION(FEET) =  277.00  DOWNSTREAM ELEVATION(FEET) =  269.30
STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.01
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.28
  HALFSTREET FLOOD WIDTH(FEET) =    7.87
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.72
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
STREET FLOW TRAVEL TIME(MIN.) =   2.52   Tc(MIN.) =   4.89
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  98
AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    2.41
TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       3.21

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.70
FLOW VELOCITY(FEET/SEC.) =  3.03   DEPTH*VELOCITY(FT*FT/SEC.) =   0.97
LONGEST FLOWPATH FROM NODE    350.00 TO NODE    349.00 =   472.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    349.00 TO NODE    349.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   4.89
RAINFALL INTENSITY(INCH/HR) =   9.22
TOTAL STREAM AREA(ACRES) =     0.40
PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.21

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        3.21     4.94        9.222         0.40
    2        3.21     4.89        9.222         0.40

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1        6.39     4.89       9.222
    2        6.42     4.94       9.222

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      6.42   Tc(MIN.) =    4.94
TOTAL AREA(ACRES) =      0.80
```

```
  LONGEST FLOWPATH FROM NODE    346.00 TO NODE    349.00 =   512.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    349.00 TO NODE    349.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   263.00  DOWNSTREAM(FEET) =   262.10
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.42
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   4.97
  LONGEST FLOWPATH FROM NODE    346.00 TO NODE    349.10 =   532.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    349.10 TO NODE    349.10 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        6.42     4.97       9.222        0.80
  LONGEST FLOWPATH FROM NODE    346.00 TO NODE    349.10 =   532.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      215.06    20.82       3.675      128.80
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    349.10 =  5168.90 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      57.76       4.97        9.222
     2     217.61      20.82        3.675

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    217.61   Tc(MIN.) =   20.82
  TOTAL AREA(ACRES) =    129.60

****************************************************************************
  FLOW PROCESS FROM NODE    349.10 TO NODE    349.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| FLOW ENTERS HORSE RANCH CREEK FLOOD PLAIN                                |
| SEE PONDPACK ANALYSIS                                                    |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    353.00 TO NODE    354.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6300
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    279.00
```

```
  DOWNSTREAM ELEVATION(FEET) =    278.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.553
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.745
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.49

****************************************************************************
  FLOW PROCESS FROM NODE    354.00 TO NODE    355.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    278.40  DOWNSTREAM(FEET) =    270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   840.00   CHANNEL SLOPE =  0.0100
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.052
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6300
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     21.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.59
  AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   3.05
  Tc(MIN.) =   9.61
  SUBAREA AREA(ACRES) =    11.10       SUBAREA RUNOFF(CFS) =   42.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.630
  TOTAL AREA(ACRES) =     11.20         PEAK FLOW RATE(CFS) =      42.71

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.81   FLOW VELOCITY(FEET/SEC.) =   5.40
  LONGEST FLOWPATH FROM NODE    353.00 TO NODE    355.00 =   900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    355.00 TO NODE    355.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   264.00  DOWNSTREAM(FEET) =   262.70
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.48
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     42.71
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   9.83
  LONGEST FLOWPATH FROM NODE    353.00 TO NODE    355.10 =  1030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    355.10 TO NODE    355.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    356.10 TO NODE    357.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    289.00
  DOWNSTREAM ELEVATION(FEET) =    287.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.147
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
```

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    357.10 TO NODE    358.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  287.00  DOWNSTREAM ELEVATION(FEET) =  267.00
  STREET LENGTH(FEET) =   854.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.29
  STREET FLOW TRAVEL TIME(MIN.) =   3.87   Tc(MIN.) =   6.01
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.188
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    8.55
  TOTAL AREA(ACRES) =      1.30        PEAK FLOW RATE(CFS) =       9.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.37
  FLOW VELOCITY(FEET/SEC.) =  4.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    356.10 TO NODE    358.00 =   914.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    358.00 TO NODE    355.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   263.45  DOWNSTREAM(FEET) =   262.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.26
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   6.21
  LONGEST FLOWPATH FROM NODE    356.10 TO NODE    355.10 =   989.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    355.10 TO NODE    355.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1         9.26     6.21       8.021        1.30
```

```
  LONGEST FLOWPATH FROM NODE    356.10 TO NODE    355.10 =   989.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       42.71     9.83       5.961       11.20
  LONGEST FLOWPATH FROM NODE    353.00 TO NODE    355.10 =  1030.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      36.22       6.21        8.021
     2      49.59       9.83        5.961

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     49.59   Tc(MIN.) =    9.83
  TOTAL AREA(ACRES) =     12.50

****************************************************************************
  FLOW PROCESS FROM NODE    355.10 TO NODE    355.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    355.10 TO NODE    355.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   262.70  DOWNSTREAM(FEET) =   262.10
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.63
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.59
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   9.94
  LONGEST FLOWPATH FROM NODE    353.00 TO NODE    355.20 =  1090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    355.20 TO NODE    355.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.94
  RAINFALL INTENSITY(INCH/HR) =   5.92
  TOTAL STREAM AREA(ACRES) =    12.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.59

****************************************************************************
  FLOW PROCESS FROM NODE    355.30 TO NODE    355.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    289.00
  DOWNSTREAM ELEVATION(FEET) =    287.80
  ELEVATION DIFFERENCE(FEET) =      1.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.545
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    355.40 TO NODE    355.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  287.80  DOWNSTREAM ELEVATION(FEET) =  266.30
  STREET LENGTH(FEET) =   953.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   4.64   Tc(MIN.) =   7.19
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.296
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    6.35
  TOTAL AREA(ACRES) =      1.10        PEAK FLOW RATE(CFS) =       6.98

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.95
  FLOW VELOCITY(FEET/SEC.) =  3.89   DEPTH*VELOCITY(FT*FT/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE    355.30 TO NODE    355.20 =  1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    355.20 TO NODE    355.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.19
  RAINFALL INTENSITY(INCH/HR) =   7.30
  TOTAL STREAM AREA(ACRES) =     1.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.98

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       49.59     9.94        5.921         12.50
     2        6.98     7.19        7.296          1.10

  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       42.85     7.19       7.296
     2       55.25     9.94       5.921
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     55.25   Tc(MIN.) =    9.94
  TOTAL AREA(ACRES) =     13.60
  LONGEST FLOWPATH FROM NODE    353.00 TO NODE    355.20 =  1090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    355.20 TO NODE    355.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   266.30  DOWNSTREAM(FEET) =   266.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.91
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     55.25
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =  10.13
  LONGEST FLOWPATH FROM NODE    353.00 TO NODE    355.50 =  1170.00 FEET.

+--------------------------------------------------------------------------+
| FLOW ENTERS HORSE RANCH CREEK                                            |
| SEE PONDPACK ANALYSIS IN THIS REPORT                                     |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    356.00 TO NODE    357.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    318.00
  DOWNSTREAM ELEVATION(FEET) =    317.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.207
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    357.00 TO NODE    357.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  317.40  DOWNSTREAM ELEVATION(FEET) =  314.80
  STREET LENGTH(FEET) =   391.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.44
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.77
```

```
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
 STREET FLOW TRAVEL TIME(MIN.) =   3.67   Tc(MIN.) =   6.88
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.506
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.96
 TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       2.61

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.07
 FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
 LONGEST FLOWPATH FROM NODE    356.00 TO NODE    357.20 =   451.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    357.20 TO NODE    357.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   6.88
 RAINFALL INTENSITY(INCH/HR) =   7.51
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.61

****************************************************************************
 FLOW PROCESS FROM NODE    357.30 TO NODE    357.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
 UPSTREAM ELEVATION(FEET) =    318.00
 DOWNSTREAM ELEVATION(FEET) =    317.40
 ELEVATION DIFFERENCE(FEET) =      0.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.207
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.80
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
 FLOW PROCESS FROM NODE    357.40 TO NODE    357.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  317.40  DOWNSTREAM ELEVATION(FEET) =  314.80
 STREET LENGTH(FEET) =   391.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.79
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =    9.44
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
  STREET FLOW TRAVEL TIME(MIN.) =   3.67   Tc(MIN.) =   6.88
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.506
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.96
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       2.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.07
  FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
  LONGEST FLOWPATH FROM NODE    357.30 TO NODE    357.50 =   451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.50 TO NODE    357.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   308.80  DOWNSTREAM(FEET) =   308.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.61
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   6.99
  LONGEST FLOWPATH FROM NODE    357.30 TO NODE    357.20 =   491.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.20 TO NODE    357.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.99
  RAINFALL INTENSITY(INCH/HR) =   7.43
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        2.61     6.88        7.506          0.40
     2        2.61     6.99        7.430          0.40

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        5.18     6.88       7.506
     2        5.20     6.99       7.430

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      5.20   Tc(MIN.) =    6.99
  TOTAL AREA(ACRES) =      0.80
  LONGEST FLOWPATH FROM NODE    357.30 TO NODE    357.20 =   491.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   308.80  DOWNSTREAM(FEET) =   275.00
  FLOW LENGTH(FEET) =   104.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.20
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   7.08
  LONGEST FLOWPATH FROM NODE    357.30 TO NODE    336.00 =   595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   7.08
  RAINFALL INTENSITY(INCH/HR) =   7.37
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    334.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    319.00
  DOWNSTREAM ELEVATION(FEET) =    316.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.361
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.154
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    334.00 TO NODE    335.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    316.00  DOWNSTREAM(FEET) =    292.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   240.00   CHANNEL SLOPE =  0.1000
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.424
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.98
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.02
  Tc(MIN.) =  11.38
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    3.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      1.90         PEAK FLOW RATE(CFS) =       3.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.71
  LONGEST FLOWPATH FROM NODE    333.00 TO NODE    335.00 =   340.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   292.00  DOWNSTREAM(FEET) =   274.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.61
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =  11.68
  LONGEST FLOWPATH FROM NODE    333.00 TO NODE    336.00 =   540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.68
  RAINFALL INTENSITY(INCH/HR) =   5.34
  TOTAL STREAM AREA(ACRES) =     1.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        5.20     7.08        7.371          0.80
     2        3.61    11.68        5.336          1.90

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        7.38     7.08       7.371
     2        7.37    11.68       5.336

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      7.38   Tc(MIN.) =    7.08
  TOTAL AREA(ACRES) =      2.70
  LONGEST FLOWPATH FROM NODE    357.30 TO NODE    336.00 =   595.00 FEET.

+--------------------------------------------------------------------------+
| FLOW ENTERS HORSE RANCH CREEK FLOOD PLAIN                                |
| SEE PONDPACK ANALYSIS                                                    |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    357.60 TO NODE    357.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    314.80
  DOWNSTREAM ELEVATION(FEET) =    314.00
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.914
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.80
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
FLOW PROCESS FROM NODE    357.70 TO NODE    357.80 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  314.00  DOWNSTREAM ELEVATION(FEET) =  289.00
STREET LENGTH(FEET) =  1304.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.18
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.32
  HALFSTREET FLOOD WIDTH(FEET) =    9.65
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.04
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
STREET FLOW TRAVEL TIME(MIN.) =   7.16   Tc(MIN.) =  10.07
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.870
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  98
AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    4.60
TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =       5.11

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.78
FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.23
LONGEST FLOWPATH FROM NODE    357.60 TO NODE    357.80 =  1364.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    357.80 TO NODE    357.80 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  10.07
RAINFALL INTENSITY(INCH/HR) =   5.87
TOTAL STREAM AREA(ACRES) =     1.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.11

****************************************************************************
FLOW PROCESS FROM NODE    358.40 TO NODE    358.50 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  98
INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
UPSTREAM ELEVATION(FEET) =    314.80
DOWNSTREAM ELEVATION(FEET) =    314.00
ELEVATION DIFFERENCE(FEET) =      0.80
```

```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.914
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    358.50 TO NODE    358.60 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  314.00  DOWNSTREAM ELEVATION(FEET) =  289.00
  STREET LENGTH(FEET) =  1304.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
  STREET FLOW TRAVEL TIME(MIN.) =   7.16   Tc(MIN.) =  10.07
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.870
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    4.60
  TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =       5.11

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.78
  FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.23
  LONGEST FLOWPATH FROM NODE    358.40 TO NODE    358.60 =  1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    358.60 TO NODE    357.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   283.00  DOWNSTREAM(FEET) =   282.40
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.11
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  10.17
  LONGEST FLOWPATH FROM NODE    358.40 TO NODE    357.80 =  1404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.80 TO NODE    357.80 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.17
  RAINFALL INTENSITY(INCH/HR) =   5.83
  TOTAL STREAM AREA(ACRES) =     1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.11

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.11    10.07        5.870         1.00
      2        5.11    10.17        5.832         1.00

  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       10.16    10.07       5.870
      2       10.18    10.17       5.832

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     10.18   Tc(MIN.) =   10.17
  TOTAL AREA(ACRES) =      2.00
  LONGEST FLOWPATH FROM NODE    358.40 TO NODE    357.80 =  1404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.80 TO NODE    357.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   282.40  DOWNSTREAM(FEET) =   264.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.58
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.18
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  10.21
  LONGEST FLOWPATH FROM NODE    358.40 TO NODE    357.90 =  1459.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.90 TO NODE    357.90 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.) =  10.21
  RAINFALL INTENSITY(INCH/HR) =   5.82
  TOTAL STREAM AREA(ACRES) =     2.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.18

****************************************************************************
  FLOW PROCESS FROM NODE    359.10 TO NODE    359.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    304.10
  DOWNSTREAM ELEVATION(FEET) =    304.00
  ELEVATION DIFFERENCE(FEET) =      0.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   12.027
  WARNING: THE MINIMUM OVERLAND FLOW SLOPE, 0.5%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.235
SUBAREA RUNOFF(CFS) =      0.18
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
FLOW PROCESS FROM NODE    359.20 TO NODE    359.30 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    304.00  DOWNSTREAM(FEET) =    266.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   571.00   CHANNEL SLOPE =  0.0665
CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   6.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.227
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.55
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   4.73
Tc(MIN.) =  16.76
SUBAREA AREA(ACRES) =     4.50       SUBAREA RUNOFF(CFS) =    6.66
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =      4.60         PEAK FLOW RATE(CFS) =       6.81

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.51
LONGEST FLOWPATH FROM NODE    359.10 TO NODE    359.30 =   621.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    359.30 TO NODE    357.90 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   266.00  DOWNSTREAM(FEET) =   264.00
FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.79
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      6.81
PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =  17.13
LONGEST FLOWPATH FROM NODE    359.10 TO NODE    357.90 =   771.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    357.90 TO NODE    357.90 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.) =  17.13
RAINFALL INTENSITY(INCH/HR) =   4.17
TOTAL STREAM AREA(ACRES) =     4.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.81

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       10.18    10.21       5.819         2.00
    2        6.81    17.13       4.168         4.60

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       14.24    10.21       5.819
    2       14.10    17.13       4.168

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     14.24   Tc(MIN.) =   10.21
TOTAL AREA(ACRES) =      6.60
LONGEST FLOWPATH FROM NODE    358.40 TO NODE    357.90 =  1459.00 FEET.

+----------------------------------------------------------------------+
| FLOW ENTERS HORSE RANCH CREEK FLOOD PLAIN                            |
| SEE PONDPACK ANALYSIS                                                |
|                                                                      |
+----------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    366.00 TO NODE    367.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
UPSTREAM ELEVATION(FEET) =    319.00
DOWNSTREAM ELEVATION(FEET) =    318.00
ELEVATION DIFFERENCE(FEET) =      1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.029
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.886
SUBAREA RUNOFF(CFS) =      0.21
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
FLOW PROCESS FROM NODE    367.00 TO NODE    368.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    318.00  DOWNSTREAM(FEET) =    268.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1192.00   CHANNEL SLOPE =  0.0419
CHANNEL BASE(FEET) =   35.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.080
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  78
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.24
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.59
AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   7.67
Tc(MIN.) =  17.70
SUBAREA AREA(ACRES) =    16.20       SUBAREA RUNOFF(CFS) =   23.13
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =     16.30         PEAK FLOW RATE(CFS) =      23.28

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   3.34
LONGEST FLOWPATH FROM NODE    366.00 TO NODE    368.00 =  1262.00 FEET.

+----------------------------------------------------------------------+
| FLOW ENTERS HORSE RANCH CREEK FLOOD PLAIN                            |
| SEE PONDPACK ANALYSIS IN THIS REPORT                                 |
|                                                                      |
+----------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    370.00 TO NODE    371.00 IS CODE =  21
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  14003.00 TO NODE  14003.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  13.43   RAIN INTENSITY(INCH/HOUR) =  4.88
  TOTAL AREA(ACRES) =    18.20   TOTAL RUNOFF(CFS) =     31.05

+--------------------------------------------------------------------------+
| FLOW DATA PER UPSTREAM HYDROLOGY IN SECTION 4                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE  14003.00 TO NODE    326.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    287.00  DOWNSTREAM(FEET) =    286.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00   CHANNEL SLOPE =  0.0101
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.749
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     33.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.94
  AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   0.56
  Tc(MIN.) =  13.99
  SUBAREA AREA(ACRES) =     3.00       SUBAREA RUNOFF(CFS) =    4.99
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     21.20         PEAK FLOW RATE(CFS) =      35.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   2.99
  LONGEST FLOWPATH FROM NODE    370.00 TO NODE    326.00 =   301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   287.00  DOWNSTREAM(FEET) =   285.10
  FLOW LENGTH(FEET) =   186.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.05
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     35.23
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =  14.34
  LONGEST FLOWPATH FROM NODE    370.00 TO NODE    327.00 =   487.70 FEET.

+--------------------------------------------------------------------------+
| FLOW DISCHARGES ONTO HORSE RANCH CREEK FLOOD PLAIN                       |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LIMITED INDUSTRIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    274.50
  DOWNSTREAM ELEVATION(FEET) =    274.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.182
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE    371.00 TO NODE    372.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    274.00  DOWNSTREAM(FEET) =    272.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE =  0.0167
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.75
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  LIMITED INDUSTRIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.75
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.53
  Tc(MIN.) =   3.72
  SUBAREA AREA(ACRES) =     0.60       SUBAREA RUNOFF(CFS) =    4.70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  TOTAL AREA(ACRES) =      0.70         PEAK FLOW RATE(CFS) =       5.49

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   4.30
  LONGEST FLOWPATH FROM NODE    370.00 TO NODE    372.00 =   170.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    372.00 TO NODE    373.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   266.00  DOWNSTREAM(FEET) =   263.50
  FLOW LENGTH(FEET) =    32.00   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.) =  12.25
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.49
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   3.76
  LONGEST FLOWPATH FROM NODE    370.00 TO NODE    373.00 =   202.00 FEET.

+--------------------------------------------------------------------------+
| FLOW DISCHARGES INTO EX. HORSE RANCH CREEK                               |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
```

```
  TOTAL AREA(ACRES)      =     21.20  TC(MIN.) =     14.34
  PEAK FLOW RATE(CFS)    =     35.23
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

SECTION 6F:
POST-DEVELOPMENT CONDITIONS - HYDROLOGY MAP (ON-SITE)

RATIONAL HYDROLOGY MAP FOR:

CAMPUS PARK – POST-DEVELOPMENT

SUB-BASIN AREA TABLE

UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
BASIN 100		
3007	101	7.8
2003	106	9.3
1002	112	10.5
106	107	0.1
107	105	7.3
108	108.1	0.1
108.1	109	0.5
109	110	1.1
110	123	0.1
121	121.1	0.1
121.1	122	0.6
122	123	1.4
119	119.1	0.1
119.1	120	0.2
120	116	2
131	131.1	0.1
131.1	132	0.4
132	133	1.9
134	134.1	0.1
134.1	135	0.3
135	133	1.9
137	137.1	0.1
137.1	138	0.8
138	139	1.7
139	136	0.2
141	141.1	0.1
141.1	142	0.3
142	143	1.4
1431	1431.1	0.1
1431.1	1432	0.3
1432	143	1.5
144	144.1	0.1
144.1	145	0.6
145	146	1.4
147	147.1	0.1
147.1	148	0.4
148	1481	1.5
1481	1482	0.2
1482	146	1.1
149	149.1	0.1
149.1	150	0.3
150	151	0.7
152	152.1	0.1
152.1	153	0.2
153	154	0.4
154	155	0.8
162	162.1	0.1
162.1	163	0.1
163	161	0.8
161	155	2.1
165	165.1	0.1
165.1	166	0.2
166	164	3.9
155.1	173	1.9
173	169	2.1
167	167.1	0.1
167.1	168	1
169	170	3.2
BASIN 400		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
5007	401	0.1
6006	401	0.1
401	402	4
4003	402	13.5
403	403.1	0.1
403.1	404	9.3
404	402	2.9
BASIN 200		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
206	206.1	0.1
206.1	207	0.8
207	208	2.2
218	218.1	0.2
218.1	219	0.5
219	220	1.8
220	215	0.5
209	209.1	0.2
209.1	210	0.8
210	215	3.6
222	222.1	0.1
222.1	223	0.4
223	224	1.8
225	225.1	0.2
225.1	226	0.7
226	227	1.9
228	228.1	0.1
228.1	229	0.3
229	227	1.3
221	230	1
232	232.1	0.1
232.1	233	0.1
233	234	1.7
235	235.1	0.1
235.1	234	0.8
237	237.1	0.1
237.1	238	0.6
238	236	0.6
239	239.1	0.1
239.1	240	2.1
241	241.1	0.1
241.1	242	0.5
242	236	1.8
244	244.1	0.1
244.1	245	0.5
245	243	1.8
246	246.1	0.1
246.1	247	0.3
247	248	1.3
248	249	0.5
251	251.1	0.1
251	252	1.4
252	253	6.8
2541	2541.1	0.1
2501	2501.1	0.1
2501.1	250	0.6
256	256.1	0.1
256.1	257	3.2
259	259.1	0.1
259.1	260	13.1
2601	2601.1	0.1
2601.1	2602	0.5
2602	260	1.2
262	262.1	0.1
262.1	261	0.2
2631	2631.1	0.1
2631.1	263	0.2
264	264.1	0.1
264.1	265	1.6
2661	2661.1	0.1
2661.1	266	0.2
270	271.1	0.1
271.1	271	0.2
271	269	2.4
272	272.1	0.1
272.1	273	0.4
273	274	2.1
276	276.1	0.1
276.1	277	0.2
277	278	4.3
284	284.1	0.1
284.1	285	0.2
285	286	0.4
286	287	0.3
288	288.1	0.1
288.1	289	0.1
289	290	0.1
290	287	1.5
292	292.1	0.1
292.1	293	0.2
293	291	1.3
294	294.1	0.1
294.1	295	0.3
295	291	1
297	297.1	0.05
297.1	298	0.05
2981	2981.1	0.1
2981.1	2982	0.6
2982	2983	0.1
298	299	1.1
2101	2101.1	0.1
2101.1	2102	0.1
2102	2103	1.4
2104	2104.1	0.1
2104.1	2105	0.3
2105	2103	1.1
2108	2108.1	0.1
2108.1	2109	0.4
2110	2110.1	0.05
2110.1	2111	0.05
2111	2109	2.4
21121	21121.1	0.1
21121	21122	0.1
21122	21123	2.2
21123	2112	0.1
2112	2106	0.5
2106	2113	0.6
2114	2114.1	0.1
2114.1	2115	0.5
2115	2116	2.1
2118	2118.1	0.1
218.1	2119	0.4
2119	2117	1
2120	2120.1	0.1
2120.1	2121	0.4
2121	2122	1.4
2124	2124.1	0.1
2124.1	2125	0.2
2125	2123	0.9
2123	21171	2
2129	2129.1	0.1
2129.1	2130	0.3
2130	2131	0.8
2131	2128	0.2
2132	2132.1	0.1
2132.1	2133	0.1
2133	2134	1.4
2136	2136.1	0.1
2136.1	2137	0.3
2137	2128	1.9
2140	2141.1	0.05
2141.1	2141	0.05
2142	2143	0.1
2143	2141	0.5
2145	2145.1	0.1
2145.1	2146	0.1
2146	2144	0.5
2144	2139	0.1
2139	2135	2.7
2150	2150.1	0.1
2150.1	2151	0.1
2151	2149	1.5
2153	2153.1	0.1
2153.1	2154	0.3
2154	2149	2.3
2156	2157	0.1
2157	2155	1.4
2159	2160	0.3
2160	2161	4
2163	2163.1	0.1
2163.1	2164	0.5
2164	2162	1.9
2166	2167	0.1
2167	2168	3.9
2170	2170.1	0.1
2170.1	2171	0.4
2171	2172	1.5
2175	2176	0.1
2176	2177	18.9
21781	2179	0.1
2179	2180	3.6
2182	2183	0.1
2183	2184	4.5
BASIN 500		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
508	508.1	0.1
508.1	507	2.8
510	510.1	0.1
510.1	509	1.7
BASIN 300		
UPSTREAM NODE	DOWNSTREAM NODE	AREA (AC)
302	303	0.1
303	304	3.2
308	309	0.1
309	307	0.7
313	314	0.1
314	315	1.1
316	317	0.1
317	312	0.7
319	320	0.5
320	321	10.2
318	322	2.2
324	345	4
339	340	0.1
340	338	3.7
342	343	0.1
343	341	1.8
345	345.1	3.6
347	348	0.3
350	351	0.1
351	349	0.3
353	354	0.1
354	355	11.1
356.1	357.1	0.1
357.1	358	1.2
360	361	0.1
361	362	1.1
362	355.1	1.5
355.3	355.4	0.1
355.4	355.2	1
356	357	0.1
357	357.2	0.3
357.3	357.4	0.1
357.4	357.5	0.3
333	334	0.1
334	335	1.8
357.6	357.7	0.1
357.7	357.8	0.9
358.4	358.5	0.1
358.5	358.6	0.9
395.1	359.2	0.1
395.2	359.3	4.5
366	367	0.1
367	368	16.2
370	371	0.1
371	372	0.7

LANDMARK CONSULTING
PLANNING • ENGINEERING • SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

POST-DEVELOPMENT CONDITIONS

CAMPUS PARK

SECTION 7:
OFF-SITE INTERSECTIONS ANALYSIS

SECTION 7A:
OFF-SITE INTERSECTIONS
RATIONAL HYDROLOGY AND HYDRAULICS CALCULATIONS

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                          Analysis prepared by:

                           LANDMARK CONSULTING
                      9555 GENESEE AVENUE, SUITE 200
                           SAN DEIGO, CA 92121
                            TEL:  858-587-8070

 ************************** DESCRIPTION OF STUDY **************************
* CAMPUS PARK                                                              *
* OFFSITE INTERSECTIONS                                                    *
* 100-YEAR STORM                                                           *
 ***************************************************************************

  FILE NAME: 614OSI.DAT
  TIME/DATE OF STUDY: 16:17 05/06/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  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

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

+--------------------------------------------------------------------------+
| PALA ROAD AT I-15                                                        |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    300.60
  DOWNSTREAM ELEVATION(FEET) =    300.00
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.983
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.319
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    300.00  DOWNSTREAM(FEET) =    287.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   248.00   CHANNEL SLOPE =  0.0496
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.925
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.37
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.95
  Tc(MIN.) =   9.93
  SUBAREA AREA(ACRES) =     1.90       SUBAREA RUNOFF(CFS) =    7.99
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.692
  TOTAL AREA(ACRES) =      2.00         PEAK FLOW RATE(CFS) =       8.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   5.51
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =   298.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   287.70  DOWNSTREAM(FEET) =   286.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.33
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.20
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  10.04
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.00 =   358.00 FEET.

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

```
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    286.00  DOWNSTREAM(FEET) =    276.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   357.00   CHANNEL SLOPE =  0.0280
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.050
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.22
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   2.68
  Tc(MIN.) =  12.72
  SUBAREA AREA(ACRES) =     4.70       SUBAREA RUNOFF(CFS) =   16.85
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.705
  TOTAL AREA(ACRES) =      6.70         PEAK FLOW RATE(CFS) =      23.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   2.59
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =   715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   273.00  DOWNSTREAM(FEET) =   272.70
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.70
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.84
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  12.74
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    106.00 =   730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.74
  RAINFALL INTENSITY(INCH/HR) =   5.04
  TOTAL STREAM AREA(ACRES) =     6.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.84

+--------------------------------------------------------------------------+
| FLOW ENTERS EXISTING 24" GRATED INLET BOX                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    285.00
  DOWNSTREAM ELEVATION(FEET) =    284.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.546
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.077
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    284.50  DOWNSTREAM(FEET) =    275.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1620.00   CHANNEL SLOPE =  0.0056
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.130
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.57
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =  17.15
  Tc(MIN.) =  26.70
  SUBAREA AREA(ACRES) =     9.00       SUBAREA RUNOFF(CFS) =   20.00
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.706
  TOTAL AREA(ACRES) =      9.10         PEAK FLOW RATE(CFS) =      20.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   2.02
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    109.00 =  1670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   273.00  DOWNSTREAM(FEET) =   272.70
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.76
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.11
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  26.76
```

```
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =  1700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =  26.76
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =     9.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.11

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       23.84    12.74        5.044          6.70
     2       20.11    26.76        3.125          9.10

  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       33.42    12.74       5.044
     2       34.88    26.76       3.125

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     34.88   Tc(MIN.) =   26.76
  TOTAL AREA(ACRES) =     15.80
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =  1700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   272.70  DOWNSTREAM(FEET) =   270.24
  FLOW LENGTH(FEET) =   246.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.10
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.88
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =  27.13
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    110.00 =  1946.00 FEET.

+--------------------------------------------------------------------------+
| FLOWS CROSS I15 VIA EXISTING PIPE                                        |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
```

```
+----------------------------------------------------------------------------+
| EASTERLY RAMP                                                              |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    306.10
  DOWNSTREAM ELEVATION(FEET) =    305.70
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.347
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.831
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.63

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    305.70  DOWNSTREAM(FEET) =    277.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   530.00   CHANNEL SLOPE =  0.0532
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.440
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.62
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   3.38
  Tc(MIN.) =   8.72
  SUBAREA AREA(ACRES) =     2.40       SUBAREA RUNOFF(CFS) =   10.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  TOTAL AREA(ACRES) =      2.50         PEAK FLOW RATE(CFS) =      11.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   3.19
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    113.00 =   580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   276.00  DOWNSTREAM(FEET) =   272.10
  FLOW LENGTH(FEET) =   431.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.43
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =   9.81
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    114.00 =  1011.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    922.60
  DOWNSTREAM ELEVATION(FEET) =    920.00
  ELEVATION DIFFERENCE(FEET) =      2.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.510
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.661
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    920.00  DOWNSTREAM(FEET) =    415.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.5050
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.606
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.80
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   2.88
  Tc(MIN.) =   8.39
  SUBAREA AREA(ACRES) =     7.00       SUBAREA RUNOFF(CFS) =   16.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      7.10         PEAK FLOW RATE(CFS) =      16.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   7.51
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    117.00 =  1050.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    309.55
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2250.00   CHANNEL SLOPE =  0.0469
  CHANNEL BASE(FEET) =    3.50   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.468
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     39.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.12
  AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   2.86
  Tc(MIN.) =  11.24
  SUBAREA AREA(ACRES) =    23.90       SUBAREA RUNOFF(CFS) =   45.74
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =     31.00         PEAK FLOW RATE(CFS) =      59.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.79   FLOW VELOCITY(FEET/SEC.) =  14.77
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    118.00 =  3300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   309.55  DOWNSTREAM(FEET) =   308.20
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.024
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) = 887.92
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   3.50    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     59.33
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =  11.24
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    119.00 =  3327.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    380.00
  DOWNSTREAM ELEVATION(FEET) =    378.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.132
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.068
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  378.00  DOWNSTREAM ELEVATION(FEET) =  320.00
  STREET LENGTH(FEET) =  1850.00   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) =      33.82
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.59
    HALFSTREET FLOOD WIDTH(FEET) =   24.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.32
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.74
  STREET FLOW TRAVEL TIME(MIN.) =   4.88   Tc(MIN.) =  10.01
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.894
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  SUBAREA AREA(ACRES) =   23.90      SUBAREA RUNOFF(CFS) =   64.80
  TOTAL AREA(ACRES) =     24.00        PEAK FLOW RATE(CFS) =      65.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   HALFSTREET FLOOD WIDTH(FEET) =  31.58
  FLOW VELOCITY(FEET/SEC.) =  7.27   DEPTH*VELOCITY(FT*FT/SEC.) =   5.08
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1850.0 FT WITH ELEVATION-DROP =  58.0 FT, IS   75.7 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    122.00
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =  1900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   313.50  DOWNSTREAM(FEET) =   310.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.024
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.26
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     65.07
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  10.13
```

```
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =  2000.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 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.) =  10.13
  RAINFALL INTENSITY(INCH/HR) =   5.85
  TOTAL STREAM AREA(ACRES) =    24.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     65.07

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    322.00
  DOWNSTREAM ELEVATION(FEET) =    321.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.324
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    123.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  321.00  DOWNSTREAM ELEVATION(FEET) =  317.00
  STREET LENGTH(FEET) =   153.00   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) =       1.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   3.17
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.60
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       2.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.84
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE    124.00 TO NODE    123.00 =   203.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   3.17
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.41

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       65.07    10.13        5.847         24.00
     2        2.41     3.17        9.222          0.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       22.76     3.17       9.222
     2       66.60    10.13       5.847

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     66.60   Tc(MIN.) =   10.13
  TOTAL AREA(ACRES) =     24.30
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =  2000.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    119.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   310.00  DOWNSTREAM(FEET) =   308.20
  FLOW LENGTH(FEET) =   122.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.9 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.22
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     66.60
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  10.30
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    119.00 =  2122.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 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       66.60    10.30       5.786       24.30
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    119.00 =  2122.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       59.33    11.24       5.468       31.00
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    119.00 =  3327.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     120.95      10.30        5.786
     2     122.26      11.24        5.468

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    122.26   Tc(MIN.) =   11.24
  TOTAL AREA(ACRES) =     55.30

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    126.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   308.20  DOWNSTREAM(FEET) =   307.50
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.30
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    122.26
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  11.28
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    126.00 =  3367.00 FEET.

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

```
  FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   307.50  DOWNSTREAM(FEET) =   289.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.78
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    122.26
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =  11.77
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    127.00 =  3767.00 FEET.

+--------------------------------------------------------------------------+
| FLOW CROSSES I-15 VIA EXISTING STORM DRAIN                               |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    305.60
  DOWNSTREAM ELEVATION(FEET) =    305.20
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.153
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  305.20  DOWNSTREAM ELEVATION(FEET) =  299.10
  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 =  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) =       2.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   10.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   6.29   Tc(MIN.) =   9.44
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.119
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =     0.55      SUBAREA RUNOFF(CFS) =    2.93
  TOTAL AREA(ACRES) =      0.65        PEAK FLOW RATE(CFS) =       3.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.46
  FLOW VELOCITY(FEET/SEC.) =  2.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
  LONGEST FLOWPATH FROM NODE    128.00 TO NODE    130.00 =   806.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.44
  RAINFALL INTENSITY(INCH/HR) =   6.12
  TOTAL STREAM AREA(ACRES) =     0.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.46

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    30.00
  UPSTREAM ELEVATION(FEET) =    318.20
  DOWNSTREAM ELEVATION(FEET) =    315.00
  ELEVATION DIFFERENCE(FEET) =      3.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.432
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    301.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =  0.0700
CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.565
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.65
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.53
AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.17
Tc(MIN.) =   5.61
SUBAREA AREA(ACRES) =     0.90       SUBAREA RUNOFF(CFS) =    2.70
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =      1.00         PEAK FLOW RATE(CFS) =       3.00

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   1.94
LONGEST FLOWPATH FROM NODE    131.00 TO NODE    133.00 =   230.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    133.00 TO NODE    130.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  301.00  DOWNSTREAM ELEVATION(FEET) =  299.10
STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.77
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.48
  HALFSTREET FLOOD WIDTH(FEET) =   17.93
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.21
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.07
STREET FLOW TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =   8.22
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.694
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  88
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    7.50
TOTAL AREA(ACRES) =      4.20        PEAK FLOW RATE(CFS) =       9.84

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  20.82
FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
```

```
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    130.00 =   576.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.22
  RAINFALL INTENSITY(INCH/HR) =   6.69
  TOTAL STREAM AREA(ACRES) =     4.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.84

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         3.46     9.44        6.119          0.65
     2         9.84     8.22        6.694          4.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        12.85     8.22       6.694
     2        12.46     9.44       6.119

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     12.85   Tc(MIN.) =    8.22
  TOTAL AREA(ACRES) =      4.85
  LONGEST FLOWPATH FROM NODE    128.00 TO NODE    130.00 =   806.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    134.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  299.10  DOWNSTREAM ELEVATION(FEET) =  291.00
  STREET LENGTH(FEET) =   731.00   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) =      14.47
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.54
```

```
    HALFSTREET FLOOD WIDTH(FEET) =   21.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.88
  STREET FLOW TRAVEL TIME(MIN.) =   3.50   Tc(MIN.) =  11.71
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.326
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.476
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    3.24
  TOTAL AREA(ACRES) =      5.55        PEAK FLOW RATE(CFS) =      14.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  20.90
  FLOW VELOCITY(FEET/SEC.) =  3.44   DEPTH*VELOCITY(FT*FT/SEC.) =   1.84
  LONGEST FLOWPATH FROM NODE    128.00 TO NODE    134.00 =  1537.00 FEET.

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

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    136.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    20.00
  UPSTREAM ELEVATION(FEET) =    340.00
  DOWNSTREAM ELEVATION(FEET) =    330.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.803
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    330.00  DOWNSTREAM(FEET) =    294.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   118.00   CHANNEL SLOPE =  0.3008
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.36
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   0.83
  Tc(MIN.) =   3.64
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      0.20         PEAK FLOW RATE(CFS) =       0.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.43
  LONGEST FLOWPATH FROM NODE    135.00 TO NODE    137.00 =   138.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    138.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   291.56  DOWNSTREAM(FEET) =   288.22
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.25
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.65
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   4.10
  LONGEST FLOWPATH FROM NODE    135.00 TO NODE    138.00 =   229.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    138.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   4.10
  RAINFALL INTENSITY(INCH/HR) =   9.22
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.65

****************************************************************************
  FLOW PROCESS FROM NODE    139.00 TO NODE    140.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  95
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    313.50
  DOWNSTREAM ELEVATION(FEET) =    312.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.877
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.76
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.76
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    141.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    312.00  DOWNSTREAM(FEET) =    296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   309.00   CHANNEL SLOPE =  0.0518
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  95
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.30
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.56
  Tc(MIN.) =   4.44
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    3.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       3.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   3.95
  LONGEST FLOWPATH FROM NODE    139.00 TO NODE    141.00 =   369.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    138.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    296.00  DOWNSTREAM(FEET) =    290.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   395.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.354
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  95
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.74
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   1.39
  Tc(MIN.) =   5.83
  SUBAREA AREA(ACRES) =     1.90       SUBAREA RUNOFF(CFS) =   13.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  TOTAL AREA(ACRES) =      2.40         PEAK FLOW RATE(CFS) =      16.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   5.33
  LONGEST FLOWPATH FROM NODE    139.00 TO NODE    138.00 =   764.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    134.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   288.14  DOWNSTREAM(FEET) =   287.50
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.16
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.44
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   5.91
  LONGEST FLOWPATH FROM NODE    139.00 TO NODE    134.00 =   794.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================
***MEMORY FUNCTION CAN NOT BE ACCESSED - PROCESS IGNORED.***

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================
***MEMORY FUNCTION CAN NOT BE ACCESSED - PROCESS IGNORED.***

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    142.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   287.50  DOWNSTREAM(FEET) =   286.25
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.024
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.23
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.44
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   6.18
  LONGEST FLOWPATH FROM NODE    139.00 TO NODE    142.00 =   879.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 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.) =   6.18
  RAINFALL INTENSITY(INCH/HR) =   8.04
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.44

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    144.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
================================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    298.50
  DOWNSTREAM ELEVATION(FEET) =    297.30
  ELEVATION DIFFERENCE(FEET) =      1.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.545
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    142.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  297.30  DOWNSTREAM ELEVATION(FEET) =  280.63
  STREET LENGTH(FEET) =   588.00   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) =       3.68
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.59
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
  STREET FLOW TRAVEL TIME(MIN.) =   2.70   Tc(MIN.) =   5.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.937
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    5.75
  TOTAL AREA(ACRES) =      0.84        PEAK FLOW RATE(CFS) =       6.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.46
  FLOW VELOCITY(FEET/SEC.) =  4.13   DEPTH*VELOCITY(FT*FT/SEC.) =   1.59
  LONGEST FLOWPATH FROM NODE    143.00 TO NODE    142.00 =   648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   5.25
  RAINFALL INTENSITY(INCH/HR) =   8.94
  TOTAL STREAM AREA(ACRES) =     0.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.44     6.18        8.044          2.40
      2        6.53     5.25        8.937          0.84

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       20.49     5.25       8.937
      2       22.32     6.18       8.044

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     22.32   Tc(MIN.) =    6.18
  TOTAL AREA(ACRES) =      3.24
  LONGEST FLOWPATH FROM NODE    143.00 TO NODE    142.00 =   648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   286.17  DOWNSTREAM(FEET) =   285.45
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.024
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.10
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     22.32
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   6.26
  LONGEST FLOWPATH FROM NODE    143.00 TO NODE    145.00 =   682.00 FEET.

 +--------------------------------------------------------------------------+
 | FLOW EXITS EX. 24" CMP AND DISCHARGES ONTO EXIST. TERRAIN S'LY OF PALA   |
 | ROAD                                                                     |
 |                                                                          |
 +--------------------------------------------------------------------------+
+---------------------------------------------------------------------------+
 | RECHE RD. AT OLD HWY 395                                                 |
 | CANONITA RD. AT OLD HWY 395                                              |
 |                                                                          |
 +--------------------------------------------------------------------------+

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

```
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    741.00
  DOWNSTREAM ELEVATION(FEET) =    740.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.577
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.053
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    535.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2100.00   CHANNEL SLOPE =  0.0975
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.232
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     14.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.82
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   9.15
  Tc(MIN.) =  16.73
  SUBAREA AREA(ACRES) =    15.70       SUBAREA RUNOFF(CFS) =   27.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =     15.80         PEAK FLOW RATE(CFS) =      27.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   5.00
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    703.00 =  2150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   535.20  DOWNSTREAM(FEET) =   531.69
  FLOW LENGTH(FEET) =   103.70   MANNING'S N =  0.024
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  12.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.39
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =  16.95
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    704.00 =  2253.70 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    705.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    531.69  DOWNSTREAM(FEET) =    395.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3700.00   CHANNEL SLOPE =  0.0369
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.860
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     46.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.48
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =  13.76
  Tc(MIN.) =  30.70
  SUBAREA AREA(ACRES) =    36.70       SUBAREA RUNOFF(CFS) =   36.74
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.368
  TOTAL AREA(ACRES) =     52.50         PEAK FLOW RATE(CFS) =      55.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =   4.79
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    705.00 =  5953.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    706.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   395.00  DOWNSTREAM(FEET) =   387.18
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.024
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.59
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     55.25
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  30.76
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    706.00 =  6009.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    706.00 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.) =  30.76
  RAINFALL INTENSITY(INCH/HR) =   2.86
  TOTAL STREAM AREA(ACRES) =    52.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     55.25

****************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE    708.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    520.00
  DOWNSTREAM ELEVATION(FEET) =    500.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.431
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    708.00 TO NODE    706.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    397.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   950.00   CHANNEL SLOPE =  0.1078
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.716
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.23
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   3.74
  Tc(MIN.) =   8.17
  SUBAREA AREA(ACRES) =     5.30       SUBAREA RUNOFF(CFS) =   12.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      5.40         PEAK FLOW RATE(CFS) =      12.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   5.21
  LONGEST FLOWPATH FROM NODE    707.00 TO NODE    706.00 =  1000.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    706.00 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.) =   8.17
  RAINFALL INTENSITY(INCH/HR) =   6.72
  TOTAL STREAM AREA(ACRES) =     5.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.69

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
```

```
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1        55.25     30.76        2.857         52.50
    2        12.69      8.17        6.716          5.40

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF       Tc       INTENSITY
NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1       27.38      8.17       6.716
    2       60.65     30.76       2.857

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     60.65   Tc(MIN.) =   30.76
TOTAL AREA(ACRES) =     57.90
LONGEST FLOWPATH FROM NODE    701.00 TO NODE    706.00 =  6009.70 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    706.00 TO NODE    709.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   387.11  DOWNSTREAM(FEET) =   386.20
FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.024
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     60.65
PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  30.83
LONGEST FLOWPATH FROM NODE    701.00 TO NODE    709.00 =  6099.70 FEET.

+--------------------------------------------------------------------------+
| FLOW EXITS EX. 24" CMP AND DISCHARGES ONTO EX. TERRAIN S'LY OF CANONITA  |
| ROAD                                                                     |
|                                                                          |
+--------------------------------------------------------------------------+
```

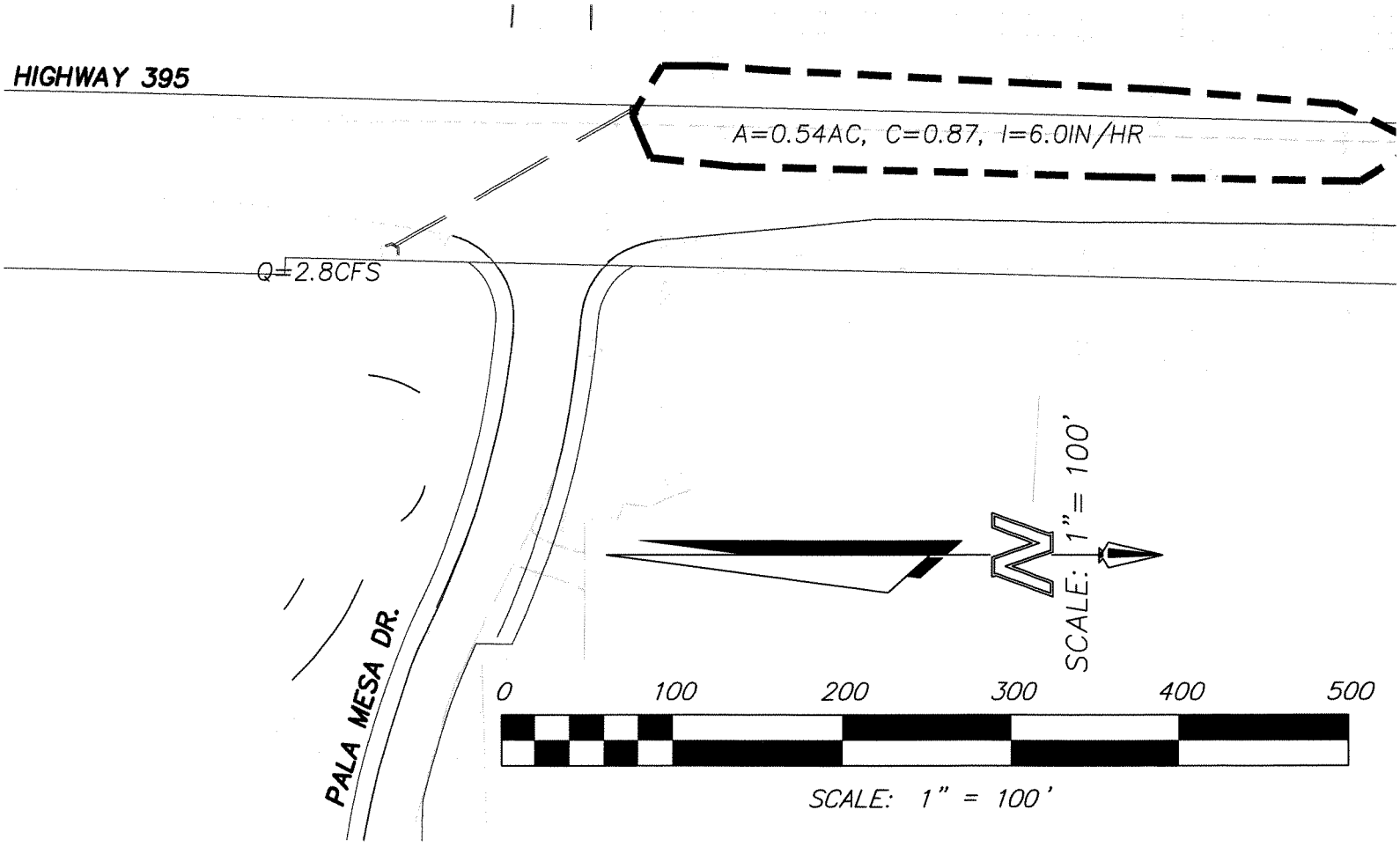
OFF-SITE INTERSECTION:

PALA MESA DRIVE @ OLD HIGHWAY 395

Q = C I A

A = 0.54 Ac
C = 0.87 (roadway)
I = 6.0 in/hr

Q = 2.8 cfs, discharged into the existing drainage ditch along the westerly side of Old Highway 395 via a proposed 18' RCP crossing Old Highway 395.

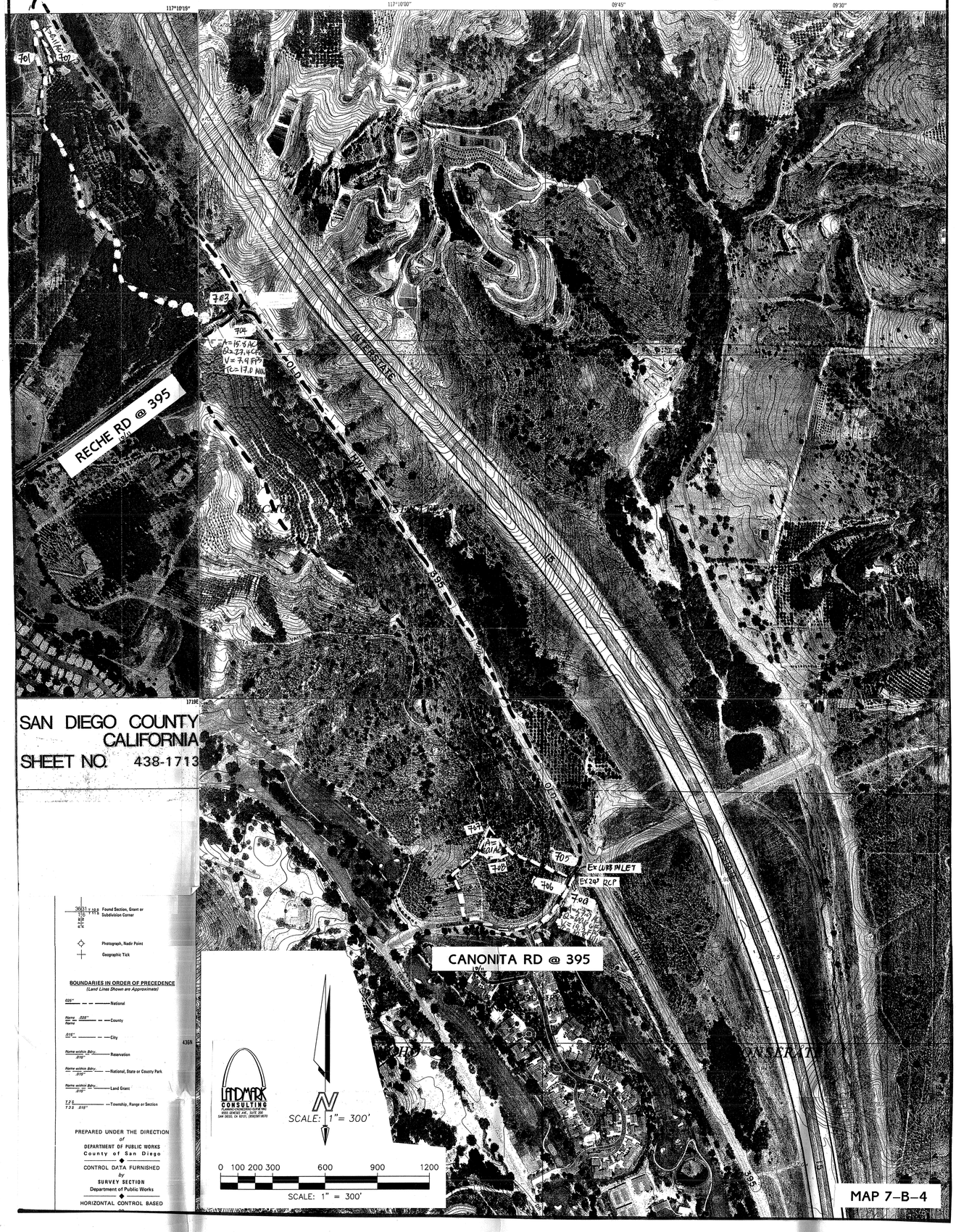


SECTION 7B:
OFF-SITE INTERSECTIONS HYDROLOGY MAPS

395 @ PALA RD
PALA RD @ 115
EX 24"-RCP
A=4.7AC
A=0.1AC
A=9AC
EX. CULVERT DISCHARGES ACROSS I-15
A=1.7AC
Q=122.3CFS
MONSERATE
SCALE: 1" = 300'
0 100 200 300 600 900 1200
PALA RD @115
MAP 7-B-1

A=0.1AC
A=0.9AC
A=3.2AC
A=0.2AC
A=5.53AC
Q=122.3 CFS
V=13.8 FPS
TC=11.8 MIN
Q=12.7 AC
A=0.4AC
A=1.9AC
A=0.1 AC
A=0.74 AC
A=0.7 AC
SCALE: 1" = 100'
DETAIL AREA
0 100 200 300 400 500
SCALE: 1" = 100'

HIC SURVEY COUNTY OF SAN DIEGO TOPO



SECTION 8:
HORSE RANCH CREEK 100-YEAR NCRS HYDROLOGIC METHOD

SECTION 8A:
HEC HMS ANALYSIS FOR
PRE AND POST-DEVELOPMENT CONDITIONS

Project	Campus Park	**Date**	07/29/09
Client	Landmark Consulting		
Subject	HEC-HMS Input Parameters		

Pre-Development Condition HEC-HMS Model Input

Subarea	Area (acres)	Area (mi^2)	NRCS Lag (min)	CN (PZN 2.0)	CN (PZN 2.8)	I_A (inches)
AB	5853	9.146	46.8	79.2	88.6	0.26
C	1490	2.329	20.6	76.1	86.4	0.31
Total	7344	11.47				

Post-Development Condition HEC-HMS Model Input

Subarea	Area (acres)	Area (mi^2)	NRCS Lag (min)	CN (PZN 2.0)	CN (PZN 2.8)	I_A (inches)
AB-Rev	5887	9.199	46.8	79.4	88.7	0.26
C-Rev	1137	1.777	20.6	77.3	86.9	0.30
Onsite	360	0.563	10.1	80.9	89.7	0.23
Total	7385	11.54				

PZN Interpolation Values

2.0	3.0	2.8
76	89	86.4
77	89	86.6
78	90	87.6
79	91	88.6
80	91	88.8
81	92	89.8

Notes:

1) PZN of 2.8 used for 100-year storm based on site PZN of 1.8

2) Area increase of 41 acres to account for development along Hwy 76 near the Pankey Bridge.

Project	Campus Park	**Date**	7/29/09
Client	Landmark Consulting		
Subject	Basin Lag Calculations		

$$T_l = 24 \cdot \bar{n} \cdot \left(\frac{L \cdot L_c}{s^{0.5}} \right)^m$$

Where: T_l = Army Corps of Engineers' Lag Time (hrs)

n = Average Manning's n for watercourse

L = Length of longest watercourse (miles)

L_c = Length along longest watercourse to point opposite centroid (miles)

s = Overall slope of drainage area (feet per mile)

m = Regional constant, equal to 0.38 for San Diego County

Lag Time Calculations

Basin	Upper Elev. (ft)	Lower Elev. (ft)	Length (ft)	Length (mi)	Slope (ft/mi)	Length to Centroid (ft)	Length to Centroid (mi)	Basin "n" Value*	Corps Lag (min)	Tp (min)	0.2 x Tp (min)	D (min)	NRCS Lag (min)
AB	1930	340	27171	5.15	309	9854	1.87	0.050	57.2	49.3	9.9	5.0	46.8
C	880	270	10603	2.01	304	3403	0.64	0.050	26.8	23.1	4.6	5.0	20.6
Onsite	Rational Method Tc at Node 322 (Onsite Study) = 18.3 min, Lag=80% of Tc (Eq 4-24) =								14.6	12.6	2.5	5.0	10.1

Notes:

1) Basin "n" for AB-Rev and C-Rev are same as AB and C in the existing condition since there will be no or minimal improvements in those sub-basins

2) Basin "n" of 0.05 was assumed to be representative of the land use and natural water courses in the watershed. The area is rugged with steep canyons. There is also considerable vegetation in the channels. Ground cover includes chapparal and orchards.

Project	Campus Park	**Date**	05/12/09
Client	Landmark Consulting		
Subject	HEC-HMS Reach Values		

Pre-Development Reaches

HMS Name	U/S Elev. (ft)	D/S Elev. (ft)	Length (ft)	Slope	Manning's n	Shape	Width (ft)	Side Slope
AB	325	262	8308	0.0076	0.06	Trap	800	5:1

(*) Note: Width is based on HEC-RAS Section 7145

Project	Campus Park	**Date**	08/05/09
Client	Landmark Consulting		
Subject	Preliminary Outlet Design for Campus Park Detention Basin		

Tailwater Condition

Initial Condition:	Elevation
Initial Elevation	264.1
Tailwater	Fixed
Stage	273.2
Outlets	1
Spillways	1

Outlet Configuration

Type	Culvert	
Shape	Circular	
Chart	1	
Scale	2	
Length	20	ft
Diameter	3	ft
Inlet	264	ft
Entrance loss	0.2	
Outlet Elev.	263.8	ft
Outlet loss	1	
Manning's	0.013	

Spillway Configuration

Type	Broad	
Elev.	272.5	ft
Length	500	ft
Coeff.	3.3	

Detention Basin Storage Volume

ELEV	AREA	VOL	VOL CUM
(ft)	(ft^2)	(ft^3)	(ac-ft)
264	2970	0	0.00
266	25989	28959	0.66
268	50374	76363	2.42
270	68426	118800	5.15
272	73899	142325	8.41
274	79474	153373	11.93

San Diego County Nested Storm Distribution for 5 minute period of maximum intensity
Project: Horse Ranch Creek through Campus Park Development

Precipitation Data Input

6-hr rainfall = 3.50 inches
24-hr rainfall = 6.00 inches
P6/P24 = 58%
Computation Interval = 5 minutes

Depth-Area Reduction Factor Input

Watershed Area 11.54 mi^2

Duration	Factor
30	0.890
60	0.940
180	0.967
360	0.977
1440	0.983

Time	Time Increment	Duration min.	Duration hr.	Cumulative Precip in order of Increasing Duration	Increm. Precip in.	Depth Area Reduction Factor	Adjusted Precip	% of Pt	Rainfall distribution %cumulativ	Incremental Precip in order of Distribution	Adjusted Incremental Precip in order of Distribution
0:00	0	0	0	0	0	0.890	0	0	0	0	0
0:05	1	5		0.768	0.768	0.890	0.684	0.1281	0.1280775	0.008	0.008
0:10	2	10	0.2	0.983	0.214	0.890	0.191	0.0357	0.1638093	0.008	0.008
0:15	3	15		1.135	0.152	0.890	0.135	0.0254	0.1891694	0.008	0.008
0:20	4	20	0.3	1.257	0.122	0.890	0.109	0.0203	0.2095097	0.008	0.008
0:25	5	25		1.361	0.104	0.890	0.092	0.0173	0.2267813	0.008	0.008
0:30	6	30	0.5	1.452	0.091	0.890	0.081	0.0152	0.2419449	0.008	0.008
0:35	7	35		1.533	0.082	0.898	0.073	0.0136	0.255554	0.008	0.008
0:40	8	40	0.7	1.608	0.074	0.906	0.067	0.0124	0.2679599	0.008	0.008
0:45	9	45		1.676	0.069	0.915	0.063	0.0114	0.2794016	0.008	0.008
0:50	10	50	0.8	1.740	0.064	0.923	0.059	0.0106	0.29005	0.008	0.008
0:55	11	55		1.800	0.060	0.931	0.056	0.01	0.3000318	0.008	0.008
1:00	12	60	1.0	1.857	0.056	0.940	0.053	0.0094	0.3094441	0.008	0.008
1:05	13	65		1.910	0.054	0.941	0.050	0.0089	0.3183631	0.008	0.008
1:10	14	70	1.2	1.961	0.051	0.942	0.048	0.0085	0.3268498	0.008	0.008
1:15	15	75		2.010	0.049	0.943	0.046	0.0081	0.334954	0.008	0.008
1:20	16	80	1.3	2.056	0.047	0.944	0.044	0.0078	0.3427168	0.009	0.008
1:25	17	85		2.101	0.045	0.945	0.042	0.0075	0.3501726	0.009	0.008
1:30	18	90	1.5	2.144	0.043	0.947	0.041	0.0072	0.3573506	0.009	0.008
1:35	19	95		2.186	0.042	0.948	0.039	0.0069	0.3642758	0.009	0.008
1:40	20	100	1.7	2.226	0.040	0.949	0.038	0.0067	0.3709697	0.009	0.008
1:45	21	105		2.265	0.039	0.950	0.037	0.0065	0.3774511	0.009	0.009
1:50	22	110	1.8	2.302	0.038	0.951	0.036	0.0063	0.3837363	0.009	0.009
1:55	23	115		2.339	0.037	0.952	0.035	0.0061	0.3898398	0.009	0.009
2:00	24	120	2.0	2.375	0.036	0.953	0.034	0.0059	0.3957745	0.009	0.009
2:05	25	125		2.409	0.035	0.955	0.033	0.0058	0.4015518	0.009	0.009
2:10	26	130	2.2	2.443	0.034	0.956	0.032	0.0056	0.4071818	0.009	0.009
2:15	27	135		2.476	0.033	0.957	0.032	0.0055	0.4126739	0.009	0.009
2:20	28	140	2.3	2.508	0.032	0.958	0.031	0.0054	0.4180362	0.009	0.009
2:25	29	145		2.540	0.031	0.959	0.030	0.0052	0.4232765	0.009	0.009
2:30	30	150	2.5	2.570	0.031	0.960	0.030	0.0051	0.4284014	0.009	0.009
2:35	31	155		2.601	0.030	0.962	0.029	0.005	0.4334173	0.009	0.009
2:40	32	160	2.7	2.630	0.029	0.963	0.028	0.0049	0.4383299	0.009	0.009
2:45	33	165		2.659	0.029	0.964	0.028	0.0048	0.4431444	0.009	0.009
2:50	34	170	2.8	2.687	0.028	0.965	0.027	0.0047	0.4478657	0.009	0.009
2:55	35	175		2.715	0.028	0.966	0.027	0.0046	0.4524983	0.009	0.009
3:00	36	180	3.0	2.742	0.027	0.967	0.026	0.0045	0.4570463	0.009	0.009
3:05	37	185		2.769	0.027	0.968	0.026	0.0045	0.4615135	0.009	0.009
3:10	38	190	3.2	2.795	0.026	0.968	0.025	0.0044	0.4659035	0.009	0.009
3:15	39	195		2.821	0.026	0.968	0.025	0.0043	0.4702196	0.009	0.009
3:20	40	200	3.3	2.847	0.025	0.968	0.025	0.0042	0.4744649	0.009	0.009

Time	Time Incre-ment	Duration min.	hr.	Cumulative Precip in order of Increasing Duration	Increm. Precip in.	Depth Area Reduction Factor	Adjusted Precip	% of Pt	Rainfall distri-bution %cumulativ	Incremental Precip in order of Distribution	Adjusted Incremental Precip in order of Distribution
3:25	41	205		2.872	0.025	0.969	0.024	0.0042	0.4786423	0.009	0.009
3:30	42	210	3.5	2.897	0.025	0.969	0.024	0.0041	0.4827545	0.009	0.009
3:35	43	215		2.921	0.024	0.969	0.024	0.004	0.486804	0.009	0.009
3:40	44	220	3.7	2.945	0.024	0.969	0.023	0.004	0.4907932	0.009	0.009
3:45	45	225		2.968	0.024	0.970	0.023	0.0039	0.4947243	0.010	0.009
3:50	46	230	3.8	2.992	0.023	0.970	0.023	0.0039	0.4985995	0.010	0.009
3:55	47	235		3.015	0.023	0.970	0.022	0.0038	0.5024208	0.010	0.009
4:00	48	240	4.0	3.037	0.023	0.971	0.022	0.0038	0.5061899	0.010	0.009
4:05	49	245		3.059	0.022	0.971	0.022	0.0037	0.5099087	0.010	0.009
4:10	50	250	4.2	3.081	0.022	0.971	0.021	0.0037	0.5135789	0.010	0.010
4:15	51	255		3.103	0.022	0.971	0.021	0.0036	0.5172021	0.010	0.010
4:20	52	260	4.3	3.125	0.021	0.972	0.021	0.0036	0.5207797	0.010	0.010
4:25	53	265		3.146	0.021	0.972	0.021	0.0035	0.5243132	0.010	0.010
4:30	54	270	4.5	3.167	0.021	0.972	0.020	0.0035	0.5278039	0.010	0.010
4:35	55	275		3.188	0.021	0.973	0.020	0.0034	0.5312532	0.010	0.010
4:40	56	280	4.7	3.208	0.020	0.973	0.020	0.0034	0.5346623	0.010	0.010
4:45	57	285		3.228	0.020	0.973	0.020	0.0034	0.5380324	0.010	0.010
4:50	58	290	4.8	3.248	0.020	0.973	0.019	0.0033	0.5413645	0.010	0.010
4:55	59	295		3.268	0.020	0.974	0.019	0.0033	0.5446598	0.010	0.010
5:00	60	300	5.0	3.288	0.020	0.974	0.019	0.0033	0.5479192	0.010	0.010
5:05	61	305		3.307	0.019	0.974	0.019	0.0032	0.5511438	0.010	0.010
5:10	62	310	5.2	3.326	0.019	0.975	0.019	0.0032	0.5543345	0.010	0.010
5:15	63	315		3.345	0.019	0.975	0.018	0.0032	0.5574921	0.010	0.010
5:20	64	320	5.3	3.364	0.019	0.975	0.018	0.0031	0.5606176	0.010	0.010
5:25	65	325		3.382	0.019	0.975	0.018	0.0031	0.5637117	0.010	0.010
5:30	66	330	5.5	3.401	0.018	0.976	0.018	0.0031	0.5667753	0.010	0.010
5:35	67	335		3.419	0.018	0.976	0.018	0.003	0.5698091	0.010	0.010
5:40	68	340	5.7	3.437	0.018	0.976	0.018	0.003	0.5728138	0.011	0.010
5:45	69	345		3.455	0.018	0.977	0.017	0.003	0.5757902	0.011	0.010
5:50	70	350	5.8	3.472	0.018	0.977	0.017	0.0029	0.5787388	0.011	0.010
5:55	71	355		3.490	0.018	0.977	0.017	0.0029	0.5816605	0.011	0.010
6:00	72	360	6.0	3.500	0.010	0.977	0.010	0.0017	0.5833333	0.011	0.011
6:05	73	365		3.519	0.019	0.977	0.018	0.0031	0.5864701	0.011	0.011
6:10	74	370	6.2	3.537	0.019	0.977	0.018	0.0031	0.5895807	0.011	0.011
6:15	75	375		3.556	0.019	0.977	0.018	0.0031	0.5926657	0.011	0.011
6:20	76	380	6.3	3.574	0.018	0.977	0.018	0.0031	0.5957257	0.011	0.011
6:25	77	385		3.593	0.018	0.978	0.018	0.003	0.5987612	0.011	0.011
6:30	78	390	6.5	3.611	0.018	0.978	0.018	0.003	0.6017726	0.011	0.011
6:35	79	395		3.629	0.018	0.978	0.018	0.003	0.6047606	0.011	0.011
6:40	80	400	6.7	3.646	0.018	0.978	0.017	0.003	0.6077255	0.011	0.011
6:45	81	405		3.664	0.018	0.978	0.017	0.0029	0.6106679	0.011	0.011
6:50	82	410	6.8	3.682	0.018	0.978	0.017	0.0029	0.6135881	0.011	0.011
6:55	83	415		3.699	0.017	0.978	0.017	0.0029	0.6164867	0.011	0.011
7:00	84	420	7.0	3.716	0.017	0.978	0.017	0.0029	0.619364	0.011	0.011
7:05	85	425		3.733	0.017	0.978	0.017	0.0029	0.6222204	0.012	0.011
7:10	86	430	7.2	3.750	0.017	0.978	0.017	0.0028	0.6250564	0.012	0.011
7:15	87	435		3.767	0.017	0.978	0.017	0.0028	0.6278723	0.012	0.011
7:20	88	440	7.3	3.784	0.017	0.978	0.016	0.0028	0.6306685	0.012	0.011

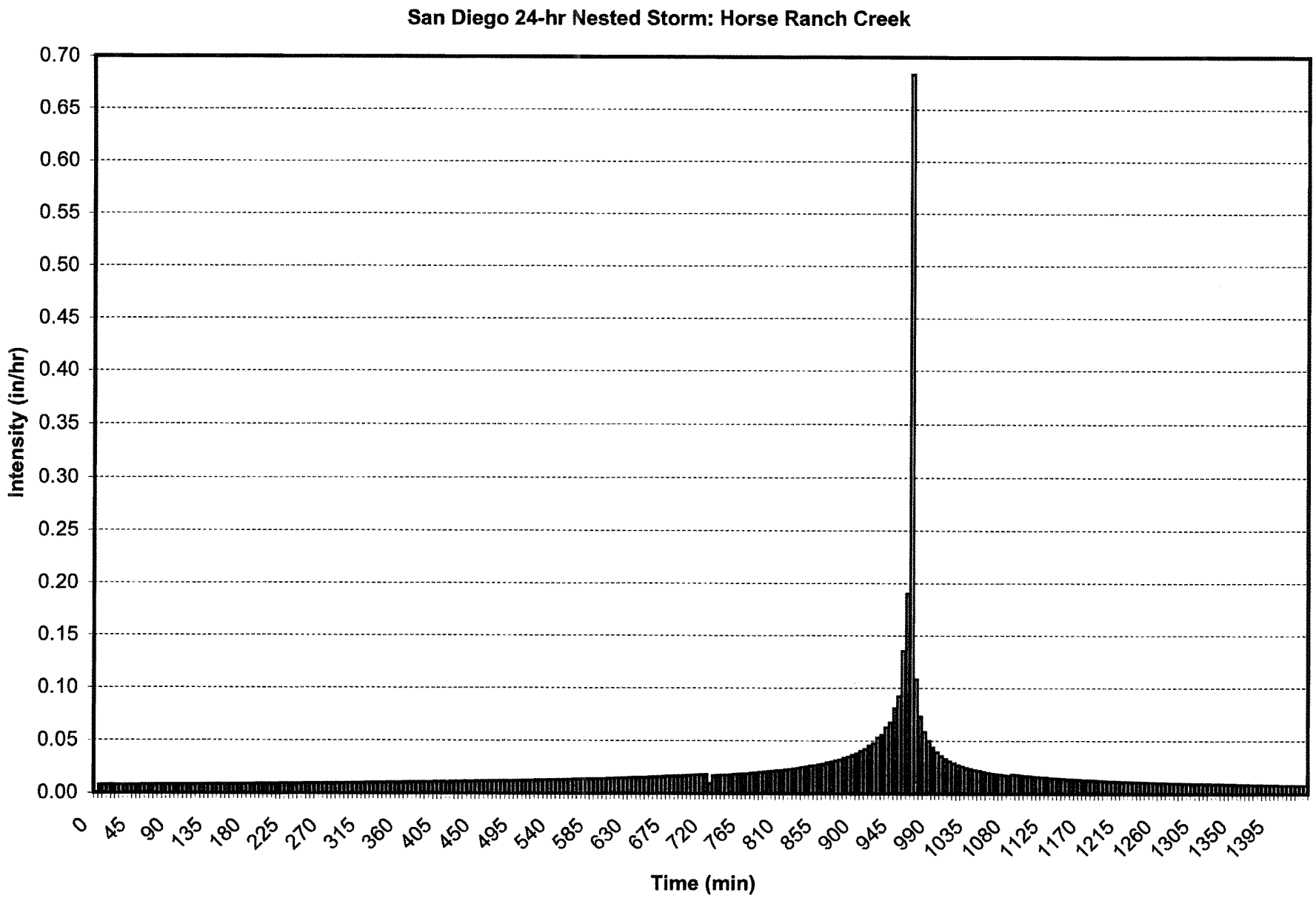
Time	Time Incre-ment	Duration min.	hr.	Cumulative Precip in order of Increasing Duration	Increm. Precip in.	Depth Area Reduction Factor	Adjusted Precip	% of Pt	Rainfall distri-bution %cumulativ	Incremental Precip in order of Distribution	Adjusted Incremental Precip in order of Distribution
7:25	89	445		3.801	0.017	0.978	0.016	0.0028	0.6334453	0.012	0.012
7:30	90	450	7.5	3.817	0.017	0.978	0.016	0.0028	0.6362031	0.012	0.012
7:35	91	455		3.834	0.016	0.978	0.016	0.0027	0.6389422	0.012	0.012
7:40	92	460	7.7	3.850	0.016	0.978	0.016	0.0027	0.641663	0.012	0.012
7:45	93	465		3.866	0.016	0.978	0.016	0.0027	0.6443658	0.012	0.012
7:50	94	470	7.8	3.882	0.016	0.978	0.016	0.0027	0.6470509	0.012	0.012
7:55	95	475		3.898	0.016	0.978	0.016	0.0027	0.6497186	0.012	0.012
8:00	96	480	8.0	3.914	0.016	0.978	0.016	0.0027	0.6523692	0.012	0.012
8:05	97	485		3.930	0.016	0.978	0.015	0.0026	0.655003	0.012	0.012
8:10	98	490	8.2	3.946	0.016	0.978	0.015	0.0026	0.6576202	0.012	0.012
8:15	99	495		3.961	0.016	0.978	0.015	0.0026	0.6602211	0.013	0.012
8:20	100	500	8.3	3.977	0.016	0.978	0.015	0.0026	0.662806	0.013	0.012
8:25	101	505		3.992	0.015	0.978	0.015	0.0026	0.6653752	0.013	0.012
8:30	102	510	8.5	4.008	0.015	0.978	0.015	0.0026	0.6679289	0.013	0.013
8:35	103	515		4.023	0.015	0.978	0.015	0.0025	0.6704673	0.013	0.013
8:40	104	520	8.7	4.038	0.015	0.978	0.015	0.0025	0.6729907	0.013	0.013
8:45	105	525		4.053	0.015	0.978	0.015	0.0025	0.6754994	0.013	0.013
8:50	106	530	8.8	4.068	0.015	0.978	0.015	0.0025	0.6779934	0.013	0.013
8:55	107	535		4.083	0.015	0.978	0.015	0.0025	0.6804731	0.013	0.013
9:00	108	540	9.0	4.098	0.015	0.978	0.014	0.0025	0.6829387	0.013	0.013
9:05	109	545		4.112	0.015	0.978	0.014	0.0025	0.6853904	0.013	0.013
9:10	110	550	9.2	4.127	0.015	0.978	0.014	0.0024	0.6878284	0.014	0.013
9:15	111	555		4.142	0.015	0.978	0.014	0.0024	0.6902528	0.014	0.013
9:20	112	560	9.3	4.156	0.014	0.979	0.014	0.0024	0.692664	0.014	0.013
9:25	113	565		4.170	0.014	0.979	0.014	0.0024	0.695062	0.014	0.014
9:30	114	570	9.5	4.185	0.014	0.979	0.014	0.0024	0.6974471	0.014	0.014
9:35	115	575		4.199	0.014	0.979	0.014	0.0024	0.6998195	0.014	0.014
9:40	116	580	9.7	4.213	0.014	0.979	0.014	0.0024	0.7021792	0.014	0.014
9:45	117	585		4.227	0.014	0.979	0.014	0.0023	0.7045266	0.014	0.014
9:50	118	590	9.8	4.241	0.014	0.979	0.014	0.0023	0.7068617	0.014	0.014
9:55	119	595		4.255	0.014	0.979	0.014	0.0023	0.7091848	0.015	0.014
10:00	120	600	10.0	4.269	0.014	0.979	0.014	0.0023	0.7114959	0.015	0.014
10:05	121	605		4.283	0.014	0.979	0.014	0.0023	0.7137954	0.015	0.014
10:10	122	610	10.2	4.296	0.014	0.979	0.013	0.0023	0.7160832	0.015	0.015
10:15	123	615		4.310	0.014	0.979	0.013	0.0023	0.7183596	0.015	0.015
10:20	124	620	10.3	4.324	0.014	0.979	0.013	0.0023	0.7206247	0.015	0.015
10:25	125	625		4.337	0.014	0.979	0.013	0.0023	0.7228787	0.015	0.015
10:30	126	630	10.5	4.351	0.013	0.979	0.013	0.0022	0.7251217	0.015	0.015
10:35	127	635		4.364	0.013	0.979	0.013	0.0022	0.7273538	0.016	0.015
10:40	128	640	10.7	4.377	0.013	0.979	0.013	0.0022	0.7295753	0.016	0.015
10:45	129	645		4.391	0.013	0.979	0.013	0.0022	0.7317861	0.016	0.016
10:50	130	650	10.8	4.404	0.013	0.979	0.013	0.0022	0.7339865	0.016	0.016
10:55	131	655		4.417	0.013	0.979	0.013	0.0022	0.7361766	0.016	0.016

Time	Time Incre-ment	Duration min.	hr.	Cumulative Precip in order of Increasing Duration	Increm. Precip in.	Depth Area Reduction Factor	Adjusted Precip	% of Pt	Rainfall distri-bution %cumulativ	Incremental Precip in order of Distribution	Adjusted Incremental Precip in order of Distribution
11:00	132	660	11.0	4.430	0.013	0.979	0.013	0.0022	0.7383564	0.016	0.016
11:05	133	665		4.443	0.013	0.979	0.013	0.0022	0.7405262	0.017	0.016
11:10	134	670	11.2	4.456	0.013	0.979	0.013	0.0022	0.7426861	0.017	0.016
11:15	135	675		4.469	0.013	0.979	0.013	0.0022	0.7448361	0.017	0.017
11:20	136	680	11.3	4.482	0.013	0.979	0.013	0.0021	0.7469764	0.017	0.017
11:25	137	685		4.495	0.013	0.979	0.013	0.0021	0.7491071	0.017	0.017
11:30	138	690	11.5	4.507	0.013	0.979	0.012	0.0021	0.7512284	0.017	0.017
11:35	139	695		4.520	0.013	0.979	0.012	0.0021	0.7533402	0.018	0.017
11:40	140	700	11.7	4.533	0.013	0.979	0.012	0.0021	0.7554428	0.018	0.017
11:45	141	705		4.545	0.013	0.979	0.012	0.0021	0.7575362	0.018	0.018
11:50	142	710	11.8	4.558	0.013	0.979	0.012	0.0021	0.7596206	0.018	0.018
11:55	143	715		4.570	0.012	0.979	0.012	0.0021	0.761696	0.019	0.018
12:00	144	720	12.0	4.583	0.012	0.979	0.012	0.0021	0.7637626	0.019	0.018
12:05	145	725		4.595	0.012	0.979	0.012	0.0021	0.7658204	0.010	0.010
12:10	146	730	12.2	4.607	0.012	0.979	0.012	0.002	0.7678696	0.018	0.017
12:15	147	735		4.619	0.012	0.979	0.012	0.002	0.7699102	0.018	0.017
12:20	148	740	12.3	4.632	0.012	0.980	0.012	0.002	0.7719423	0.018	0.018
12:25	149	745		4.644	0.012	0.980	0.012	0.002	0.7739661	0.018	0.018
12:30	150	750	12.5	4.656	0.012	0.980	0.012	0.002	0.7759816	0.019	0.018
12:35	151	755		4.668	0.012	0.980	0.012	0.002	0.7779889	0.019	0.018
12:40	152	760	12.7	4.680	0.012	0.980	0.012	0.002	0.779988	0.019	0.019
12:45	153	765		4.692	0.012	0.980	0.012	0.002	0.7819792	0.020	0.019
12:50	154	770	12.8	4.704	0.012	0.980	0.012	0.002	0.7839624	0.020	0.019
12:55	155	775		4.716	0.012	0.980	0.012	0.002	0.7859377	0.020	0.020
13:00	156	780	13.0	4.727	0.012	0.980	0.012	0.002	0.7879053	0.020	0.020
13:05	157	785		4.739	0.012	0.980	0.012	0.002	0.7898652	0.021	0.020
13:10	158	790	13.2	4.751	0.012	0.980	0.011	0.002	0.7918175	0.021	0.021
13:15	159	795		4.763	0.012	0.980	0.011	0.0019	0.7937622	0.022	0.021
13:20	160	800	13.3	4.774	0.012	0.980	0.011	0.0019	0.7956995	0.022	0.021
13:25	161	805		4.786	0.012	0.980	0.011	0.0019	0.7976294	0.023	0.022
13:30	162	810	13.5	4.797	0.012	0.980	0.011	0.0019	0.799552	0.023	0.022
13:35	163	815		4.809	0.011	0.980	0.011	0.0019	0.8014673	0.024	0.023
13:40	164	820	13.7	4.820	0.011	0.980	0.011	0.0019	0.8033755	0.024	0.023
13:45	165	825		4.832	0.011	0.980	0.011	0.0019	0.8052765	0.025	0.024
13:50	166	830	13.8	4.843	0.011	0.980	0.011	0.0019	0.8071706	0.025	0.024
13:55	167	835		4.854	0.011	0.980	0.011	0.0019	0.8090576	0.026	0.025
14:00	168	840	14.0	4.866	0.011	0.980	0.011	0.0019	0.8109378	0.026	0.025
14:05	169	845		4.877	0.011	0.980	0.011	0.0019	0.8128112	0.027	0.026
14:10	170	850	14.2	4.888	0.011	0.980	0.011	0.0019	0.8146778	0.028	0.027
14:15	171	855		4.899	0.011	0.980	0.011	0.0019	0.8165377	0.029	0.028
14:20	172	860	14.3	4.910	0.011	0.980	0.011	0.0019	0.8183909	0.029	0.028
14:25	173	865		4.921	0.011	0.980	0.011	0.0018	0.8202376	0.031	0.030
14:30	174	870	14.5	4.932	0.011	0.980	0.011	0.0018	0.8220778	0.031	0.030

Time	Time Incre-ment	Duration min.	hr.	Cumulative Precip in order of Increasing Duration	Increm. Precip in.	Depth Area Reduction Factor	Adjusted Precip	% of Pt	Rainfall distri-bution %cumulativ	Incremental Precip in order of Distribution	Adjusted Incremental Precip in order of Distribution
14:35	175	875		4.943	0.011	0.980	0.011	0.0018	0.8239115	0.033	0.032
14:40	176	880	14.7	4.954	0.011	0.980	0.011	0.0018	0.8257388	0.034	0.032
14:45	177	885		4.965	0.011	0.980	0.011	0.0018	0.8275598	0.036	0.034
14:50	178	890	14.8	4.976	0.011	0.980	0.011	0.0018	0.8293746	0.037	0.035
14:55	179	895		4.987	0.011	0.980	0.011	0.0018	0.831183	0.039	0.037
15:00	180	900	15.0	4.998	0.011	0.980	0.011	0.0018	0.8329854	0.040	0.038
15:05	181	905		5.009	0.011	0.980	0.011	0.0018	0.8347816	0.043	0.041
15:10	182	910	15.2	5.019	0.011	0.980	0.011	0.0018	0.8365718	0.045	0.042
15:15	183	915		5.030	0.011	0.981	0.010	0.0018	0.8383559	0.049	0.046
15:20	184	920	15.3	5.041	0.011	0.981	0.010	0.0018	0.8401341	0.051	0.048
15:25	185	925		5.051	0.011	0.981	0.010	0.0018	0.8419065	0.056	0.053
15:30	186	930	15.5	5.062	0.011	0.981	0.010	0.0018	0.8436729	0.060	0.056
15:35	187	935		5.073	0.011	0.981	0.010	0.0018	0.8454336	0.069	0.063
15:40	188	940	15.7	5.083	0.011	0.981	0.010	0.0018	0.8471885	0.074	0.067
15:45	189	945		5.094	0.010	0.981	0.010	0.0017	0.8489378	0.091	0.081
15:50	190	950	15.8	5.104	0.010	0.981	0.010	0.0017	0.8506814	0.104	0.092
15:55	191	955		5.115	0.010	0.981	0.010	0.0017	0.8524193	0.152	0.135
16:00	192	960	16.0	5.125	0.010	0.981	0.010	0.0017	0.8541518	0.214	0.191
16:05	193	965		5.135	0.010	0.981	0.010	0.0017	0.8558787	0.768	0.684
16:10	194	970	16.2	5.146	0.010	0.981	0.010	0.0017	0.8576002	0.122	0.109
16:15	195	975		5.156	0.010	0.981	0.010	0.0017	0.8593162	0.082	0.073
16:20	196	980	16.3	5.166	0.010	0.981	0.010	0.0017	0.8610269	0.064	0.059
16:25	197	985		5.176	0.010	0.981	0.010	0.0017	0.8627323	0.054	0.050
16:30	198	990	16.5	5.187	0.010	0.981	0.010	0.0017	0.8644323	0.047	0.044
16:35	199	995		5.197	0.010	0.981	0.010	0.0017	0.8661272	0.042	0.039
16:40	200	1000	16.7	5.207	0.010	0.981	0.010	0.0017	0.8678168	0.038	0.036
16:45	201	1005		5.217	0.010	0.981	0.010	0.0017	0.8695013	0.035	0.033
16:50	202	1010	16.8	5.227	0.010	0.981	0.010	0.0017	0.8711807	0.032	0.031
16:55	203	1015		5.237	0.010	0.981	0.010	0.0017	0.872855	0.030	0.029
17:00	204	1020	17.0	5.247	0.010	0.981	0.010	0.0017	0.8745242	0.028	0.027
17:05	205	1025		5.257	0.010	0.981	0.010	0.0017	0.8761885	0.027	0.026
17:10	206	1030	17.2	5.267	0.010	0.981	0.010	0.0017	0.8778478	0.025	0.025
17:15	207	1035		5.277	0.010	0.981	0.010	0.0017	0.8795022	0.024	0.024
17:20	208	1040	17.3	5.287	0.010	0.981	0.010	0.0016	0.8811517	0.023	0.023
17:25	209	1045		5.297	0.010	0.981	0.010	0.0016	0.8827964	0.022	0.022
17:30	210	1050	17.5	5.307	0.010	0.981	0.010	0.0016	0.8844363	0.021	0.021
17:35	211	1055		5.316	0.010	0.981	0.010	0.0016	0.8860714	0.021	0.020
17:40	212	1060	17.7	5.326	0.010	0.981	0.010	0.0016	0.8877018	0.020	0.019
17:45	213	1065		5.336	0.010	0.981	0.010	0.0016	0.8893274	0.019	0.019
17:50	214	1070	17.8	5.346	0.010	0.981	0.010	0.0016	0.8909485	0.019	0.018
17:55	215	1075		5.355	0.010	0.981	0.010	0.0016	0.8925649	0.018	0.018
18:00	216	1080	18.0	5.365	0.010	0.981	0.009	0.0016	0.8941767	0.018	0.017
18:05	217	1085		5.375	0.010	0.981	0.009	0.0016	0.895784	0.019	0.018

Time	Time Incre-ment	Duration min.	hr.	Cumulative Precip in order of Increasing Duration	Increm. Precip in.	Depth Area Reduction Factor	Adjusted Precip	% of Pt	Rainfall distri-bution %cumulativ	Incremental Precip in order of Distribution	Adjusted Incremental Precip in order of Distribution
18:10	218	1090	18.2	5.384	0.010	0.981	0.009	0.0016	0.8973867	0.018	0.018
18:15	219	1095		5.394	0.010	0.982	0.009	0.0016	0.898985	0.018	0.018
18:20	220	1100	18.3	5.403	0.010	0.982	0.009	0.0016	0.9005788	0.018	0.017
18:25	221	1105		5.413	0.010	0.982	0.009	0.0016	0.9021681	0.017	0.017
18:30	222	1110	18.5	5.423	0.010	0.982	0.009	0.0016	0.9037531	0.017	0.016
18:35	223	1115		5.432	0.009	0.982	0.009	0.0016	0.9053337	0.016	0.016
18:40	224	1120	18.7	5.441	0.009	0.982	0.009	0.0016	0.9069101	0.016	0.016
18:45	225	1125		5.451	0.009	0.982	0.009	0.0016	0.9084821	0.016	0.015
18:50	226	1130	18.8	5.460	0.009	0.982	0.009	0.0016	0.9100498	0.016	0.015
18:55	227	1135		5.470	0.009	0.982	0.009	0.0016	0.9116133	0.015	0.015
19:00	228	1140	19.0	5.479	0.009	0.982	0.009	0.0016	0.9131726	0.015	0.015
19:05	229	1145		5.488	0.009	0.982	0.009	0.0016	0.9147278	0.015	0.014
19:10	230	1150	19.2	5.498	0.009	0.982	0.009	0.0016	0.9162787	0.014	0.014
19:15	231	1155		5.507	0.009	0.982	0.009	0.0015	0.9178256	0.014	0.014
19:20	232	1160	19.3	5.516	0.009	0.982	0.009	0.0015	0.9193684	0.014	0.014
19:25	233	1165		5.525	0.009	0.982	0.009	0.0015	0.9209071	0.014	0.014
19:30	234	1170	19.5	5.535	0.009	0.982	0.009	0.0015	0.9224418	0.014	0.013
19:35	235	1175		5.544	0.009	0.982	0.009	0.0015	0.9239725	0.013	0.013
19:40	236	1180	19.7	5.553	0.009	0.982	0.009	0.0015	0.9254992	0.013	0.013
19:45	237	1185		5.562	0.009	0.982	0.009	0.0015	0.927022	0.013	0.013
19:50	238	1190	19.8	5.571	0.009	0.982	0.009	0.0015	0.9285408	0.013	0.013
19:55	239	1195		5.580	0.009	0.982	0.009	0.0015	0.9300558	0.013	0.012
20:00	240	1200	20.0	5.589	0.009	0.982	0.009	0.0015	0.9315669	0.013	0.012
20:05	241	1205		5.598	0.009	0.982	0.009	0.0015	0.9330741	0.012	0.012
20:10	242	1210	20.2	5.607	0.009	0.982	0.009	0.0015	0.9345775	0.012	0.012
20:15	243	1215		5.616	0.009	0.982	0.009	0.0015	0.9360771	0.012	0.012
20:20	244	1220	20.3	5.625	0.009	0.982	0.009	0.0015	0.937573	0.012	0.012
20:25	245	1225		5.634	0.009	0.982	0.009	0.0015	0.9390651	0.012	0.012
20:30	246	1230	20.5	5.643	0.009	0.982	0.009	0.0015	0.9405535	0.012	0.011
20:35	247	1235		5.652	0.009	0.982	0.009	0.0015	0.9420382	0.011	0.011
20:40	248	1240	20.7	5.661	0.009	0.982	0.009	0.0015	0.9435193	0.011	0.011
20:45	249	1245		5.670	0.009	0.982	0.009	0.0015	0.9449966	0.011	0.011
20:50	250	1250	20.8	5.679	0.009	0.982	0.009	0.0015	0.9464704	0.011	0.011
20:55	251	1255		5.688	0.009	0.982	0.009	0.0015	0.9479406	0.011	0.011
21:00	252	1260	21.0	5.696	0.009	0.982	0.009	0.0015	0.9494072	0.011	0.011
21:05	253	1265		5.705	0.009	0.982	0.009	0.0015	0.9508702	0.011	0.011
21:10	254	1270	21.2	5.714	0.009	0.983	0.009	0.0015	0.9523297	0.011	0.010
21:15	255	1275		5.723	0.009	0.983	0.009	0.0015	0.9537857	0.011	0.010
21:20	256	1280	21.3	5.731	0.009	0.983	0.009	0.0015	0.9552383	0.010	0.010
21:25	257	1285		5.740	0.009	0.983	0.009	0.0014	0.9566873	0.010	0.010
21:30	258	1290	21.5	5.749	0.009	0.983	0.009	0.0014	0.9581329	0.010	0.010
21:35	259	1295		5.757	0.009	0.983	0.009	0.0014	0.9595751	0.010	0.010
21:40	260	1300	21.7	5.766	0.009	0.983	0.008	0.0014	0.9610139	0.010	0.010

Time	Time Incre-ment	Duration min.	hr.	Cumulative Precip in order of Increasing Duration	Increm. Precip in.	Depth Area Reduction Factor	Adjusted Precip	% of Pt	Rainfall distri-bution %cumulativ	Incremental Precip in order of Distribution	Adjusted Incremental Precip in order of Distribution
21:45	261	1305		5.775	0.009	0.983	0.008	0.0014	0.9624493	0.010	0.010
21:50	262	1310	21.8	5.783	0.009	0.983	0.008	0.0014	0.9638814	0.010	0.010
21:55	263	1315		5.792	0.009	0.983	0.008	0.0014	0.9653101	0.010	0.010
22:00	264	1320	22.0	5.800	0.009	0.983	0.008	0.0014	0.9667355	0.010	0.010
22:05	265	1325		5.809	0.009	0.983	0.008	0.0014	0.9681576	0.010	0.009
22:10	266	1330	22.2	5.817	0.009	0.983	0.008	0.0014	0.9695764	0.010	0.009
22:15	267	1335		5.826	0.008	0.983	0.008	0.0014	0.970992	0.009	0.009
22:20	268	1340	22.3	5.834	0.008	0.983	0.008	0.0014	0.9724043	0.009	0.009
22:25	269	1345		5.843	0.008	0.983	0.008	0.0014	0.9738135	0.009	0.009
22:30	270	1350	22.5	5.851	0.008	0.983	0.008	0.0014	0.9752194	0.009	0.009
22:35	271	1355		5.860	0.008	0.983	0.008	0.0014	0.9766221	0.009	0.009
22:40	272	1360	22.7	5.868	0.008	0.983	0.008	0.0014	0.9780217	0.009	0.009
22:45	273	1365		5.877	0.008	0.983	0.008	0.0014	0.9794182	0.009	0.009
22:50	274	1370	22.8	5.885	0.008	0.983	0.008	0.0014	0.9808115	0.009	0.009
22:55	275	1375		5.893	0.008	0.983	0.008	0.0014	0.9822017	0.009	0.009
23:00	276	1380	23.0	5.902	0.008	0.983	0.008	0.0014	0.9835888	0.009	0.009
23:05	277	1385		5.910	0.008	0.983	0.008	0.0014	0.9849729	0.009	0.009
23:10	278	1390	23.2	5.918	0.008	0.983	0.008	0.0014	0.9863539	0.009	0.009
23:15	279	1395		5.926	0.008	0.983	0.008	0.0014	0.9877319	0.009	0.009
23:20	280	1400	23.3	5.935	0.008	0.983	0.008	0.0014	0.9891068	0.009	0.008
23:25	281	1405		5.943	0.008	0.983	0.008	0.0014	0.9904788	0.009	0.008
23:30	282	1410	23.5	5.951	0.008	0.983	0.008	0.0014	0.9918478	0.008	0.008
23:35	283	1415		5.959	0.008	0.983	0.008	0.0014	0.9932138	0.008	0.008
23:40	284	1420	23.7	5.967	0.008	0.983	0.008	0.0014	0.9945769	0.008	0.008
23:45	285	1425		5.976	0.008	0.983	0.008	0.0014	0.995937	0.008	0.008
23:50	286	1430	23.8	5.984	0.008	0.983	0.008	0.0014	0.9972942	0.008	0.008
23:55	287	1435		5.992	0.008	0.983	0.008	0.0014	0.9986486	0.008	0.008
	288	1440	24.0	6.000	0.008	0.983	0.008	0.0014	1.00	0.008	0.008
									Total Precip:	6.00	5.69


San Diego 24-hr Nested Storm: Horse Ranch Creek
Intensity (in/hr)
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0
45
90
135
180
225
270
315
360
405
450
495
540
585
630
675
720
765
810
855
900
945
990
1035
1080
1125
1170
1215
1260
1305
1350
1395
Time (min)

Project: HorseRanchCreek Simulation Run: Exist Q100

Start of Run: 01Jan2009, 00:00 Basin Model: Exist
End of Run: 02Jan2009, 02:00 Meteorologic Model: SD Nested 5 min
Compute Time: 30Jul2009, 13:12:22 Control Specifications: Exist 24 hour

Volume Units: AC-FT

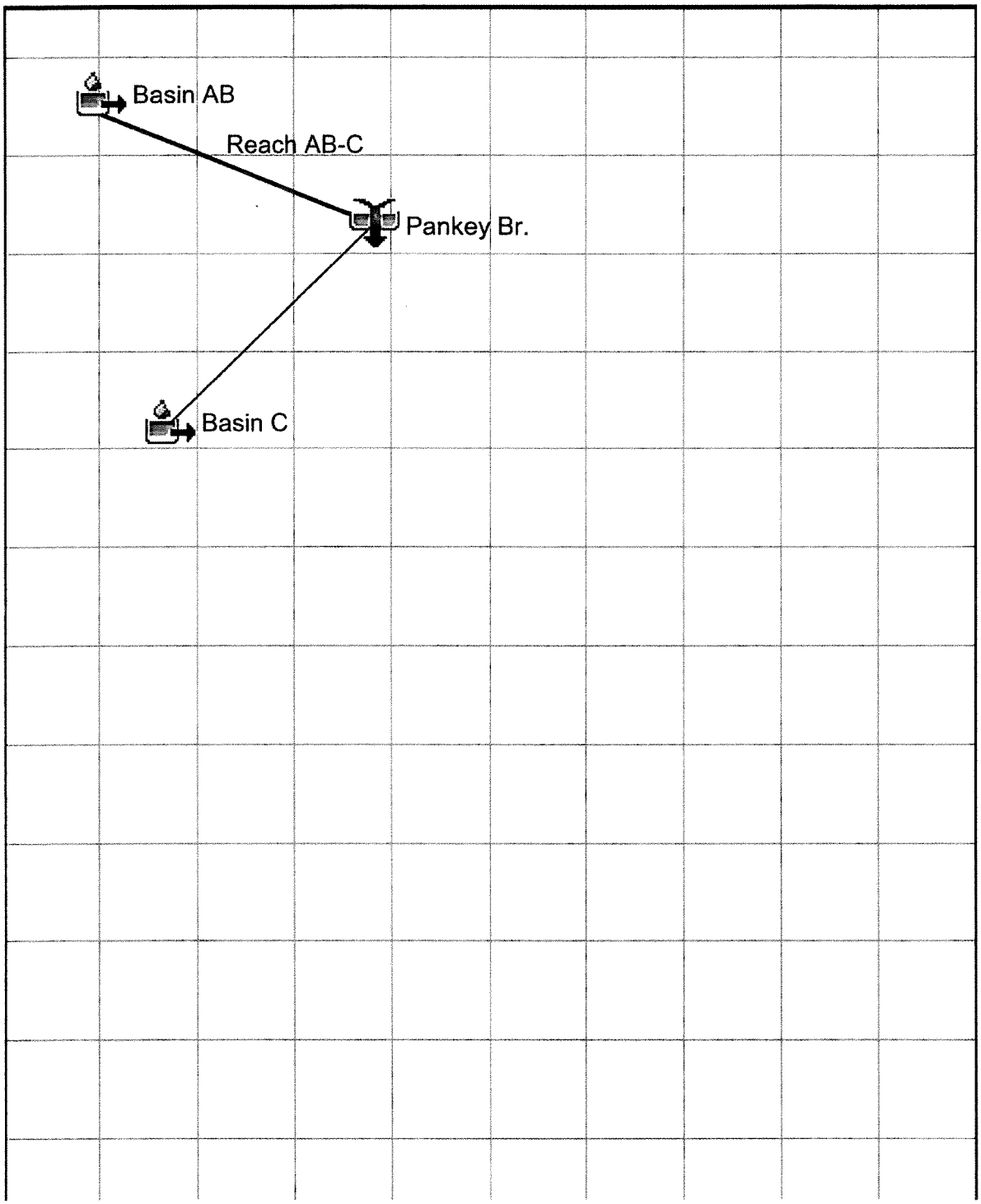
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Basin AB	9.146	8111.0	01Jan2009, 16:45	2140.0
Basin C	2.329	3224.5	01Jan2009, 16:20	517.0
Pankey Br.	11.475	8801.9	01Jan2009, 17:05	2652.4
Reach AB-C	9.146	8058.1	01Jan2009, 17:10	2135.4

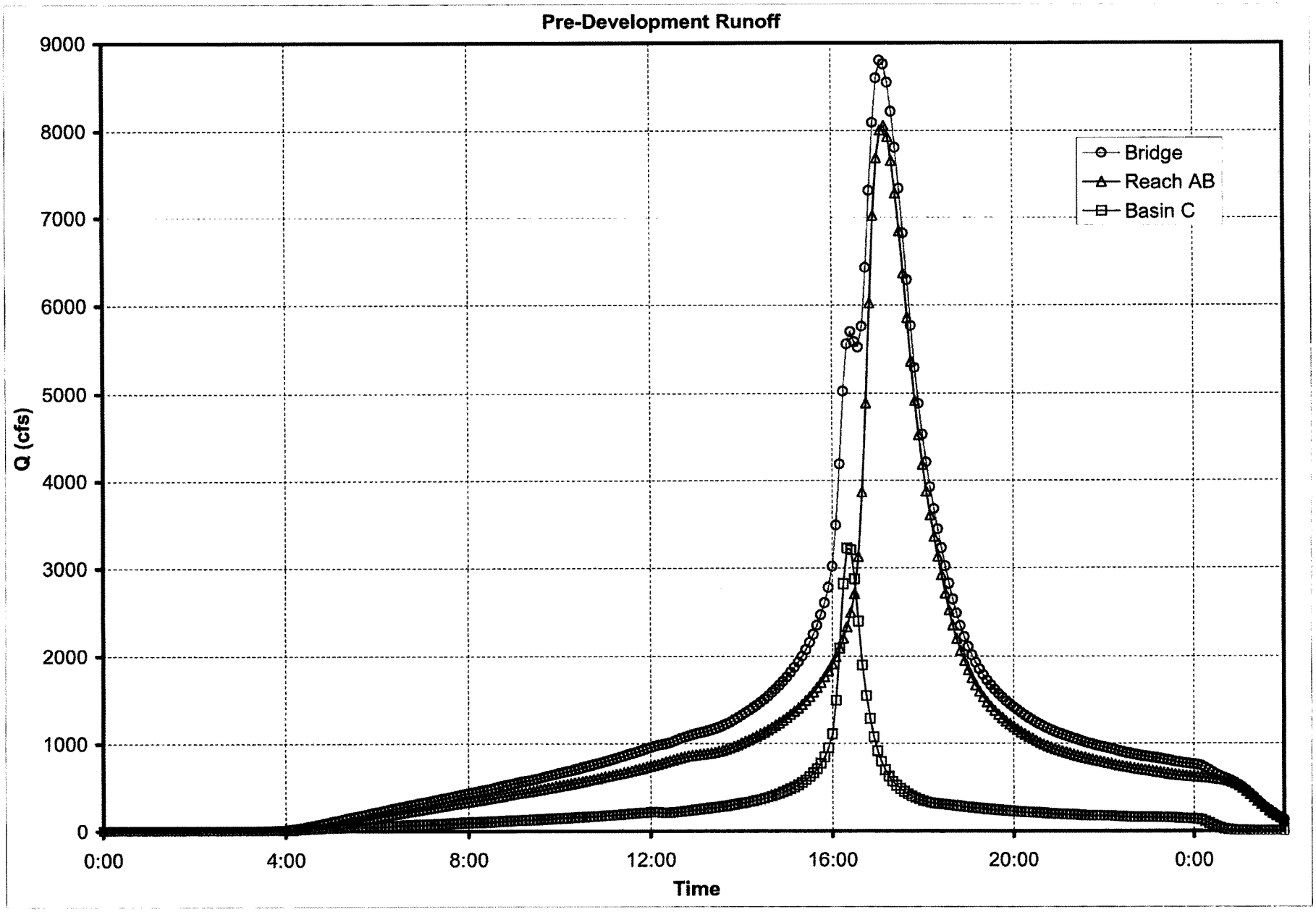
HEC-HMS

Project : HorseRanchCreek

Basin Model : Exist

Jul 30 13:16:20 PDT 2009



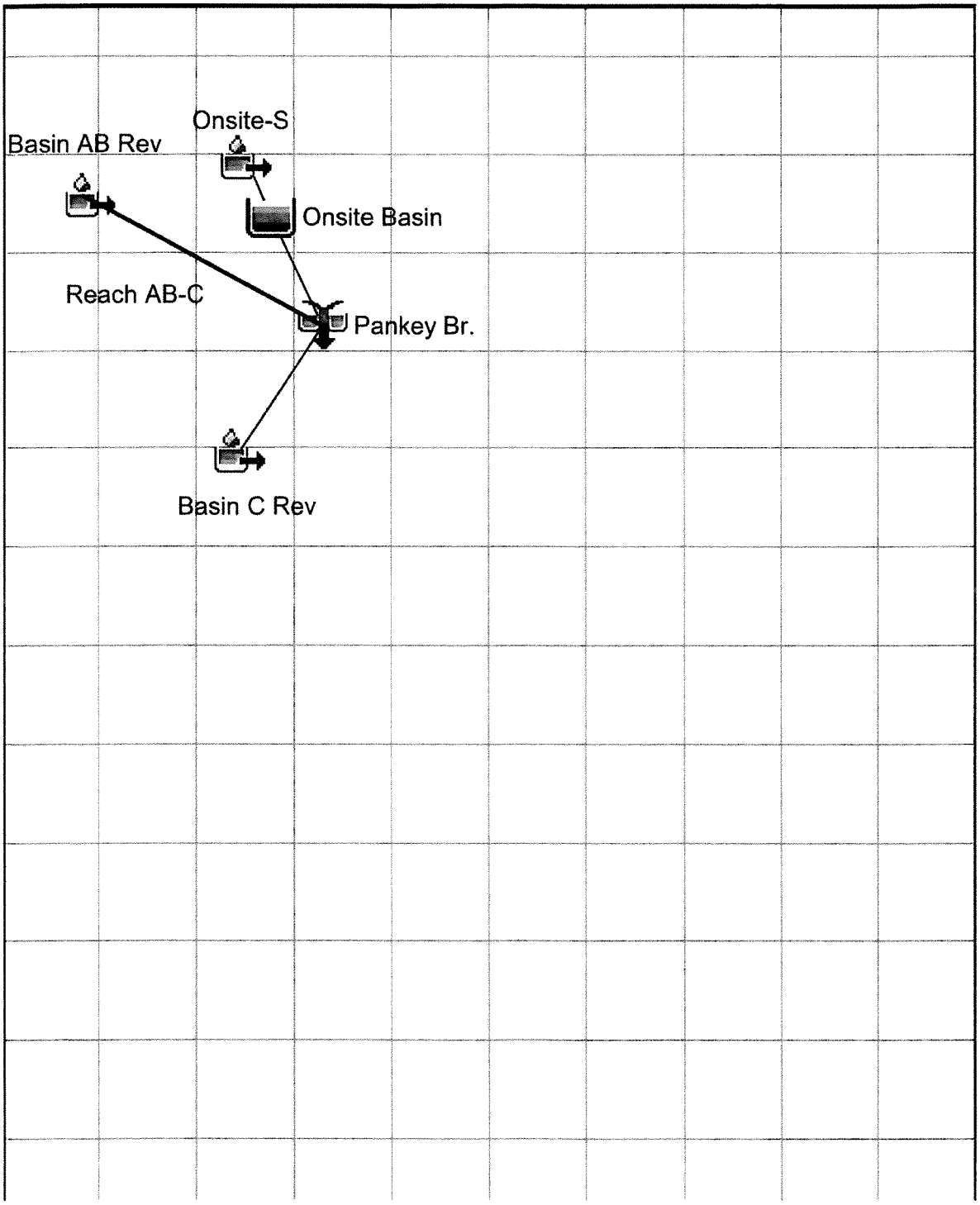

Pre-Development Runoff
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Q (cfs)
0:00
4:00
8:00
12:00
16:00
20:00
0:00
Time
Bridge
Reach AB
Basin C

HEC-HMS

Project : HorseRanchCreek

Basin Model : Developed

Aug 05 15:02:25 PDT 2009

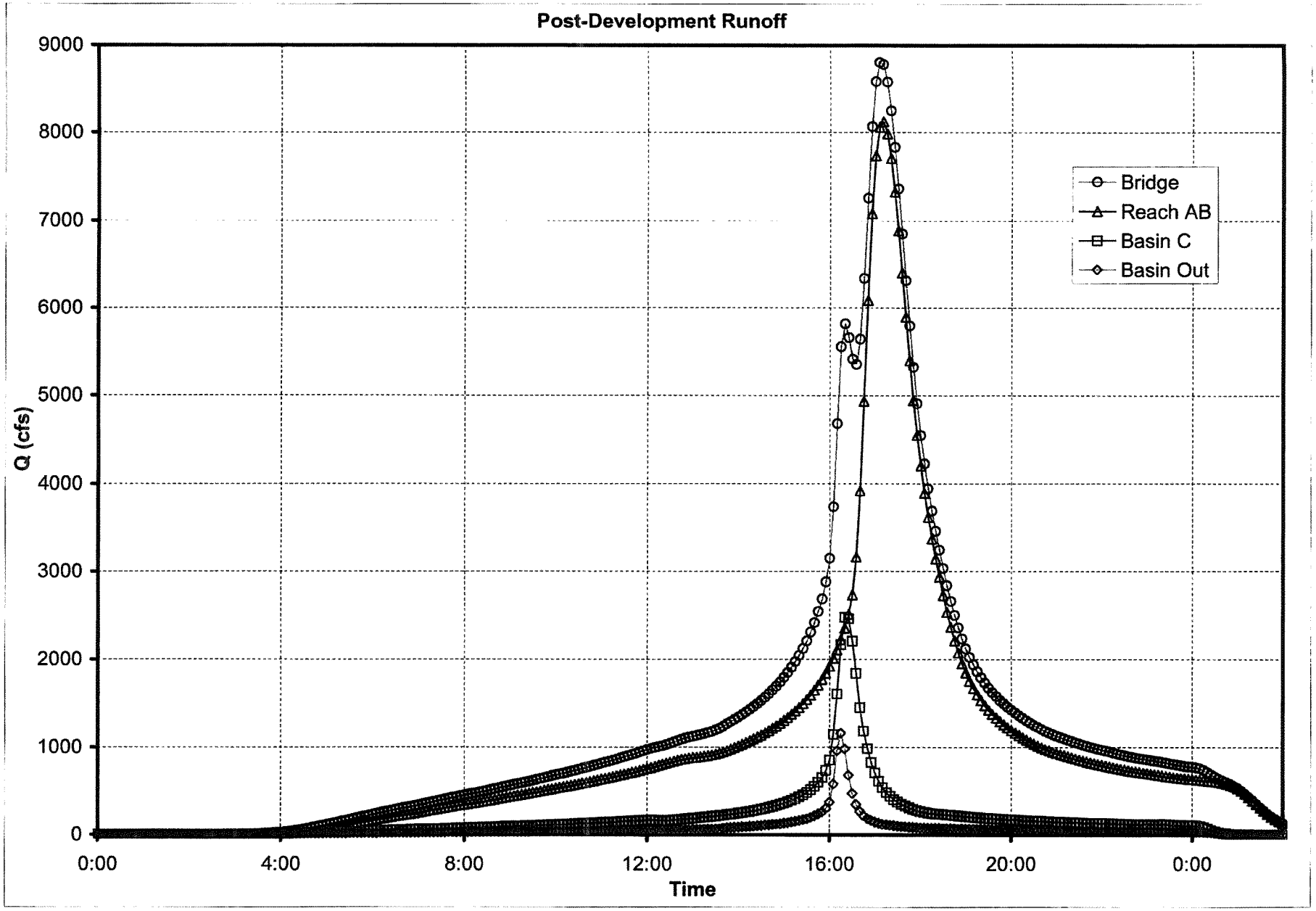


Project: HorseRanchCreek Simulation Run: Proposed Q100

Start of Run: 01Jan2009, 00:00 Basin Model: Developed
End of Run: 02Jan2009, 02:00 Meteorologic Model: SD Nested 5 min
Compute Time: 05Aug2009, 15:38:03 Control Specifications: Prop 24 hour

Volume Units: AC-FT

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Basin AB Rev	9.199	8168.4	01Jan2009, 16:45	2156.5
Basin C Rev	1.777	2478.4	01Jan2009, 16:20	399.2
Onsite Basin	0.563	1163.1	01Jan2009, 16:15	125.5
Onsite-S	0.563	1181.1	01Jan2009, 16:10	135.5
Pankey Br.	11.539	8799.8	01Jan2009, 17:05	2676.6
Reach AB-C	9.199	8121.3	01Jan2009, 17:10	2151.9


Post-Development Runoff
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Q (cfs)
0:00
4:00
8:00
12:00
16:00
20:00
0:00
Time
Bridge
Reach AB
Basin C
Basin Out

Project: HorseRanchCreek

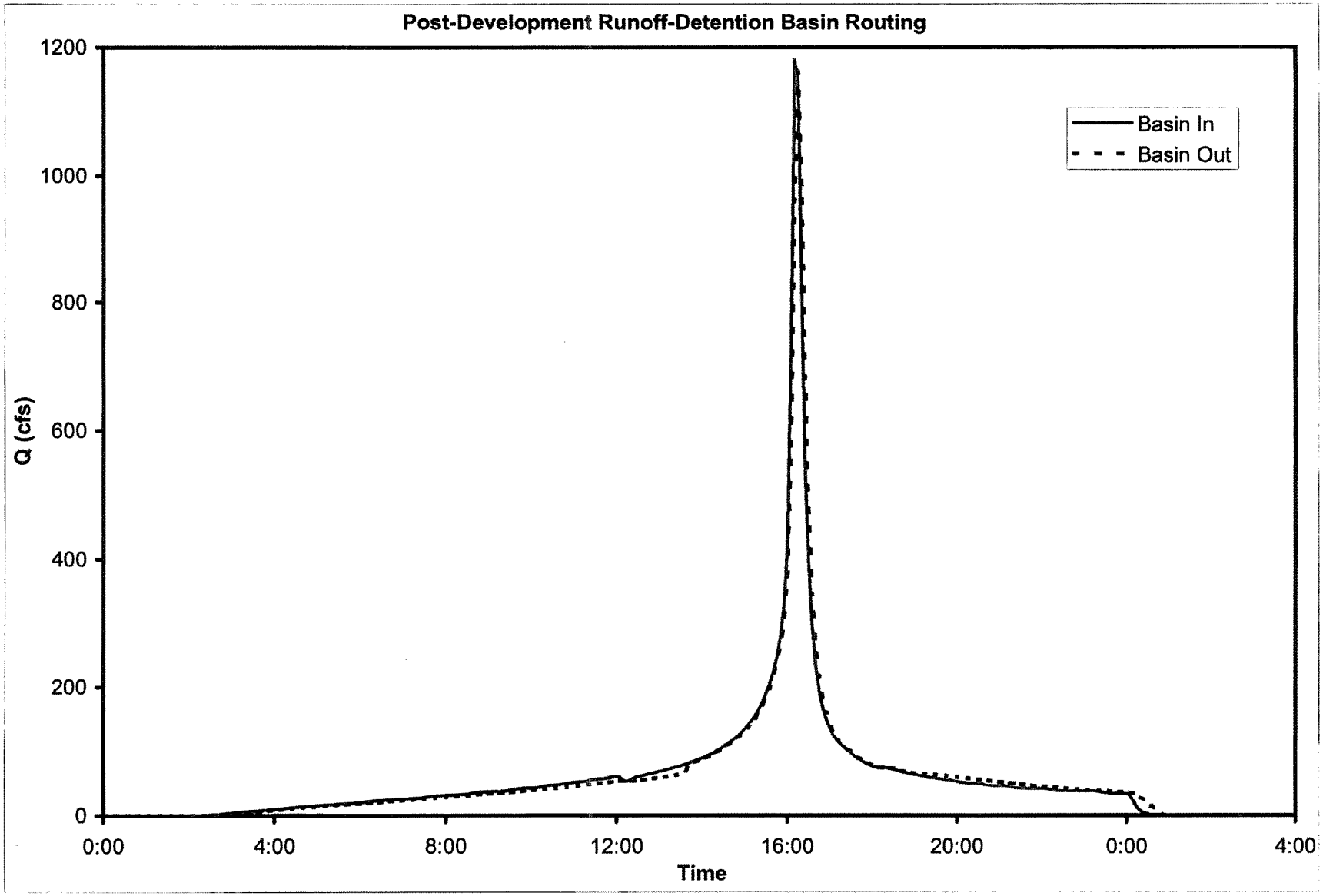
Simulation Run: Proposed Q100 Reservoir: Onsite Basin

Start of Run:	01Jan2009, 00:00	Basin Model:	Developed
End of Run:	02Jan2009, 02:00	Meteorologic Model:	SD Nested 5 min
Compute Time:	05Aug2009, 15:38:03	Control Specifications:	Prop 24 hour

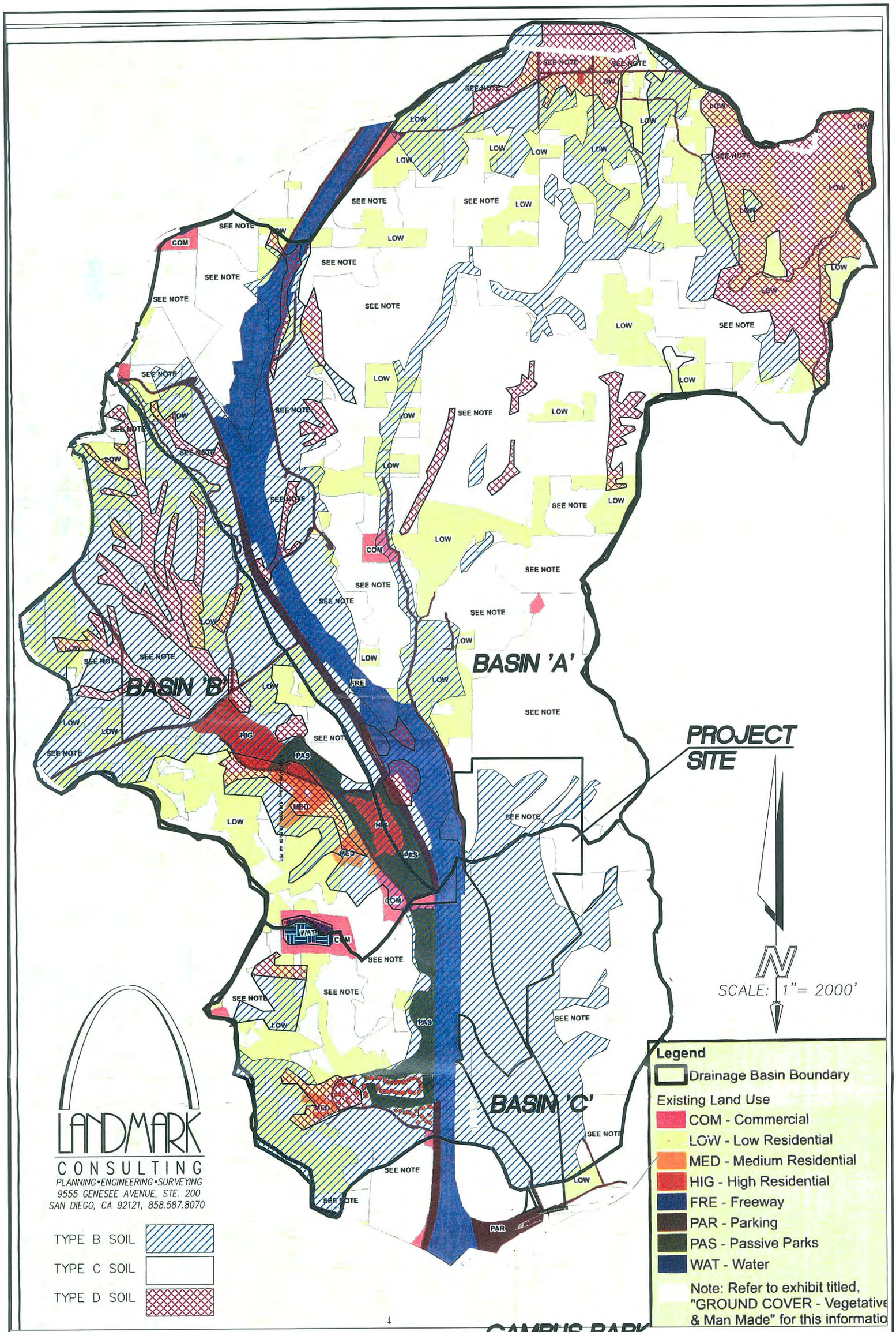
Volume Units: AC-FT

Computed Results

Peak Inflow :	1181.1 (CFS)	Date/Time of Peak Inflow :	01Jan2009, 16:10
Peak Outflow :	1163.1 (CFS)	Date/Time of Peak Outflow :	01Jan2009, 16:15
Total Inflow :	135.5 (AC-FT)	Peak Storage :	10.7 (AC-FT)
Total Outflow :	125.5 (AC-FT)	Peak Elevation :	273.3 (FT)


Post-Development Runoff-Detention Basin Routing
Basin In
Basin Out
Q (cfs)
1200
1000
800
600
400
200
0
0:00
4:00
8:00
12:00
16:00
20:00
0:00
4:00
Time

SECTION 8 B:
PRE-DEVELOPMENT CONDITIONS
HORSE RANCH CREEK HEC HMS
HYDROLOGY/DEVELOPMENT TYPE MAP



CAMPUS PARK
SOIL GROUP AND LANDUSE MAP
PRE-DEVELOPMENT

IN·

DPW GIS
Department of Public Works
Geographic Information Services

County of San Diego
Department of Public Works
Geographic Information Services

Site
Roads
Streams
40 Foot Contours

Horse Ranch Creek
HEC HMS HYDROLOGY MAP
PRE-DEVELOPMENT
CONDITIONS

1 inch equals 800 feet

Aerial images and parcel line information are not fully registered.

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

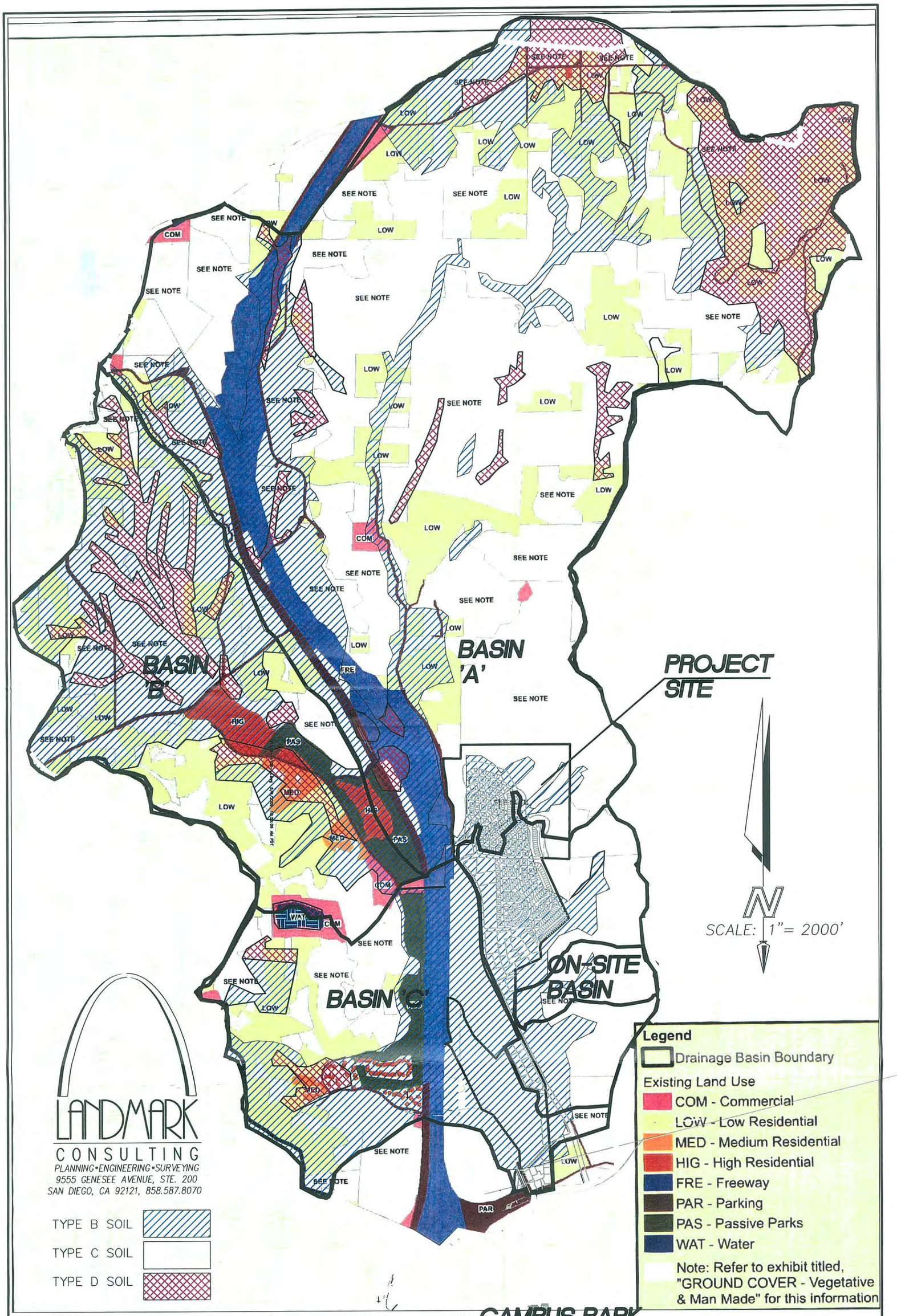
EAGLE AERIAL

Copyright Eagle Aerial All Rights Reserved

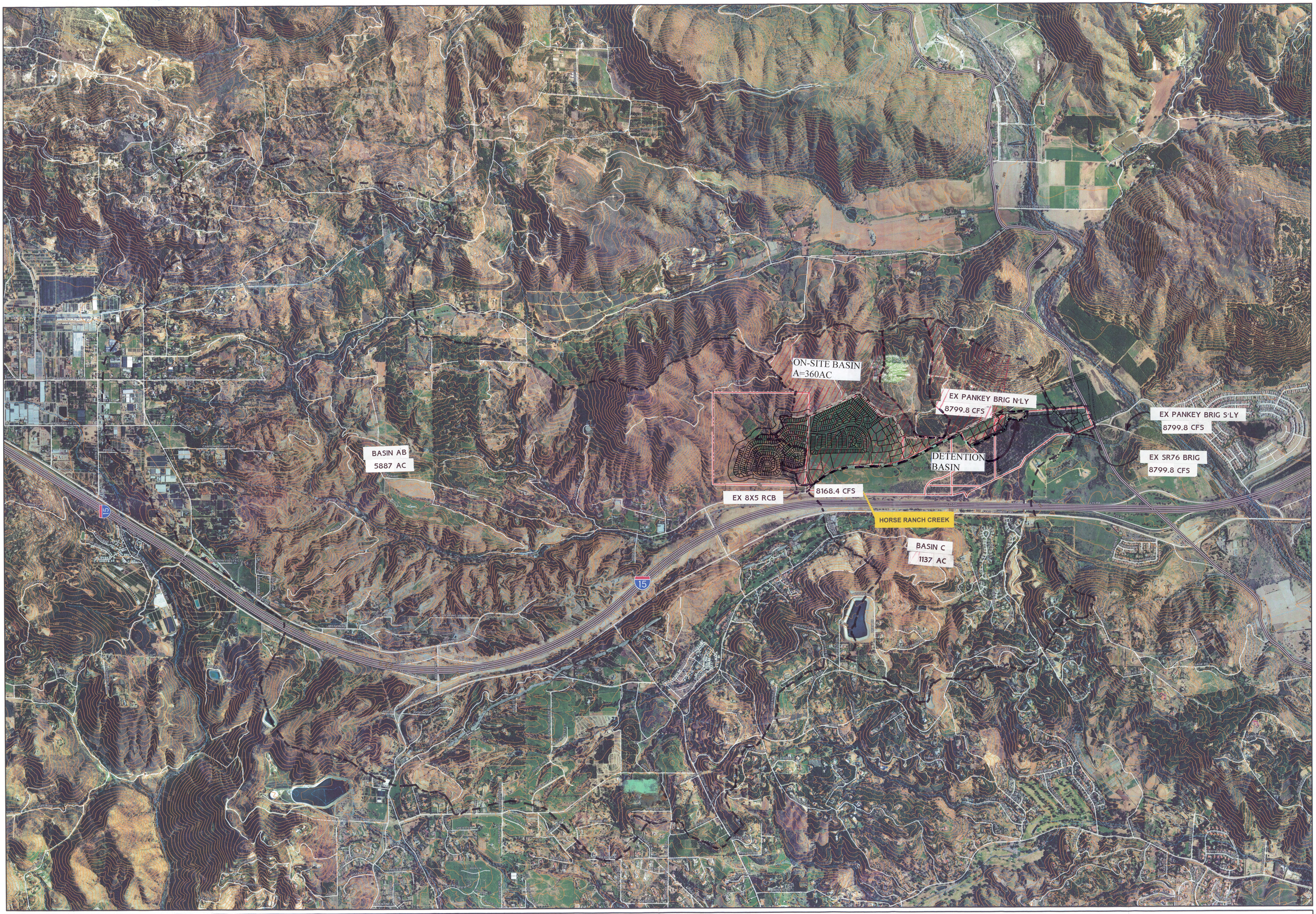
Photography: January 2008
For more information (858) 495-5775

This map (DPW34207-O:\01 Customers_Steve\A-L\Jill Harris\Horse Ranch Creek.mxd) was produced on 7/23/2008

SECTION 8C:
POST-DEVELOPMENT CONDITIONS
HORSE RANCH CREEK HEC HMS
HYDROLOGY/DEVELOPMENT TYPE MAP



CAMPUS PARK
SOIL GROUP AND LANDUSE MAP
POST-DEVELOPMENT



County of San Diego
Department of Public Works
Geographic Information Services

Site
Roads
Streams
40 Foot Contours

AREA ROUTED THROUGH DETENTION BASIN
MODELED AS ON-SITE BASIN IN HEC-HMS ANALYSIS
(360 Ac)

Horse Ranch Creek
HEC HMS HYDROLOGY MAP
POST-DEVELOPMENT
CONDITIONS

1 inch equals 800 feet

Aerial images and parcel line information are not fully registered.

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

Copyright Eagle Aerial All Rights Reserved

Photography: January 2008
For more information (858) 495-5775

This map (DPW34207-O:\01 Customers_Steve\A-L\Jill Harris\Horse Ranch Creek.mxd) was produced on 7/23/2006

SECTION 8D:

Cn NUMBER CALCULATIONS

Project Campus Park **Date** 07/29/09

Subject Curve Number Calculations (PZN 2.0)

Soil Break Down(PREDEV)

Subarea	B	C	D	Total
A	792	3183	576	4551.0
B	745	312	237	1294.3
C	873.0	570	48.0	1491.1
Totals	2410	4065	861	7336
	33%	55%	12%	

Soil Break Down(POST DEV.)

Subarea	B	C	D	Total
A	834	3183	576	4592.7
B	745	312	237	1294.6
C	853.6	562	48.0	1463.5
Totals	2433	4057	861	7351
	33%	55%	12%	

Pre-Development Subareas

		Group B		Group C		Group D			
Basin	Landuse	Area (ac)	CN	Area (ac)	CN	Area (ac)	CN	Area (ac)	CN x A
AB	Low Density Res.	236	65	68	77	212	82	516	37941
	Med Density Res.	0	72	0	81	18	86	18	1548
	High Density Res.	52	85	0	90	9	92	61	5276
	Commercial	0	92	0	94	2	95	2	152
	Passive Park	71	61	0	74	0	80	71	4355
	Broadleaf Chapparal	0	63	0	75	0	81	0	0
	Narrowleaf Chapparal	651	72	3052	81	536	86	4239	340180
	Evegreen Orchards	364	65	301	77	10	82	675	47622
	Paved Roads	172	98	74	98	26	98	272	26636
	Totals	1546		3495		813		5853	463710
								Composite CN =	79.2

		Group B		Group C		Group D			
Basin	Landuse	Area (ac)	CN	Area (ac)	CN	Area (ac)	CN	Total Area (ac)	CN x A
C	Low Density Res.	95	65	68	77	22	82	185	13215
	Med Density Res.	1	72	0	81	6	86	7	594
	High Density Res.	22	85	0	90	13	92	35	3066
	Commercial	2	92	14	94	0	95	16	1519
	Passive Park	71	61	0	74	0	80	71	4355
	Broadleaf Chapparal	0	63	0	75	0	81	0	0
	Narrowleaf Chapparal	509	72	349	81	7	86	865	65519
	Evegreen Orchards	89	65	111	77	0	82	200	14306
	Paved Roads	83	98	28	98	0	98	111	10878
		872		570		48		1490	113452
								Composite CN =	76.1

Total Area for Pre-Dev:	2418	4065	861	7344
Post-Development Subareas	33%	55%	12%	

Basin		Group B		Group C		Group D			
AB	Landuse	Area (ac)	CN	Area (ac)	CN	Area (ac)	CN	Total Area (ac)	CN x A
	Low Density Res.	236	65	68	77	212	82	516	37960
	Med Density Res.	0	72	0	81	18	86	18	1548
	High Density Res.	89	85	10	90	9	92	108	9311
	Commercial	0	92	0	94	16	95	16	1520
	Passive Park	74	61	0	74	0	80	74	4514
	Broadleaf Chapparal	0	63	0	75	0	81	0	0
	Narrowleaf Chapparal	616	72	3056	81	536	86	4208	337984
	Evegreen Orchards	364	65	301	77	10	82	675	47657
	Paved Roads	184	98	74	98	14	98	272	26656
	Totals	1563		3509		815		5887	467150
								Composite CN =	79.4

Basin		Group B		Group C		Group D			
C	Landuse	Area (ac)	CN	Area (ac)	CN	Area (ac)	CN	Total Area (ac)	CN x A
	Low Density Res.	95	65	68	77	22	82	185	13215
	Med Density Res.	1	72	2	81	6	86	9	750
	High Density Res.	36	85	14	90	23	92	73	6454
	Commercial	2	92	0	94	0	95	2	184
	Passive Park	71	61	0	74	0	80	71	4331
	Broadleaf Chapparal	0	63	0	75	0	81	0	0
	Narrowleaf Chapparal	352	72	300	81	7	86	659	50246
	Evegreen Orchards	21	65	7	77	0	82	28	1904
Basin	Paved Roads	83	98	28	98	0	98	111	10878
Onsite		661		419		58		1138	87962
								Composite CN =	77.3

		Group B		Group C		Group D			
	Landuse	Area (ac)	CN	Area (ac)	CN	Area (ac)	CN	Total Area (ac)	CN x A
	High Density Res.	9	85	63	90	0	92	72	6435
	Commercial	10	92	10	94	0	95	20	1860
	Broadleaf Chapparal	0	63	0	75	0	81	0	0
	Narrowleaf Chapparal	140	72	107	81	0	86	247	18707
	Evegreen Orchards	0	65	0	77	0	82	0	0
	Paved Roads	5	98	17	98	0	98	22	2156
		164		197		0		361	29158
								Composite CN =	80.9

Total Area for Post-Dev:	2388	4125	873	7386
	33%	56%	12%	

SECTION 9:
100-YEAR HYDRAULIC ANALYSIS

A HEC-RAS analysis of the Horse Ranch Creek floodplain was prepared to demonstrate that the proposed project can be developed without detrimental effects to the flood carrying capacity of Horse Ranch Creek or to the surrounding properties and that the proposed pad elevations at the lower reaches of the floodplain are high enough that the building pads will not be inundated by flood waters. The HEC-RAS analysis calculated the floodplain limits of the Horse Ranch Creek (at critical locations) from the existing Pankey Road bridge southerly of SR-76 to the northerly limits of Horse Ranch Creek within the project boundary (in the pre-development, post-development and capacity conditions). The flow velocities and water surface elevations are listed in the following pages. As mentioned above, it was assumed the surrounding developments would reduce their post-development runoff volumes to pre-development levels. For the post-development condition, it was assumed only TM 5338 was built. Following the calculations are the pre-development, post-development and capacity floodplain limit exhibits.

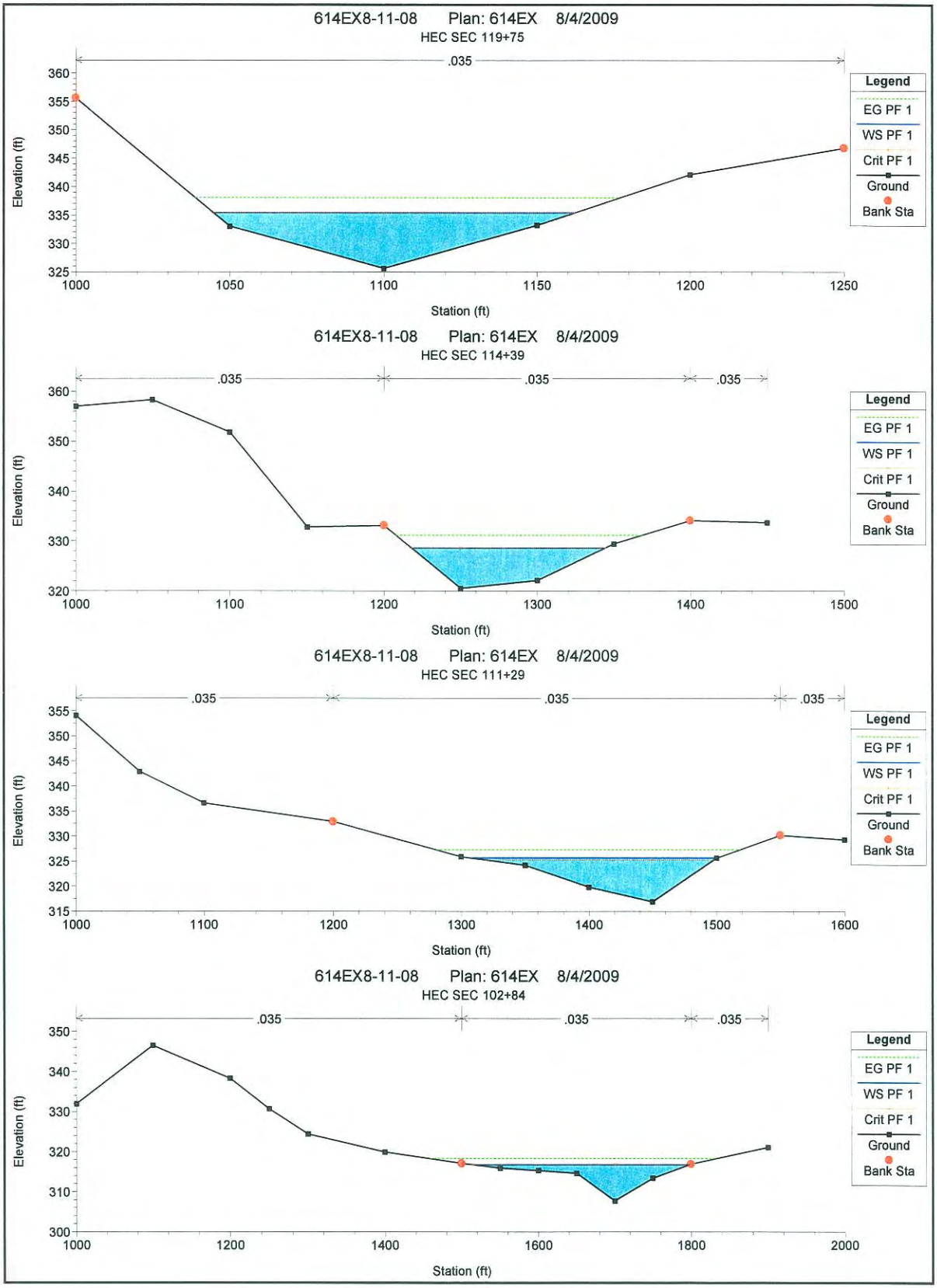
The runoff volumes used in the HEC-RAS program, for the pre and post-development 100-year flows, were taken from Section 8 - Horse Ranch Creek 100-year NRCS Hydrologic Method.

At the end of this section, the capacity of the existing 5’x8’ box culvert under Pankey Road (north) during post-development conditions to verify that the proposed project does not adversely impact this culvert crossing under outlet control conditions.

SECTION 9A:
HORSE RANCH CREEK HEC-RAS CALCS
PRE-DEVELOPMENT CONDITIONS

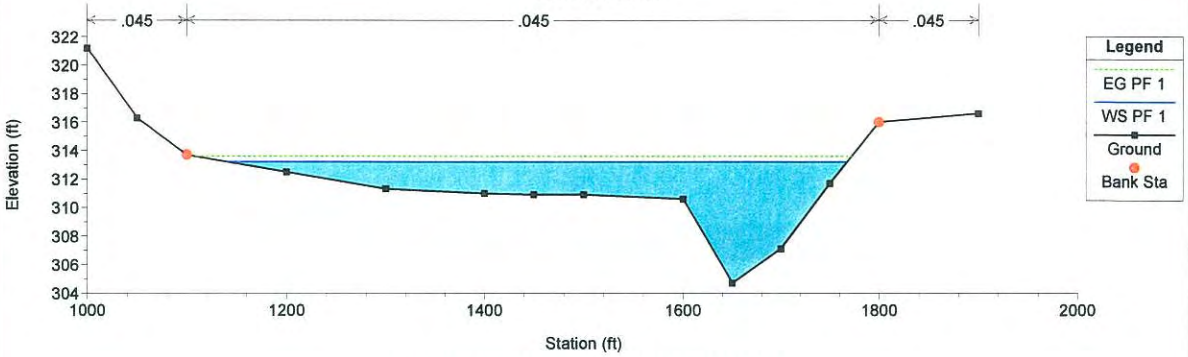
HEC-RAS Plan: 614 PRE DEV River: HRC Reach: 1 Profile: PF 1

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)	
1	11975	PF 1	8111.00	325.60	335.35	335.35	338.02	0.010559	13.09	619.43	117.30	1.00
1	11439	PF 1	8152.00	320.50	328.58	328.58	331.12	0.010662	12.79	637.49	126.46	1.00
1	11129	PF 1	8192.00	316.90	325.62	325.21	327.28	0.009001	10.33	793.10	192.08	0.90
1	10284	PF 1	8233.00	307.70	316.77	316.77	318.27	0.012686	9.81	839.08	284.53	1.01
1	9855	PF 1	8273.00	304.70	313.22		313.59	0.005950	4.92	1683.20	627.25	0.53
1	9431	PF 1	8314.00	300.50	308.58	308.41	309.50	0.018731	7.70	1079.11	484.02	0.91
1	8907	PF 1	8354.00	295.80	302.47		302.78	0.008827	4.44	1881.06	1097.71	0.60
1	8526	PF 1	8395.00	294.70	298.53		298.94	0.011876	5.13	1636.01	960.54	0.69
1	8191	PF 1	8436.00	291.70	295.15	294.29	295.40	0.009478	4.01	2103.47	980.30	0.48
1	7233	PF 1	8476.00	283.50	286.35	285.60	286.51	0.009139	3.27	2595.13	1607.93	0.45
1	6607	PF 1	8517.00	276.00	279.59		279.87	0.012655	4.24	2007.02	1067.33	0.55
1	6241	PF 1	8558.00	273.90	277.07		277.21	0.004647	2.97	2921.63	1320.46	0.34
1	5846	PF 1	8598.00	270.10	272.36	272.33	272.98	0.045662	6.33	1358.45	1279.23	0.98
1	5134	PF 1	8639.00	264.00	269.65		269.74	0.001543	2.36	3934.64	1288.57	0.21
1	4583	PF 1	8679.00	262.10	269.46		269.48	0.000209	1.19	8157.92	1638.54	0.09
1	4059	PF 1	8720.00	261.30	269.36		269.37	0.000150	0.94	8681.03	1447.05	0.07
1	3750	PF 1	8761.00	257.90	269.29		269.31	0.000184	1.40	7464.49	1156.61	0.08
1	3646	PF 1	8801.00	256.00	269.25		269.28	0.000283	2.09	6235.12	1035.54	0.11
1	3510	PF 1	8802.00	255.40	268.99	266.68	269.15	0.001629	0.84	3123.05	751.96	0.05
1	3476		Bridge									
1	3447	PF 1	8802.00	255.30	268.81	266.27	268.97	0.001388	4.27	3234.02	733.12	0.23
1	3050	PF 1	8802.00	252.25	267.75	266.30	268.10	0.004064	5.86	2127.08	1064.95	0.38
1	2846	PF 1	8802.00	252.30	267.14		267.45	0.002393	5.43	2413.18	608.74	0.31
1	2595	PF 1	8802.00	251.40	265.35	260.83	266.35	0.005779	8.04	1094.95	119.39	0.47
1	2525		Bridge									
1	2441	PF 1	8802.00	249.30	264.65		264.88	0.001823	4.83	3158.42	1097.24	0.26
1	2225	PF 1	8802.00	251.30	264.13		264.39	0.002775	5.17	2589.23	964.67	0.32
1	1989	PF 1	8802.00	250.30	262.07		263.07	0.009108	8.25	1222.35	425.39	0.57
1	1665	PF 1	8802.00	246.00	258.97	255.19	260.32	0.007219	9.37	969.70	127.55	0.53
1	1624		Bridge									
1	1580	PF 1	8802.00	246.00	257.61		258.64	0.005961	8.17	1091.89	132.14	0.48
1	1374	PF 1	8802.00	246.00	257.00	252.54	257.50	0.003218	5.94	1806.42	459.67	0.35


614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 119+75
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 114+39
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 111+29
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 102+84
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

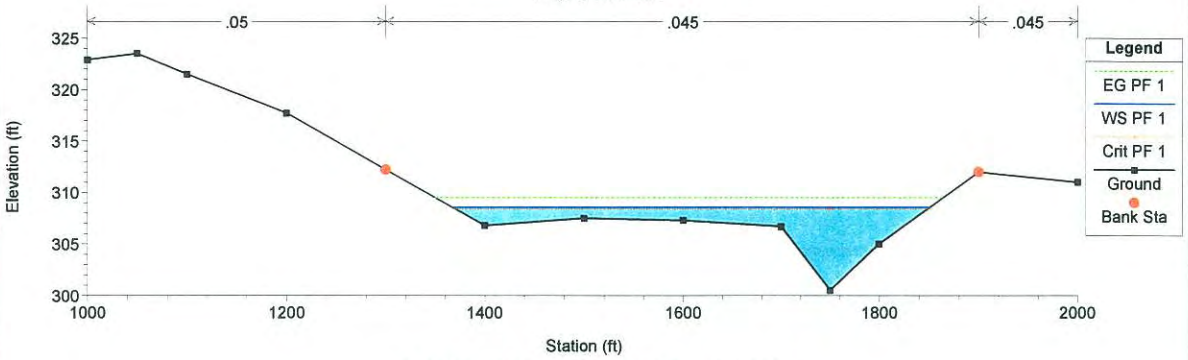
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SEC 98+55



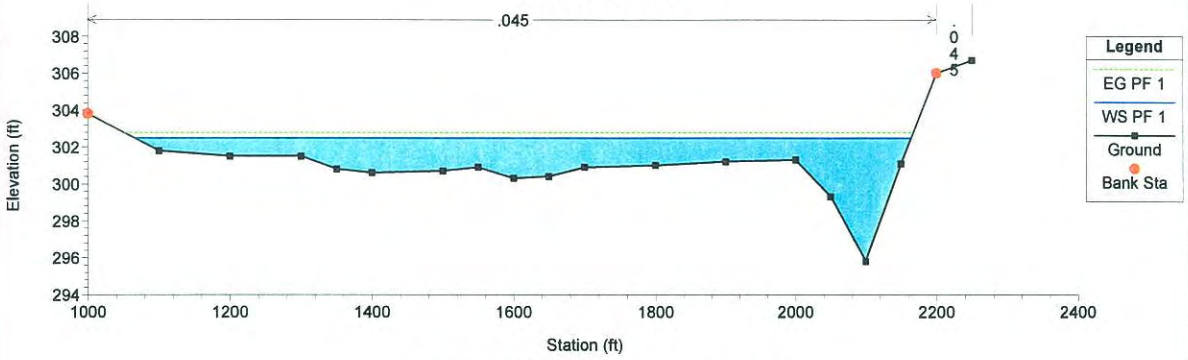
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SEC 94+31



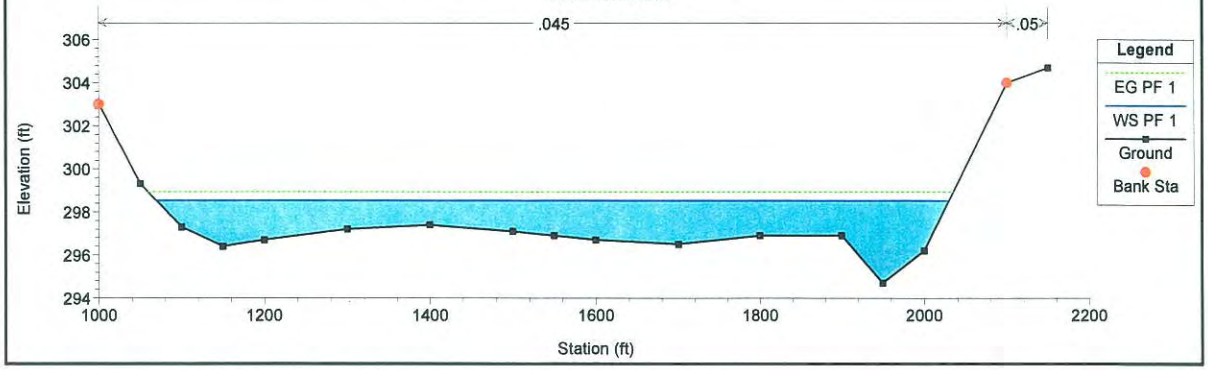
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SECTION 89+07



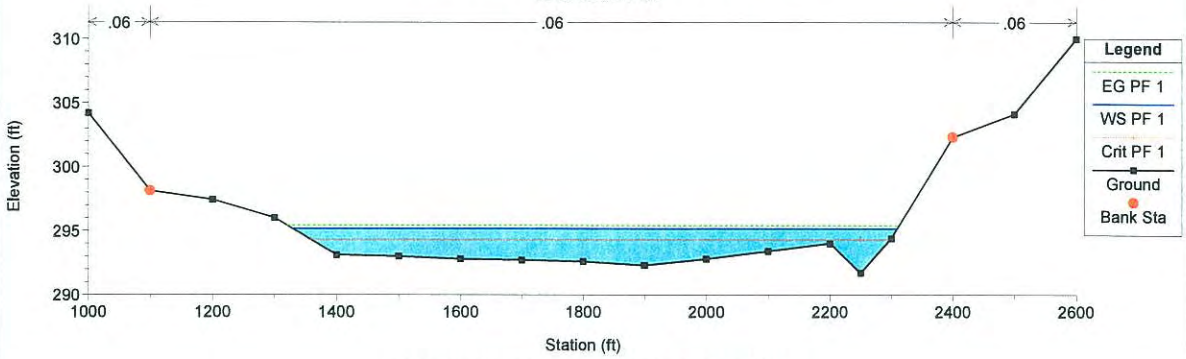
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SEC 85+26



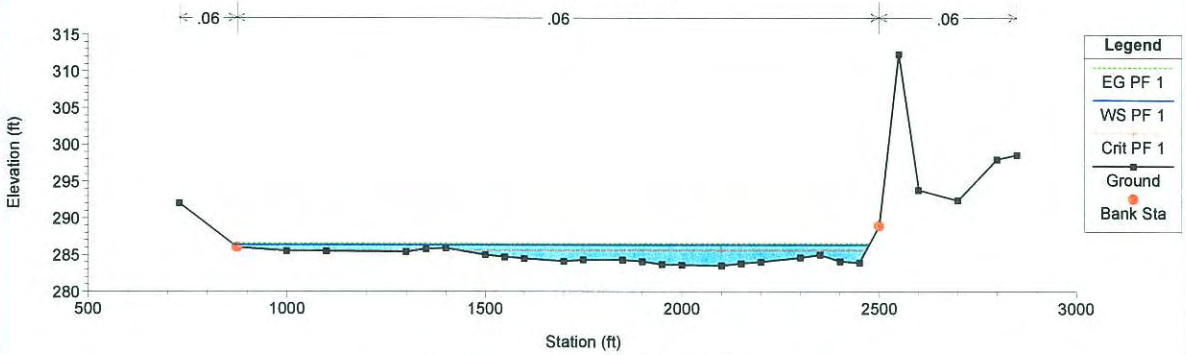
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SEC 81+91



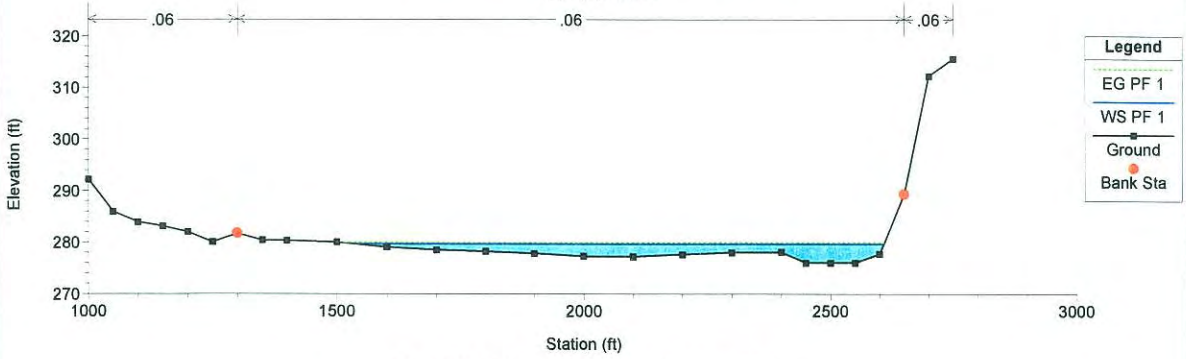
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SECTION 72+33



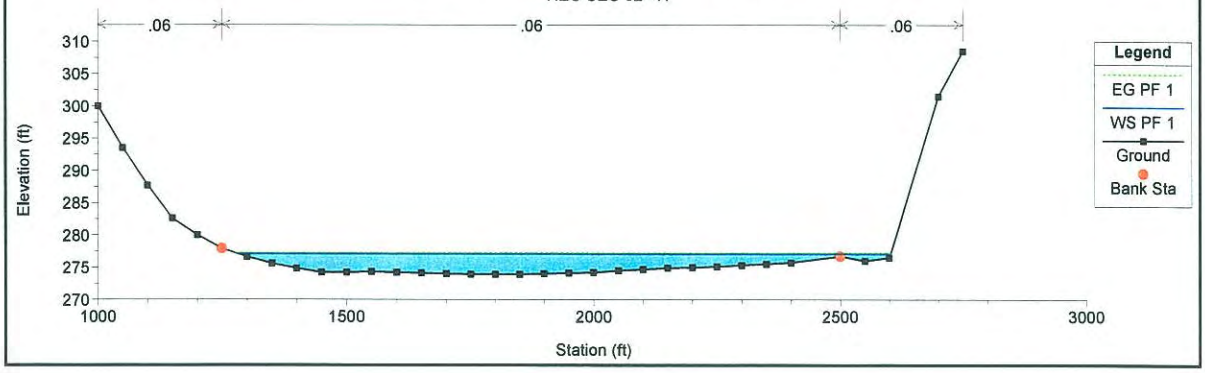
614EX8-11-08 Plan: 614EX 8/4/2009

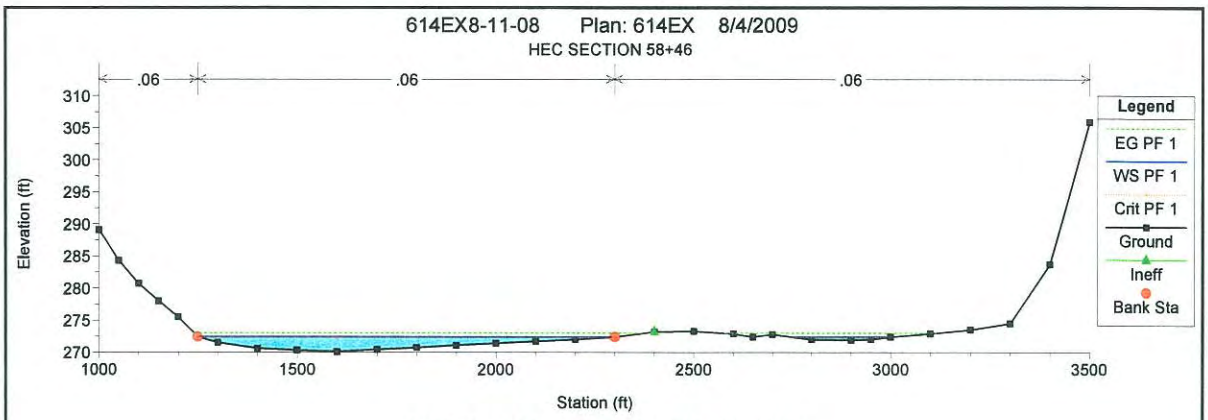
HEC SEC 66+07

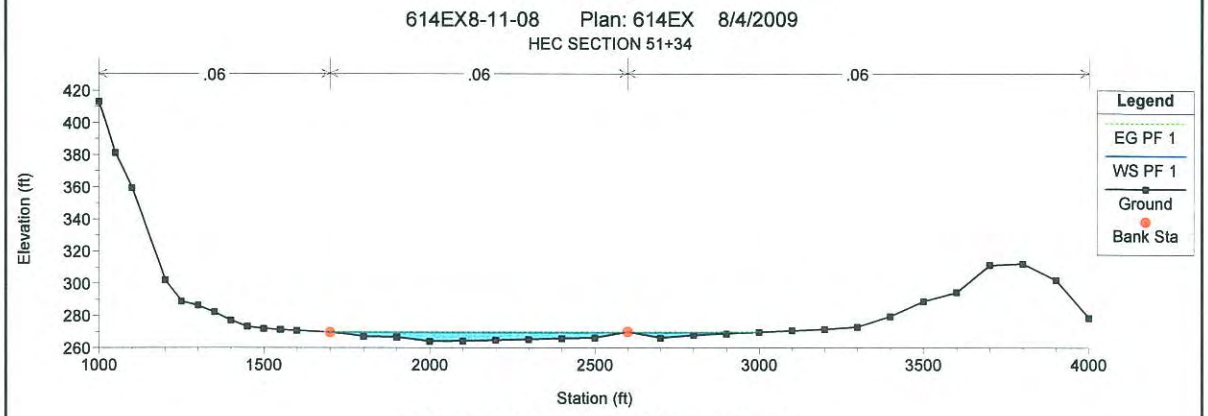


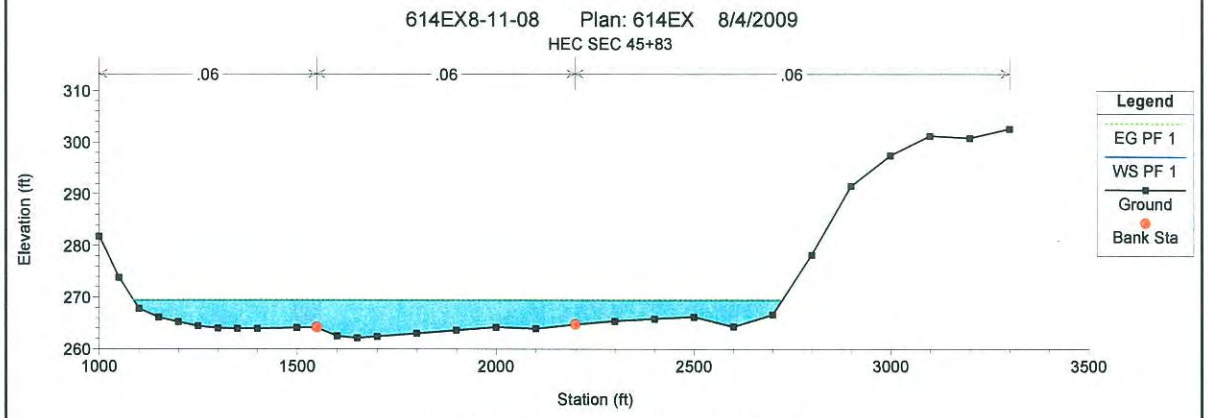
614EX8-11-08 Plan: 614EX 8/4/2009

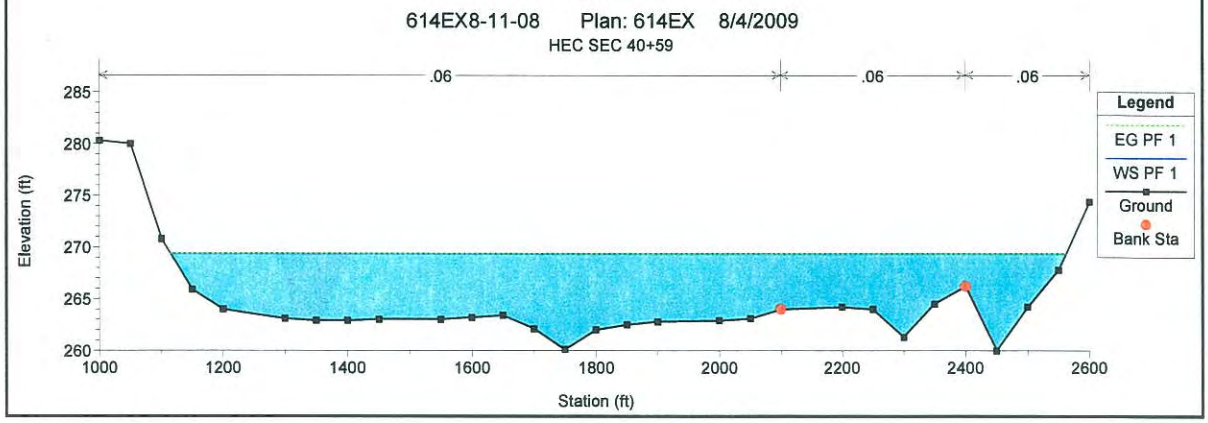
HEC SEC 62+41




614EX8-11-08 Plan: 614EX 8/4/2009
HEC SECTION 58+46
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

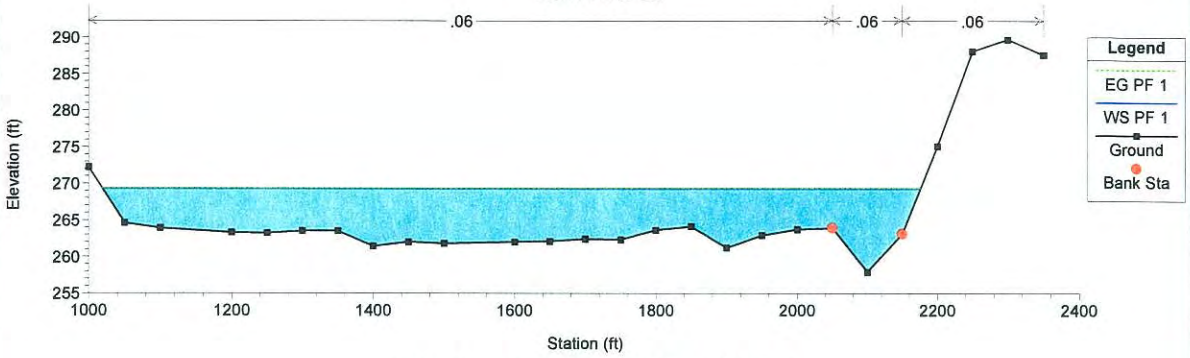

614EX8-11-08 Plan: 614EX 8/4/2009
HEC SECTION 51+34
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 45+83
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 40+59
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

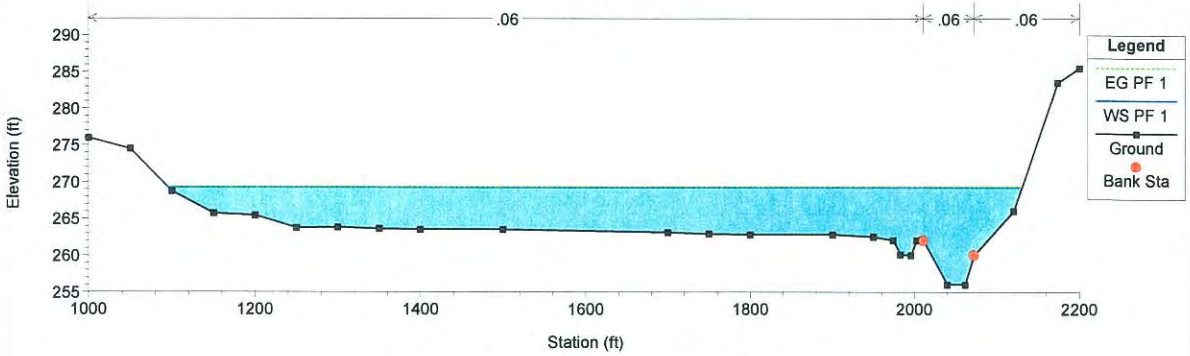
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SEC 37+50



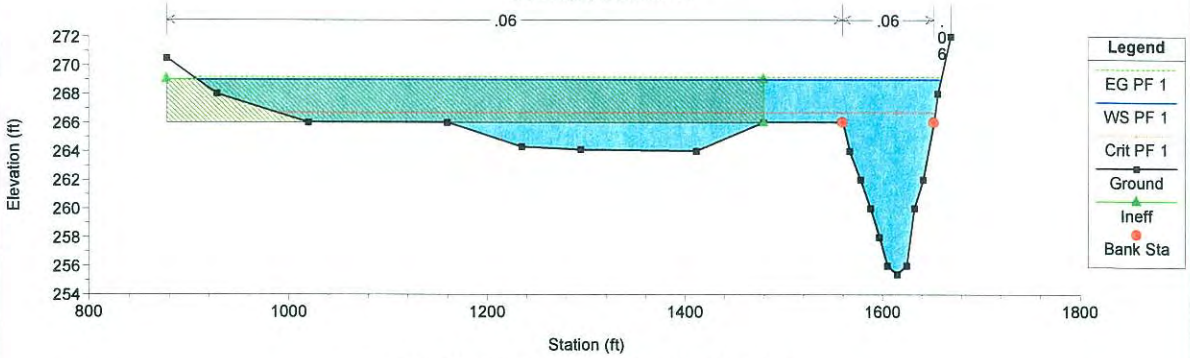
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SEC 36+46



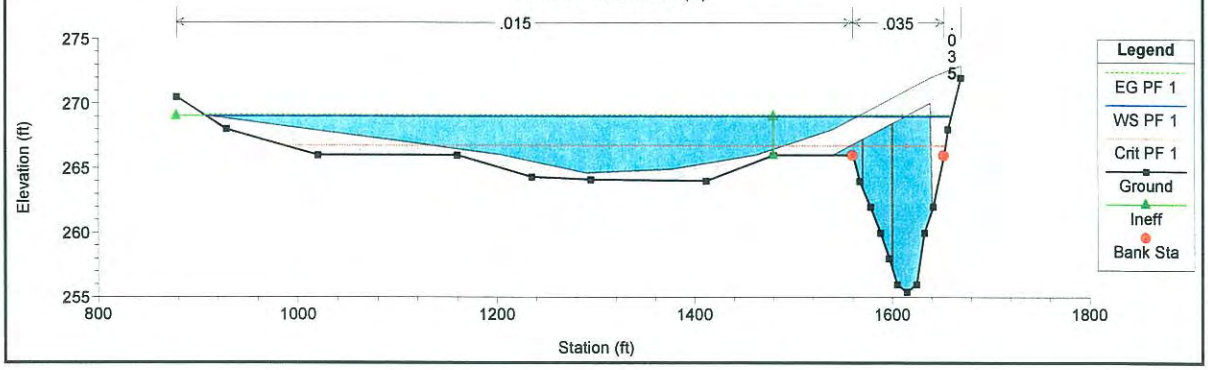
614EX8-11-08 Plan: 614EX 8/4/2009

U/S Pankey North 35+10



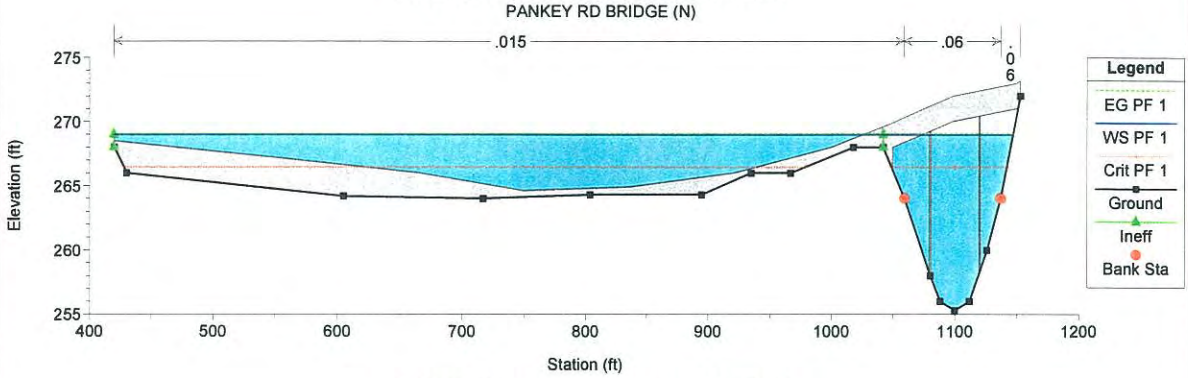
614EX8-11-08 Plan: 614EX 8/4/2009

PANKEY RD BRIDGE (N)



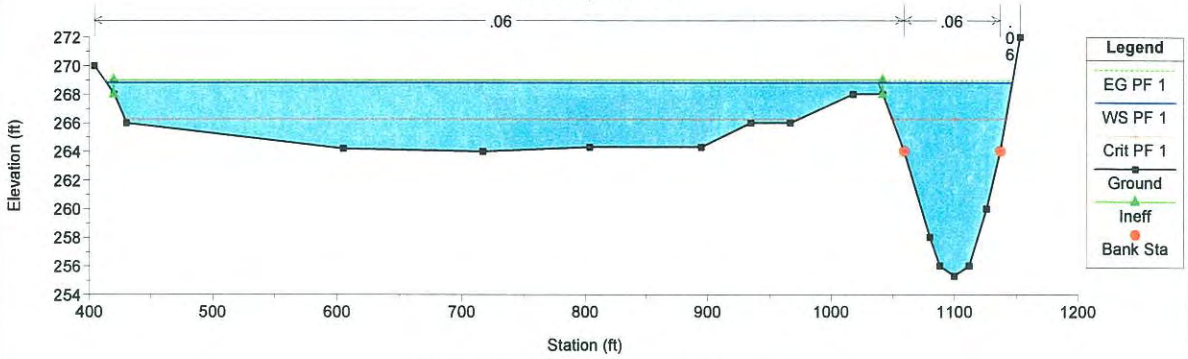
614EX8-11-08 Plan: 614EX 8/4/2009

PANKEY RD BRIDGE (N)



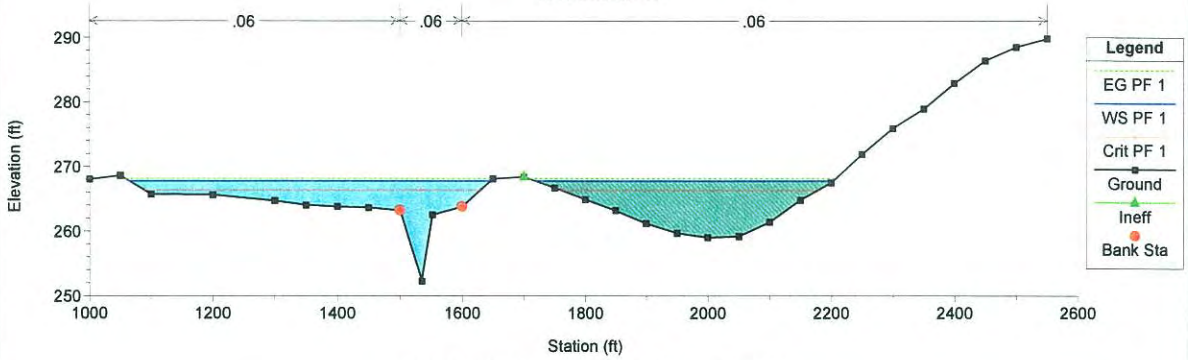
614EX8-11-08 Plan: 614EX 8/4/2009

D/S Pankey North 34+47



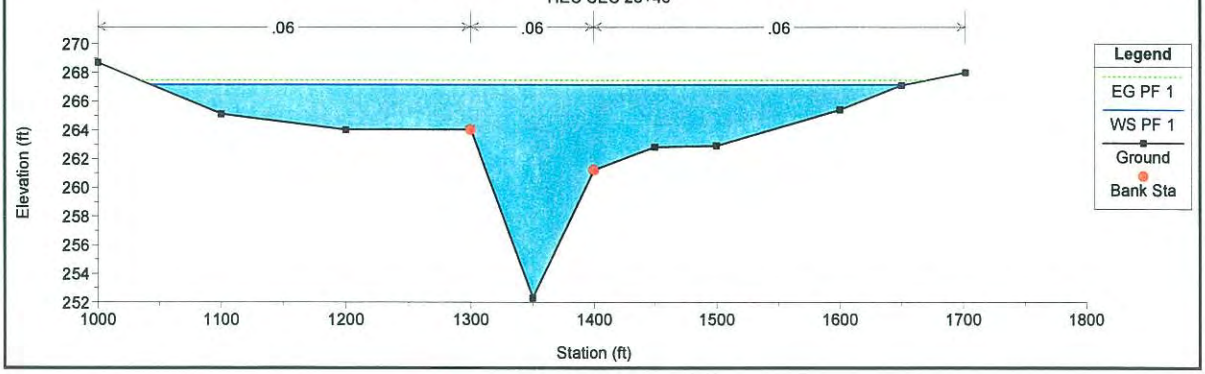
614EX8-11-08 Plan: 614EX 8/4/2009

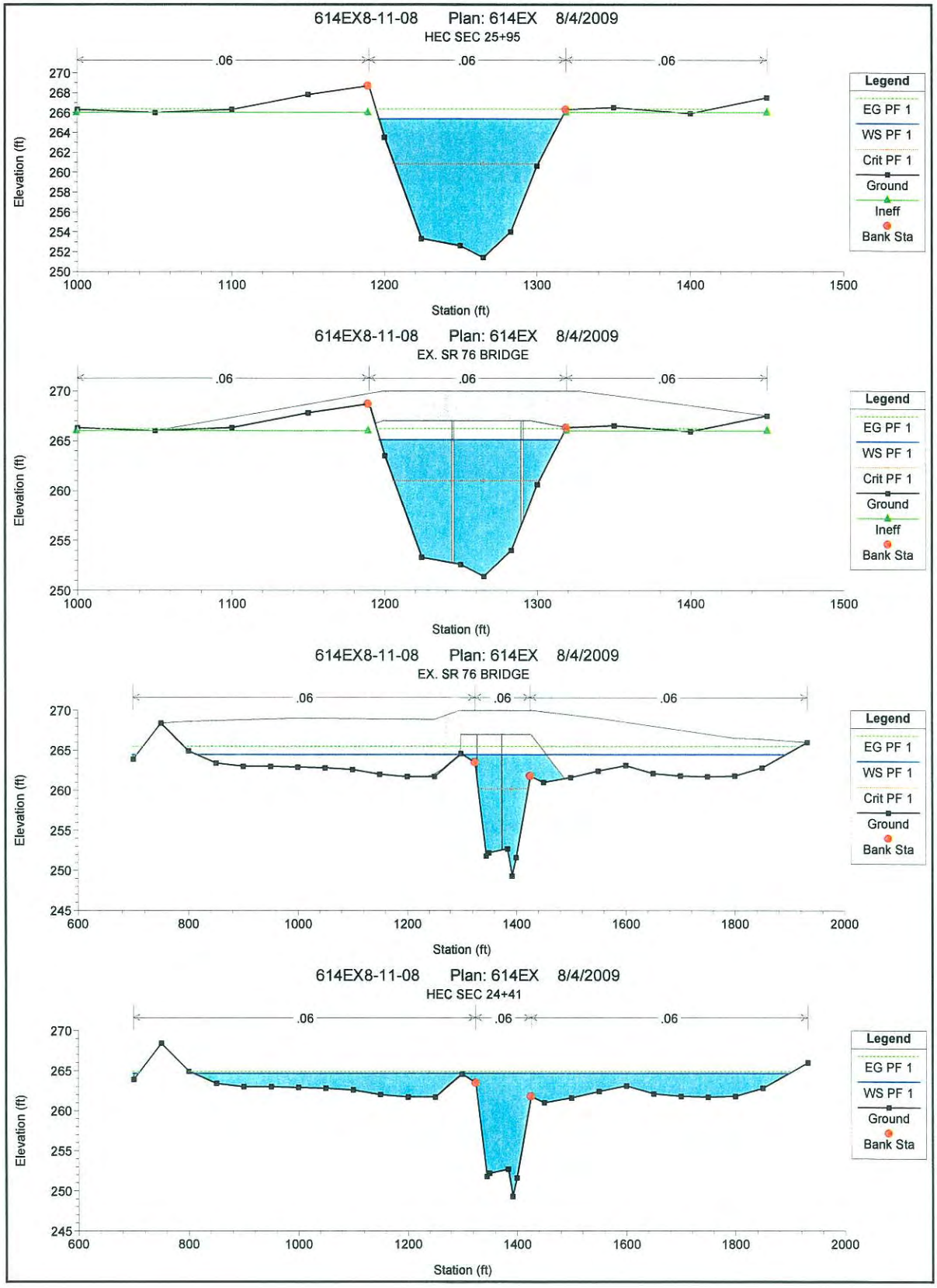
HEC SEC 30+50



614EX8-11-08 Plan: 614EX 8/4/2009

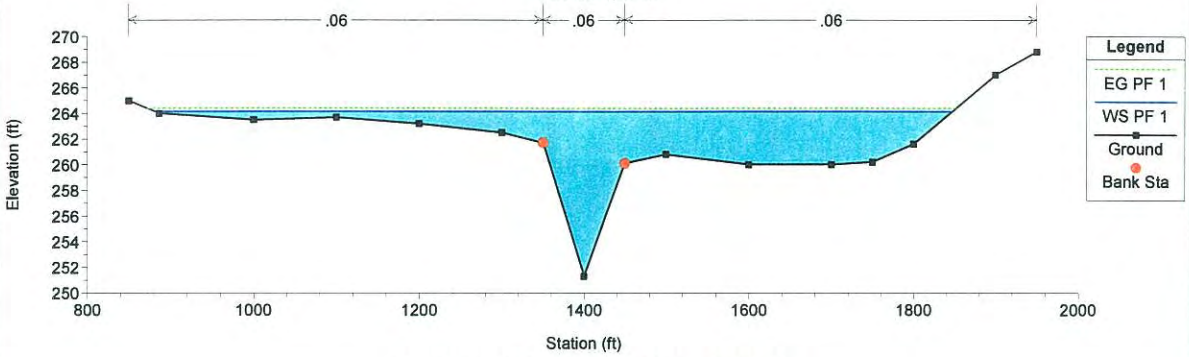
HEC SEC 28+46




614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 25+95
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
614EX8-11-08 Plan: 614EX 8/4/2009
EX. SR 76 BRIDGE
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
614EX8-11-08 Plan: 614EX 8/4/2009
EX. SR 76 BRIDGE
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 24+41
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

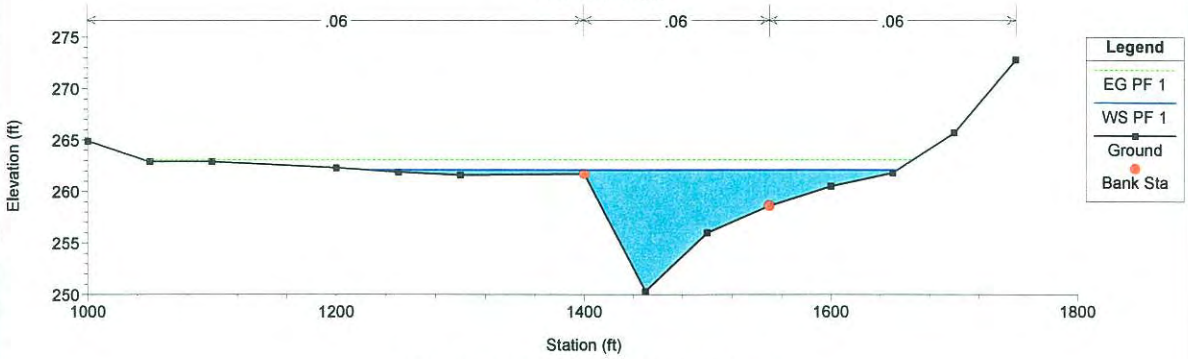
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SEC 22+25



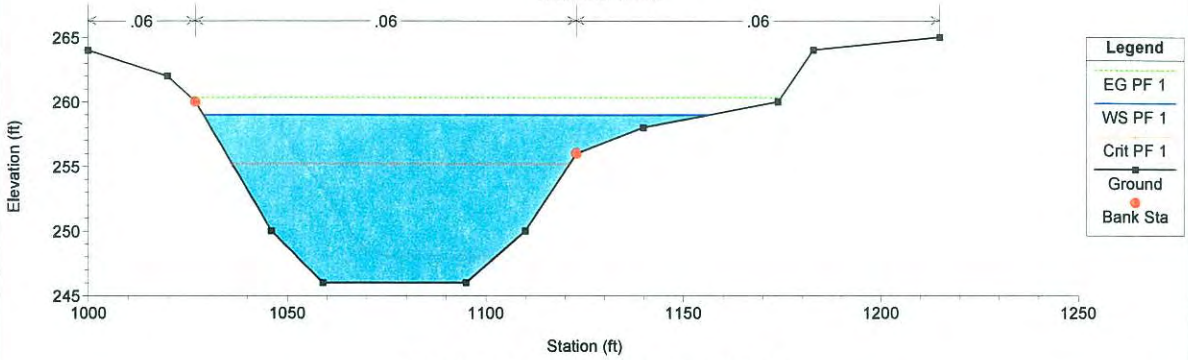
614EX8-11-08 Plan: 614EX 8/4/2009

HEC SEC 19+89



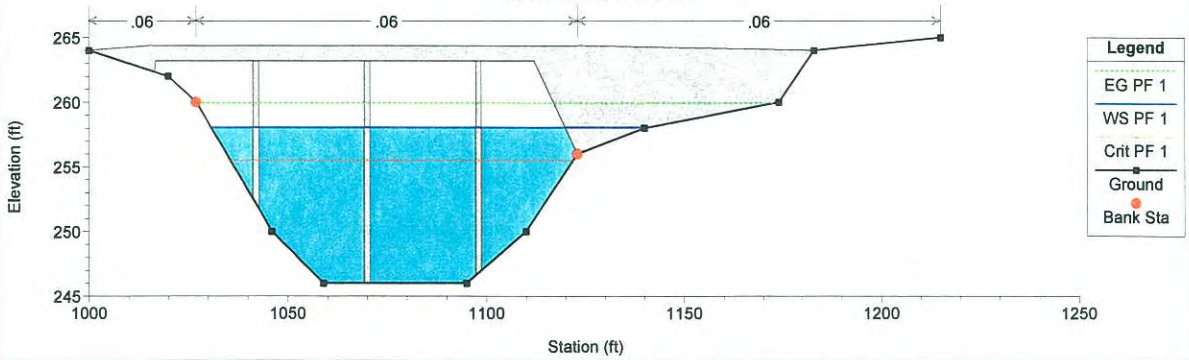
614EX8-11-08 Plan: 614EX 8/4/2009

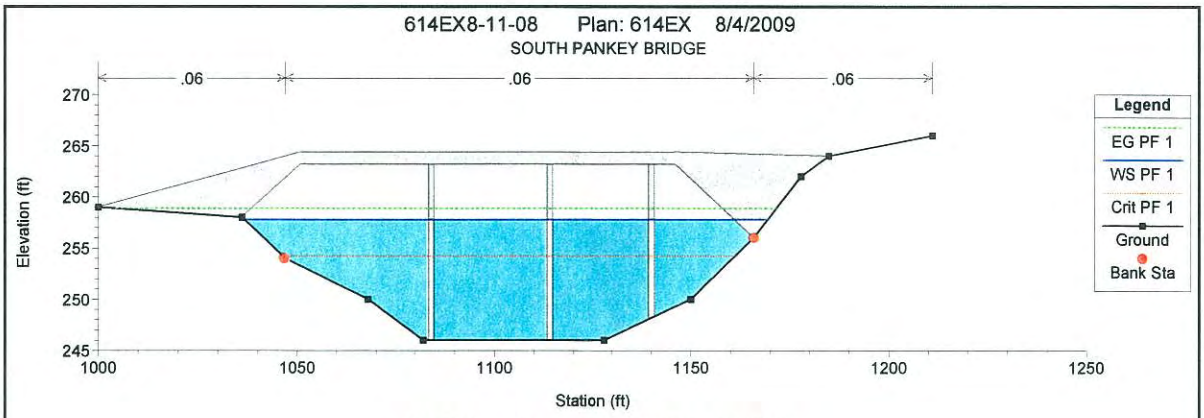
HEC SEC 16+65

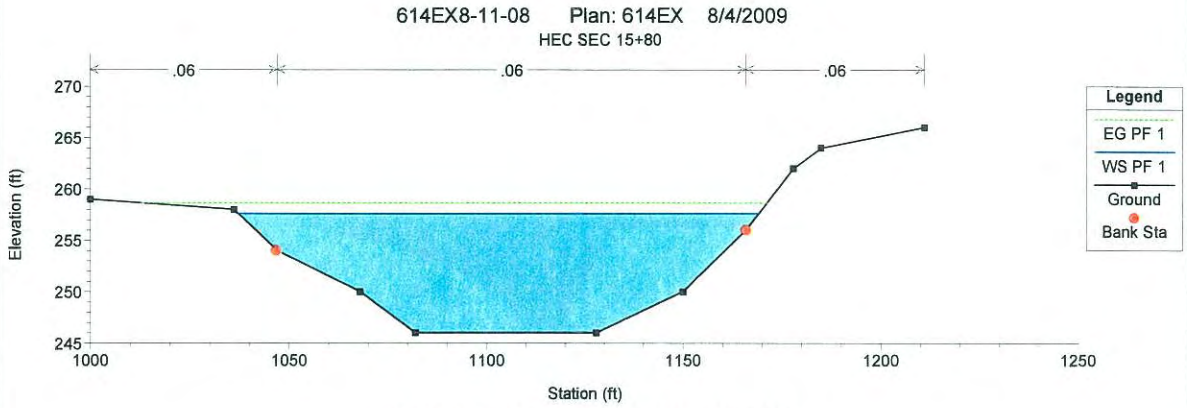


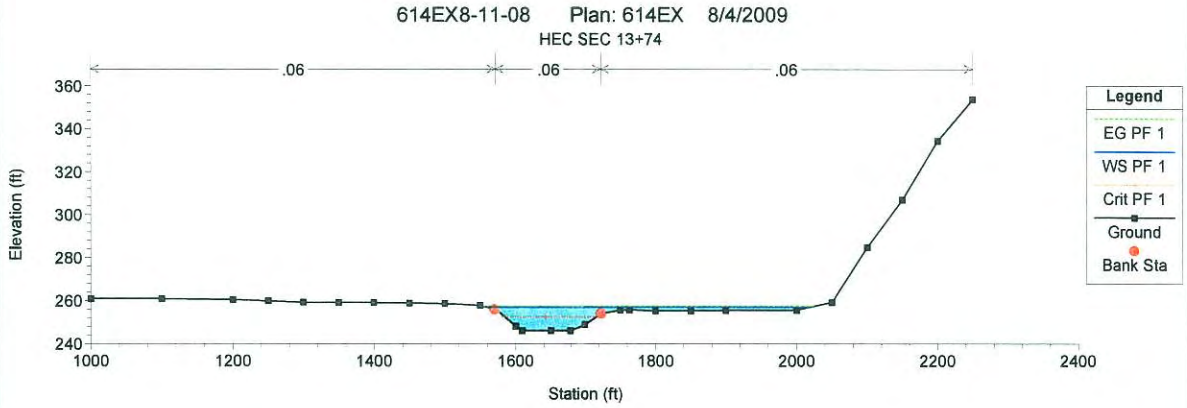
614EX8-11-08 Plan: 614EX 8/4/2009

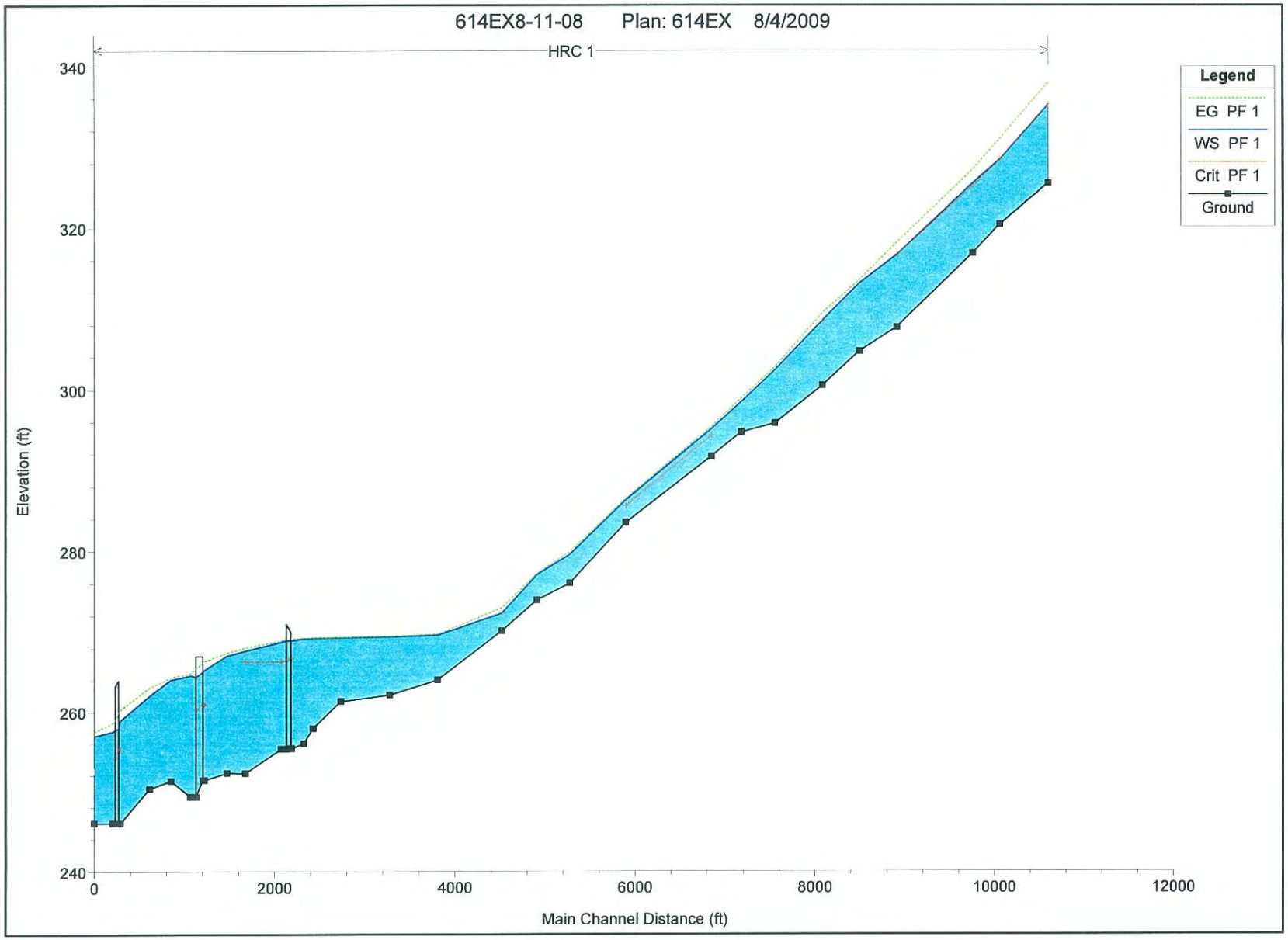
SOUTH PANKEY BRIDGE



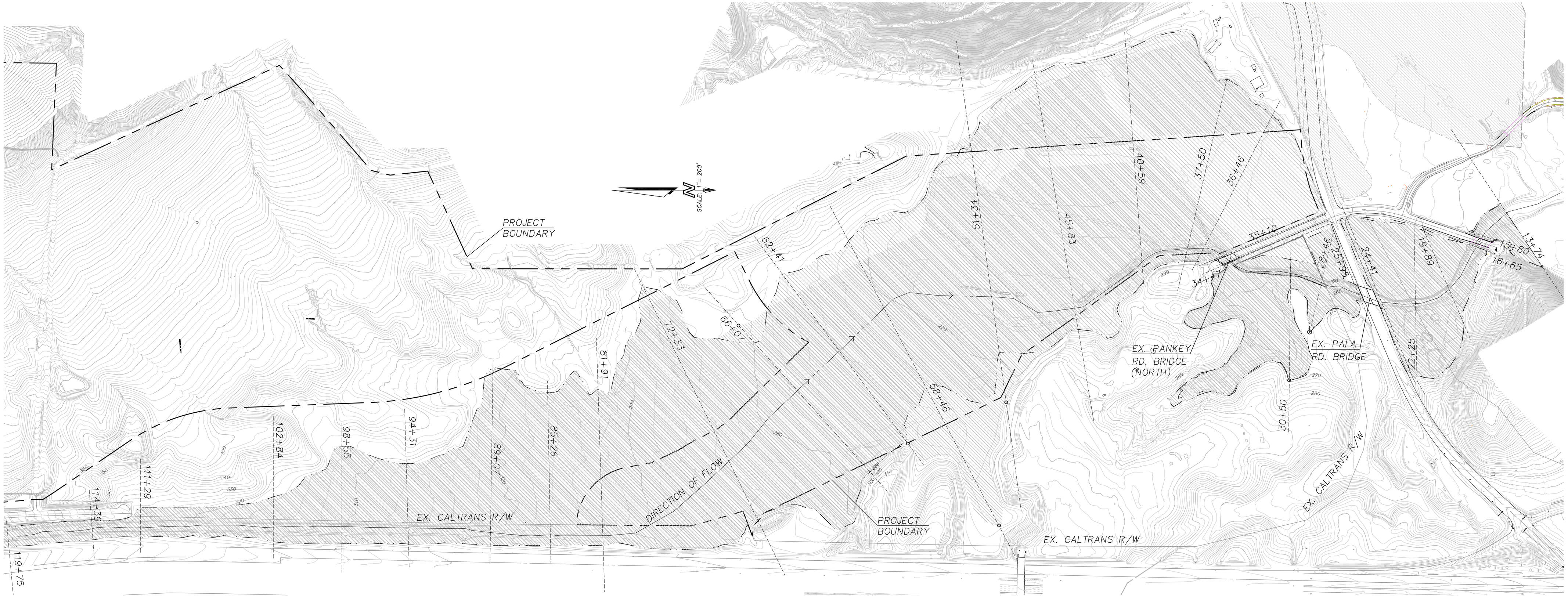

614EX8-11-08 Plan: 614EX 8/4/2009
SOUTH PANKEY BRIDGE
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 15+80
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


614EX8-11-08 Plan: 614EX 8/4/2009
HEC SEC 13+74
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


614EX8-11-08 Plan: 614EX 8/4/2009
HRC 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
340
320
300
280
260
240
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)

CAMPUS PARK
HECRAS SECTIONS & FLOOD LIMITS
PRE-DEVELOPMENT CONDITIONS



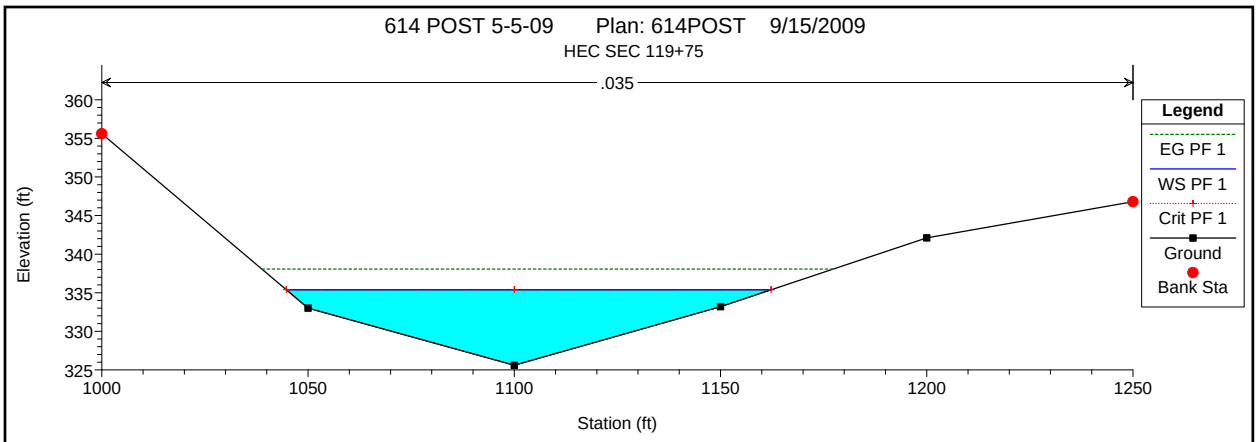
LANDMARK CONSULTING

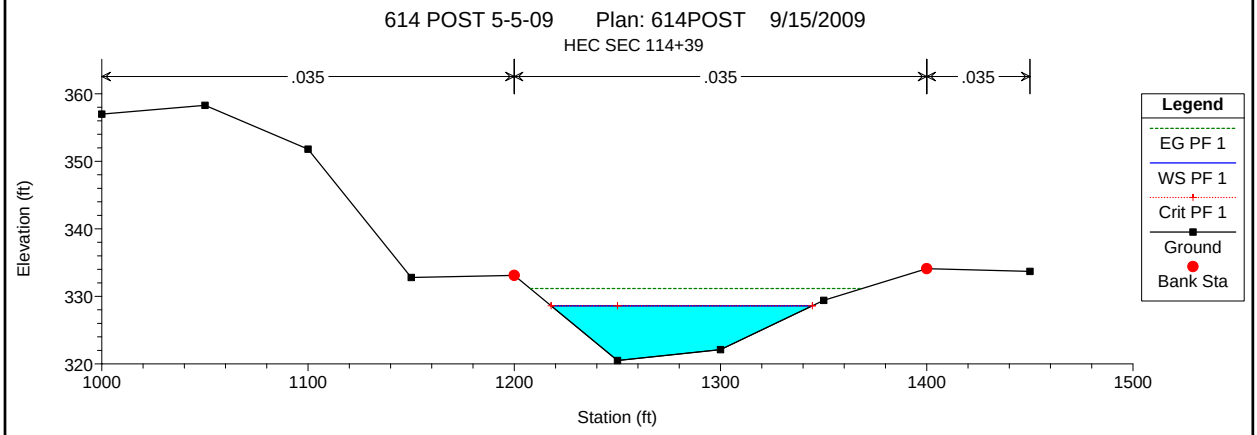
JAL: E-14

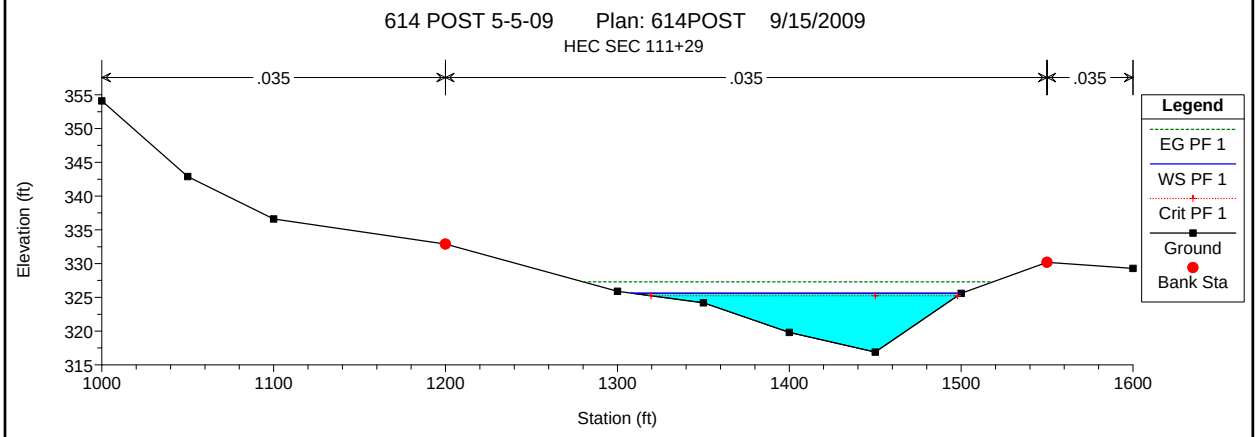
SECTION 9B:
HORSE RANCH CREEK HEC-RAS CALCS
POST-DEVELOPMENT CONDITIONS

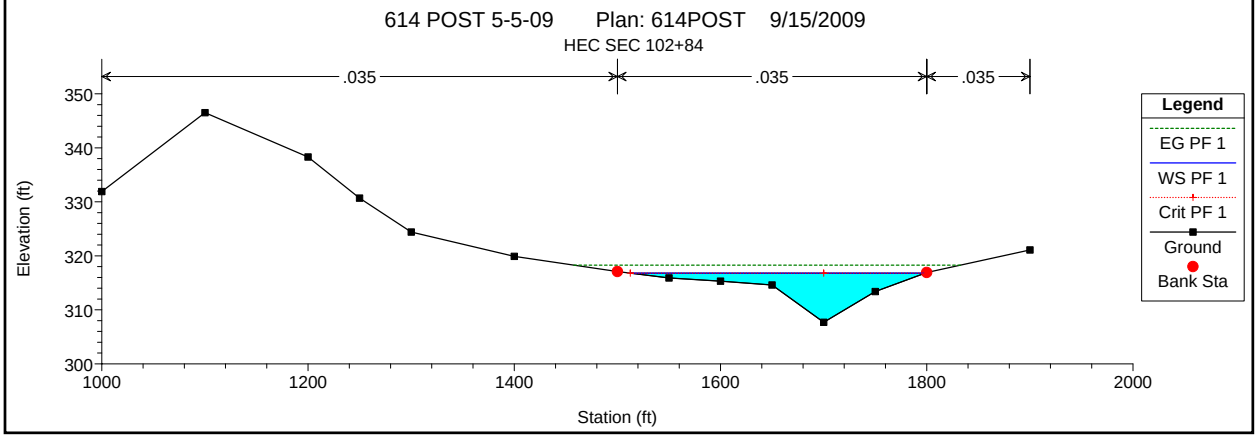
HEC-RAS Plan: 614POST River: HRC Reach: 1 Profile: PF 1

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)	
1	11975	PF 1	8168.00	325.60	335.38	335.38	338.05	0.010547	13.12	622.73	117.52	1.00
1	11439	PF 1	8203.00	320.50	328.61	328.61	331.15	0.010654	12.81	640.56	126.72	1.00
1	11129	PF 1	8238.00	316.90	325.62	325.23	327.30	0.009096	10.38	793.35	192.13	0.90
1	10284	PF 1	8274.00	307.70	316.80	316.80	318.28	0.012515	9.77	846.80	286.04	1.00
1	9855	PF 1	8309.00	304.70	313.28		313.64	0.005637	4.83	1721.47	633.01	0.52
1	9431	PF 1	8344.00	300.50	308.49	308.39	309.50	0.021391	8.05	1036.74	481.14	0.97
1	8907	PF 1	8379.00	295.80	302.53		302.82	0.007944	4.30	1947.53	1101.35	0.57
1	8526	PF 1	8414.00	294.70	298.44		298.90	0.014079	5.41	1554.60	957.32	0.75
1	8191	PF 1	8449.00	291.70	295.32	294.29	295.54	0.007448	3.72	2270.69	988.31	0.43
1	7233	PF 1	8485.00	283.50	286.19	285.60	286.40	0.012780	3.62	2346.61	1602.64	0.53
1	6607	PF 1	8520.00	276.00	279.87		280.08	0.008299	3.70	2302.47	1095.83	0.45
1	6241	PF 1	8555.00	273.90	276.75		276.97	0.008762	3.82	2268.69	1151.68	0.46
1	5846	PF 1	8590.00	270.10	273.40		273.65	0.008315	4.00	2303.54	1774.20	0.46
1	5134	PF 1	8626.00	264.00	273.21		273.23	0.000166	1.23	8193.53	1661.50	0.08
1	4583	PF 1	8661.00	263.00	273.14		273.16	0.000102	1.10	8437.02	1498.90	0.06
1	4059	PF 1	8696.00	261.30	273.07		273.09	0.000129	1.24	7109.74	1180.50	0.07
1	3750	PF 1	8731.00	257.90	272.93		273.02	0.000396	2.61	3818.09	722.07	0.13
1	3646	PF 1	8766.00	256.00	272.82		272.95	0.000539	3.46	3094.40	436.59	0.16
1	3510	PF 1	8800.00	255.40	271.73	266.51	272.58	0.003631	7.56	1272.79	156.63	0.39
1	3476		Bridge									
1	3447	PF 1	8800.00	255.30	270.59		271.74	0.004774	8.81	1081.82	121.20	0.45
1	3050	PF 1	8800.00	252.25	267.60		268.91	0.011521	9.77	1015.15	671.75	0.63
1	2846	PF 1	8800.00	252.30	267.21		267.51	0.002295	5.34	2457.17	614.89	0.30
1	2595	PF 1	8800.00	251.40	265.48	260.83	266.46	0.005555	7.92	1110.48	120.08	0.46
1	2525		Bridge									
1	2441	PF 1	8800.00	249.30	264.64		265.05	0.002765	5.95	2191.33	1088.41	0.33
1	2225	PF 1	8800.00	251.30	264.13		264.39	0.002775	5.17	2588.73	964.65	0.32
1	1989	PF 1	8800.00	250.30	262.08		263.07	0.009082	8.24	1223.95	425.90	0.57
1	1665	PF 1	8800.00	246.00	259.01	255.22	260.35	0.007123	9.33	974.76	128.29	0.52
1	1624		Bridge									
1	1580	PF 1	8800.00	246.00	257.68	254.02	258.69	0.005804	8.10	1101.13	132.47	0.47
1	1374	PF 1	8800.00	246.00	257.00	252.96	257.53	0.003601	6.13	1756.42	459.67	0.37


614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 119+75
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

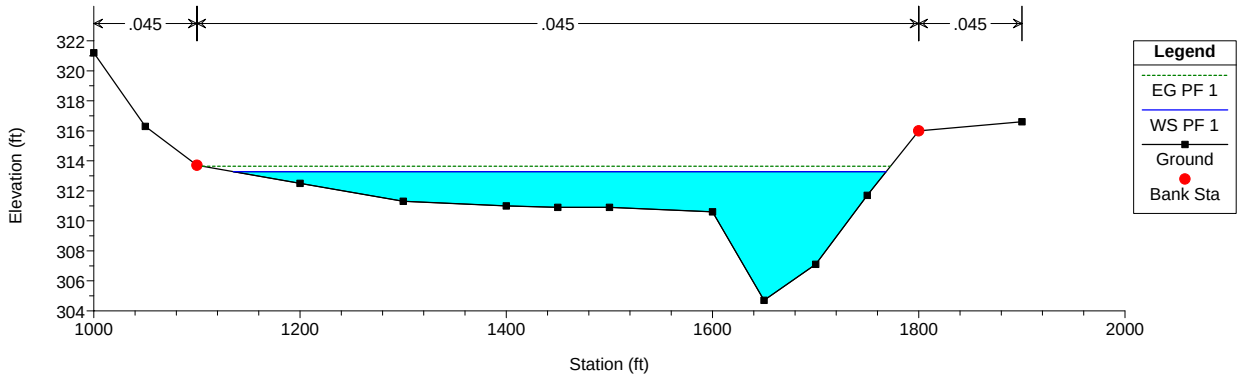

614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 114+39
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 111+29
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 102+84
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

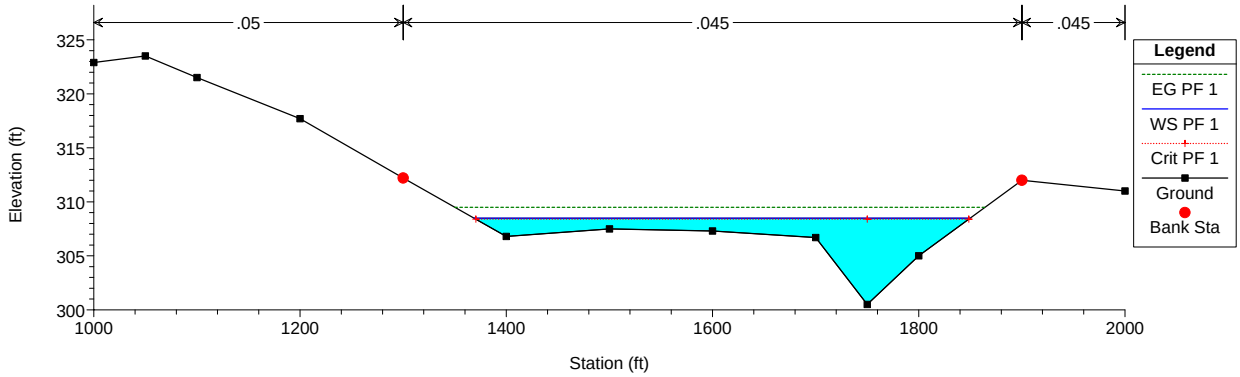
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 98+55



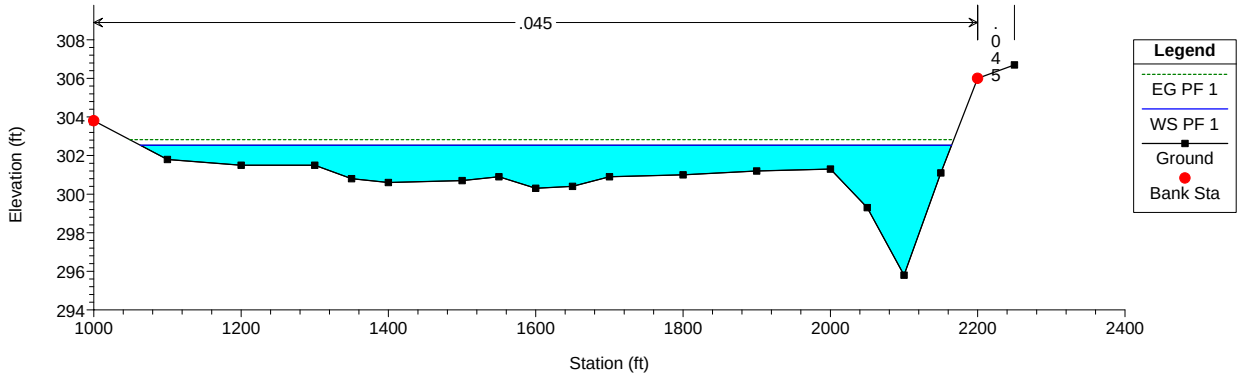
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 94+31



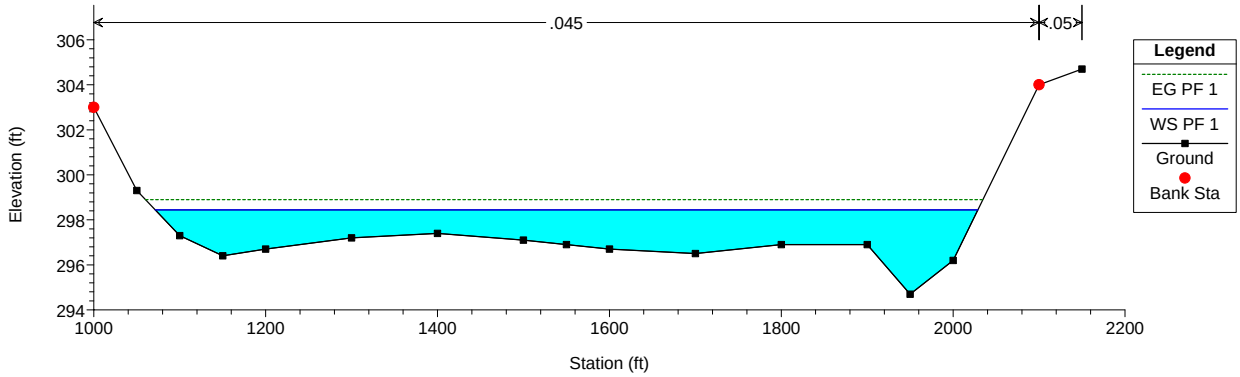
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SECTION 89+07



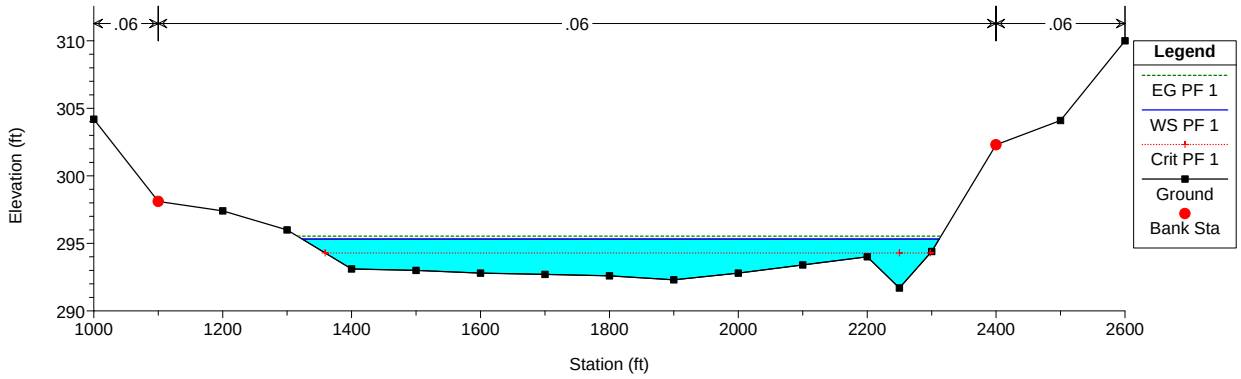
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 85+26



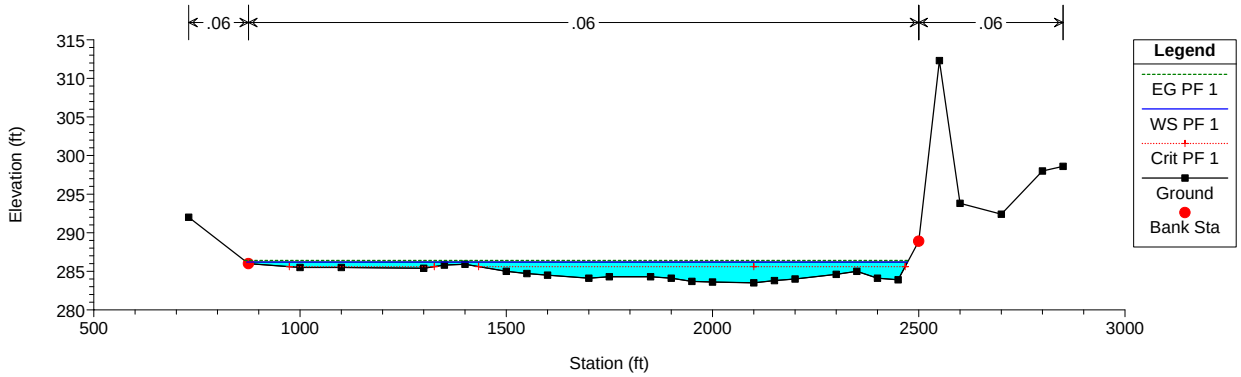
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 81+91



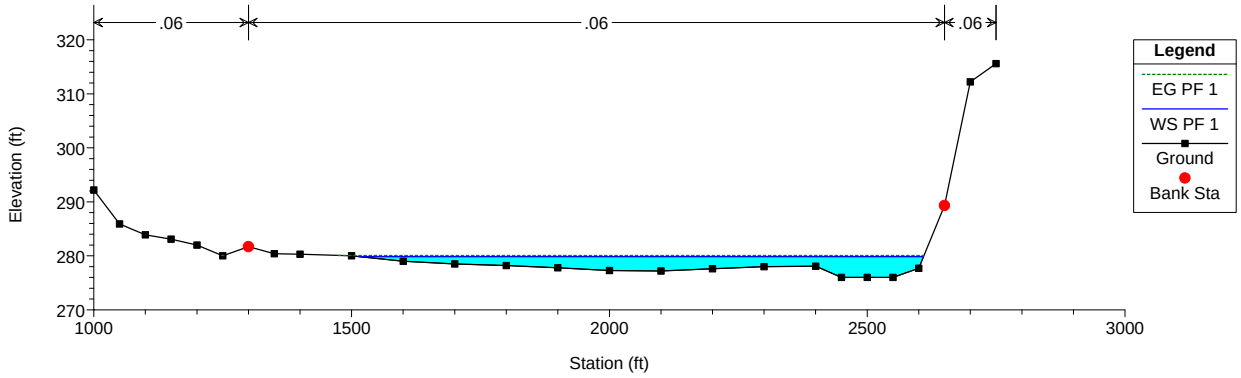
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SECTION 72+33



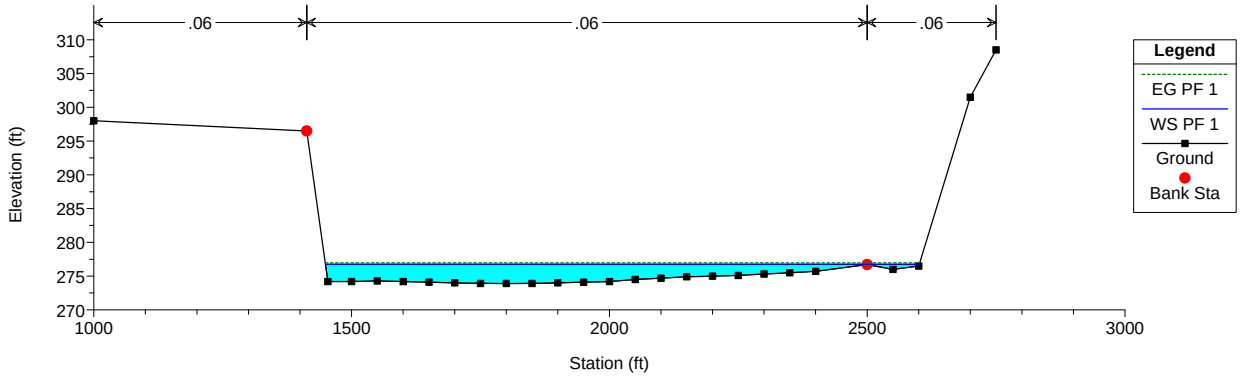
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 66+07



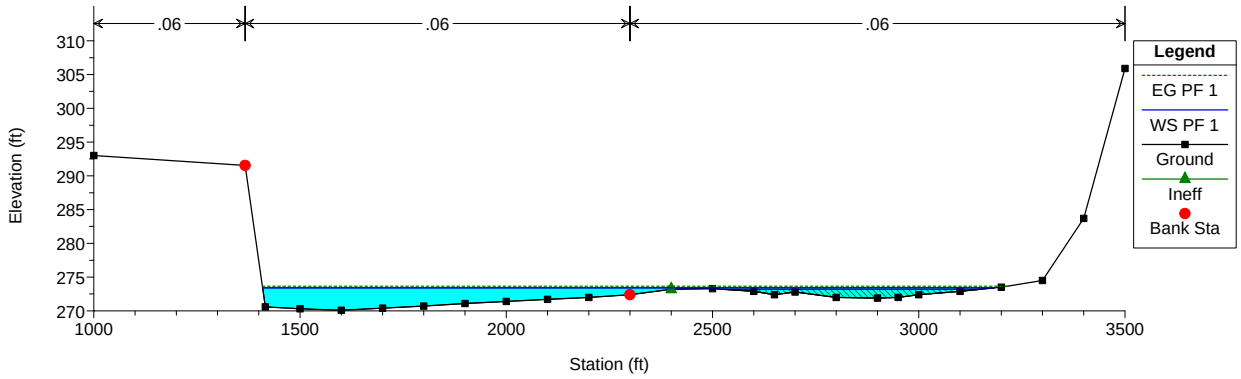
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 62+41



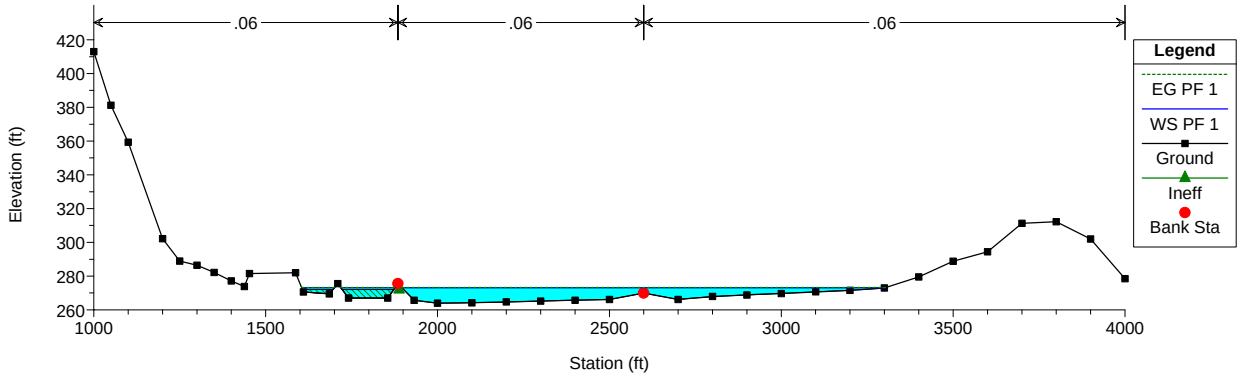
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SECTION 58+46



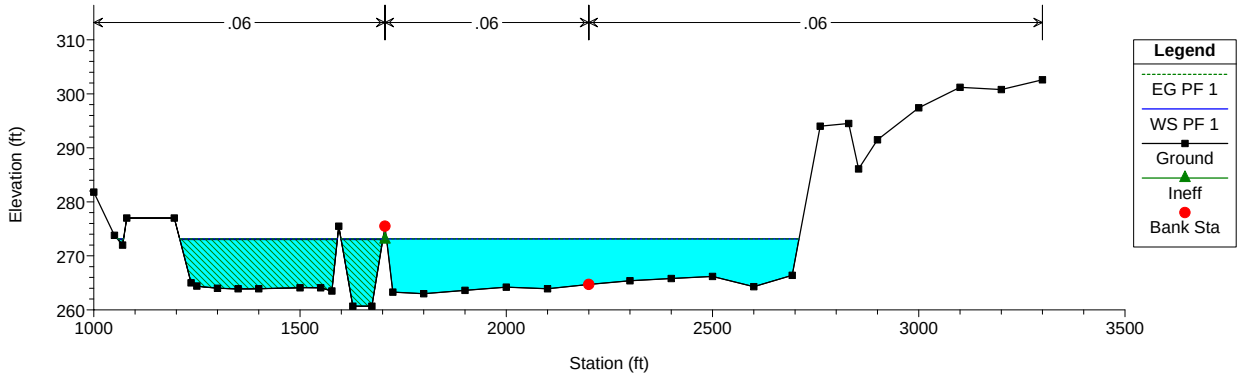
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SECTION 51+34



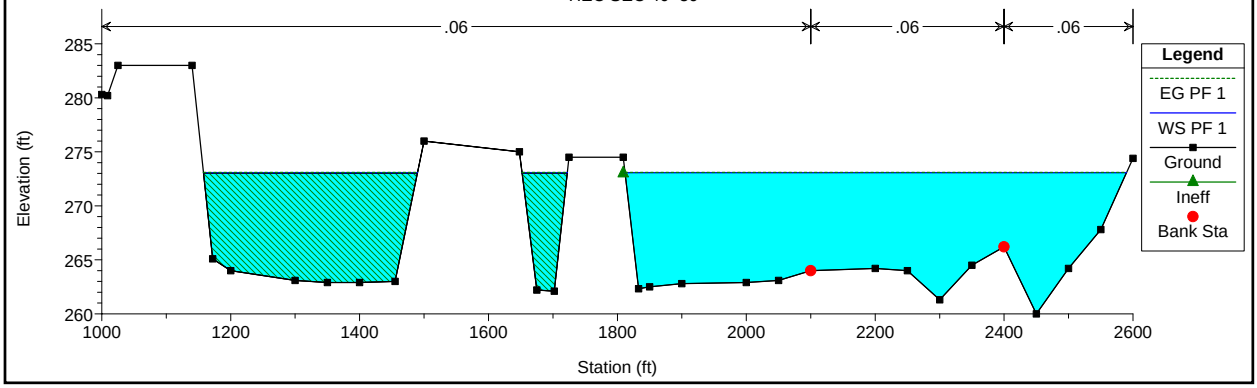
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 45+83



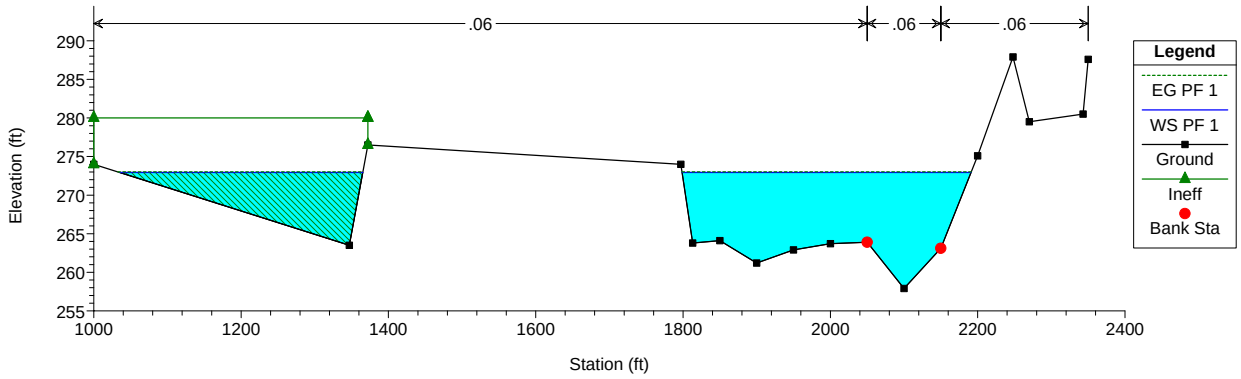
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 40+59



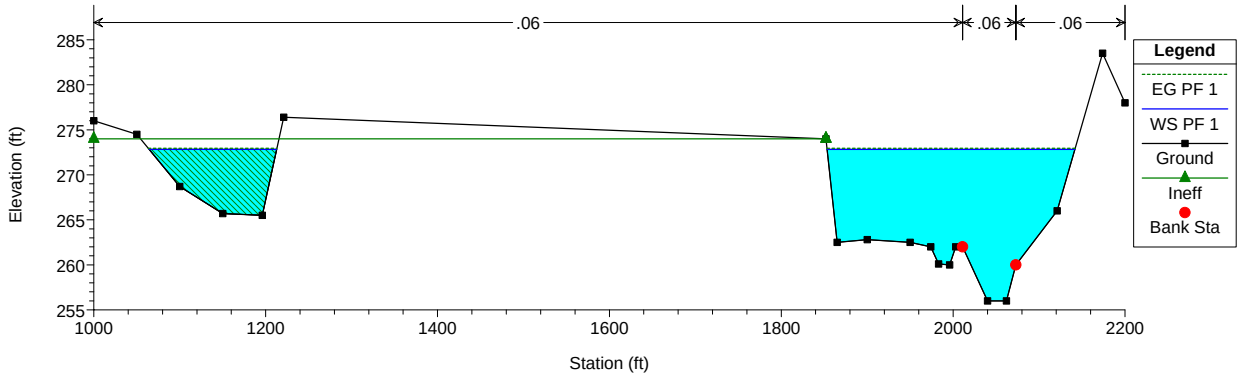
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 37+50



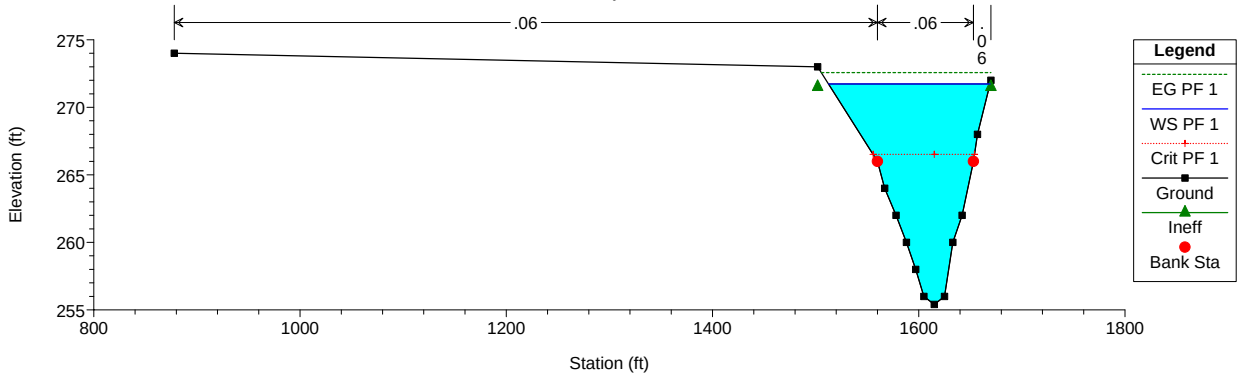
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 36+46



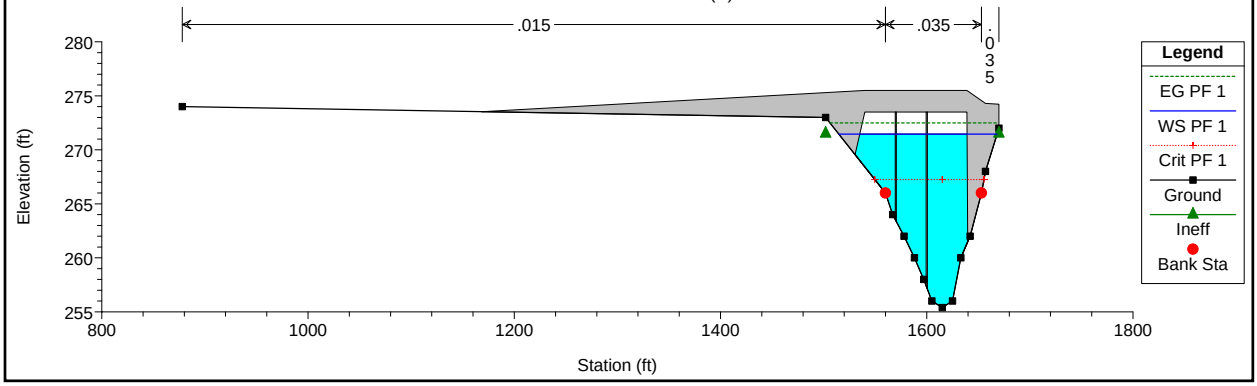
614 POST 5-5-09 Plan: 614POST 9/15/2009

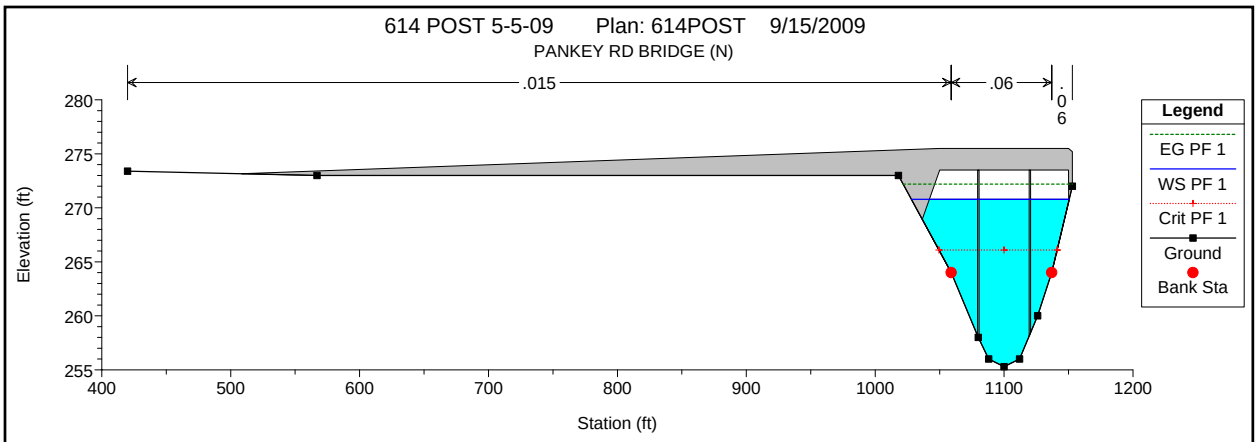
U/S Pankey North 35+10

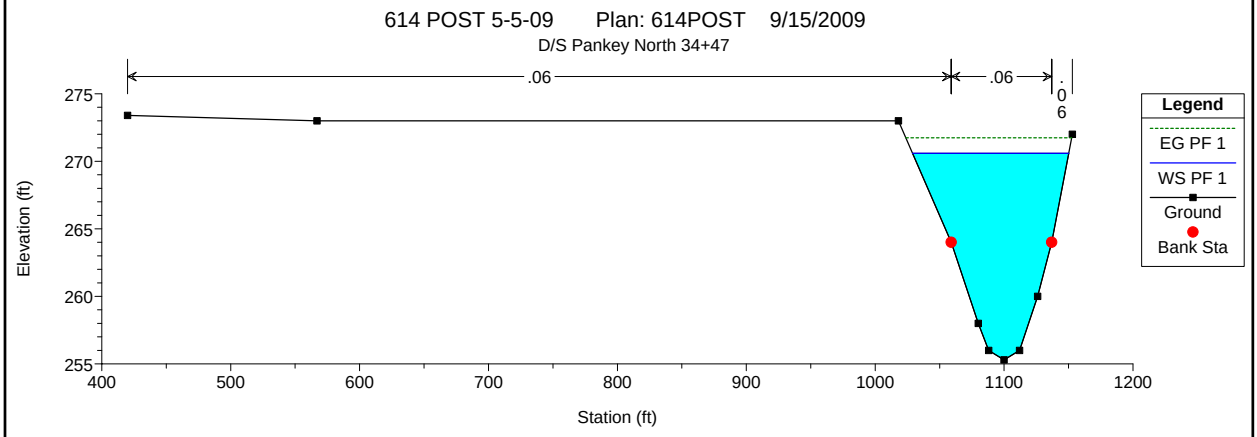


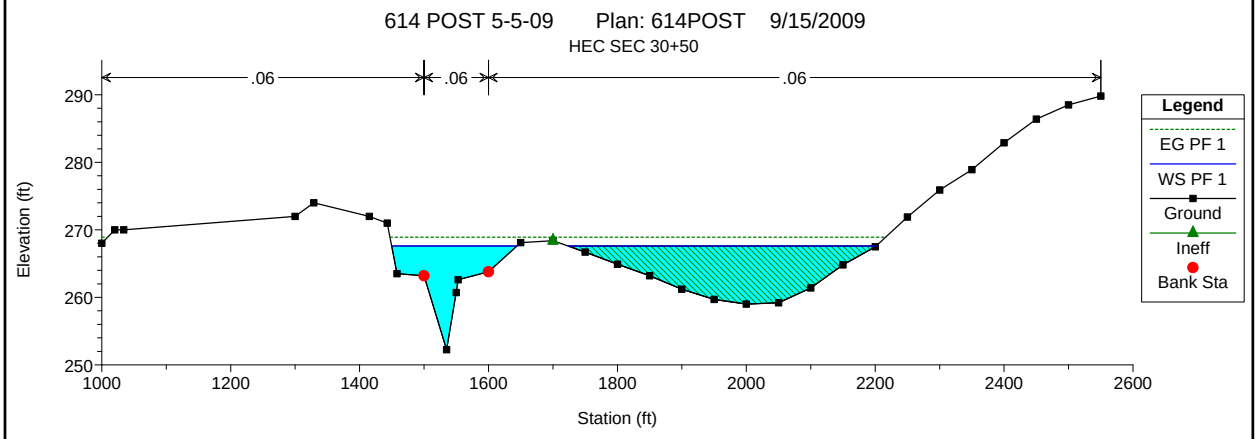
614 POST 5-5-09 Plan: 614POST 9/15/2009

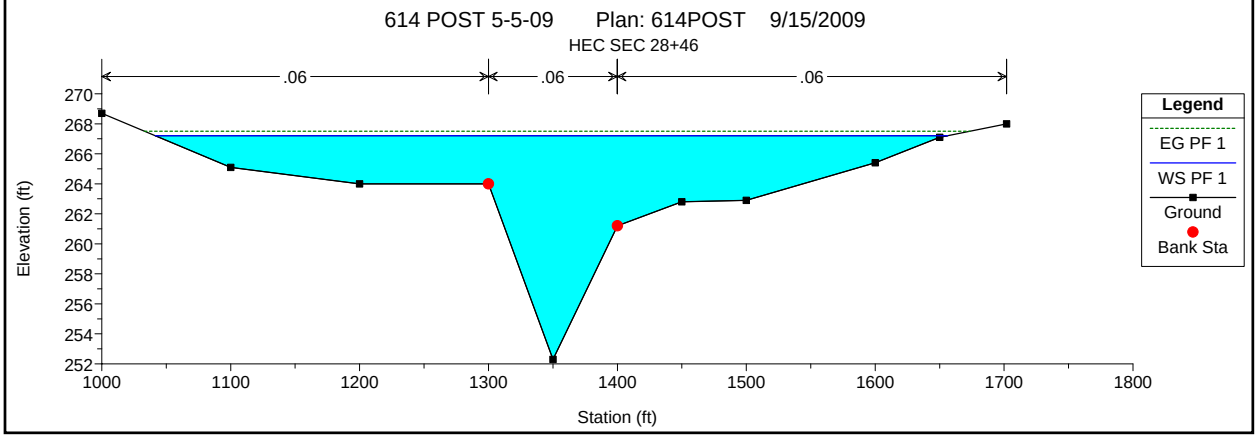
PANKEY RD BRIDGE (N)

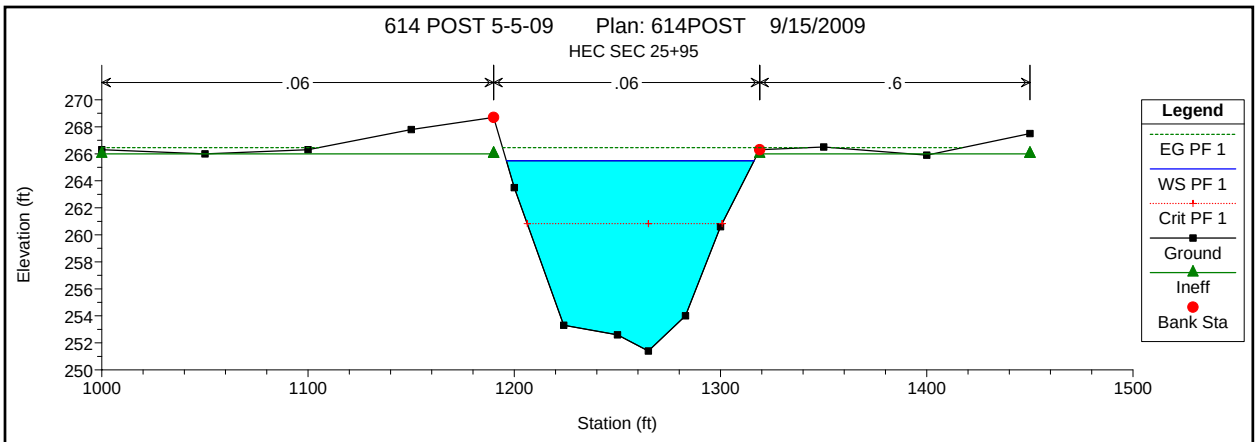


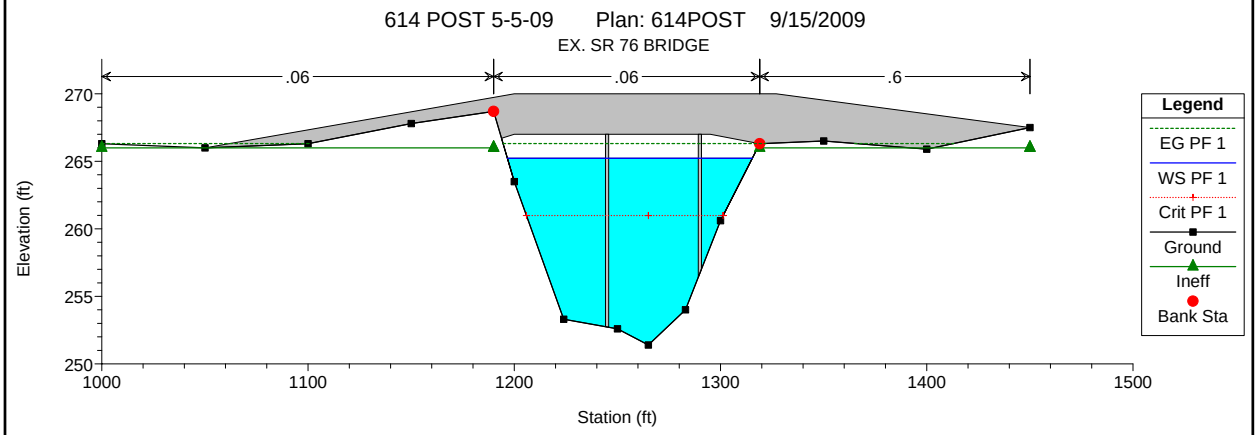

614 POST 5-5-09 Plan: 614POST 9/15/2009
PANKEY RD BRIDGE (N)
.015
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

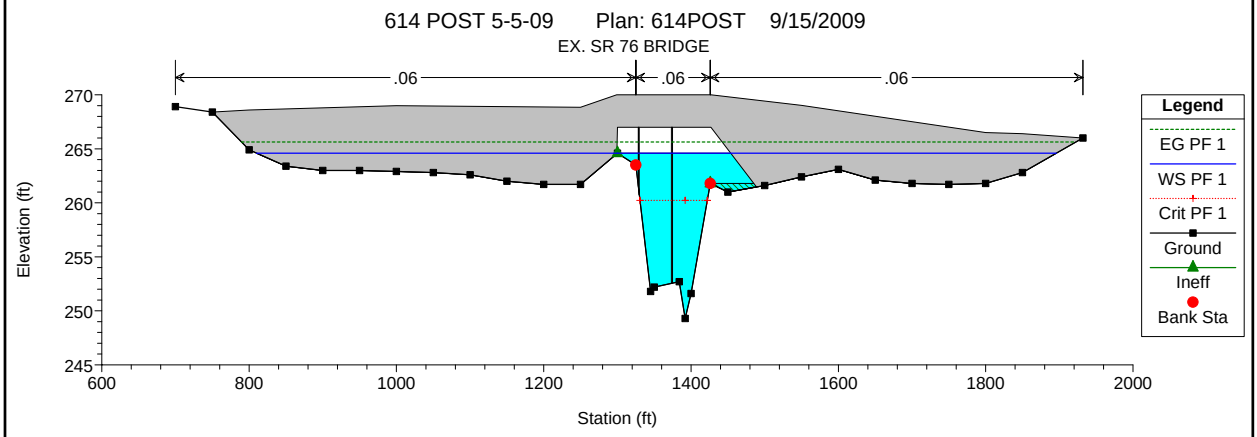

614 POST 5-5-09 Plan: 614POST 9/15/2009
D/S Pankey North 34+47
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

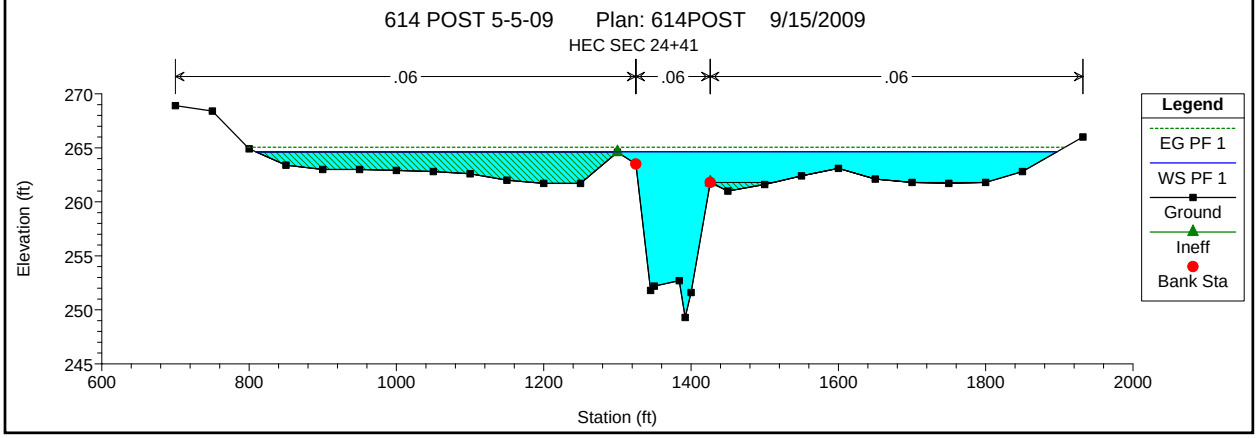

614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 30+50
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta

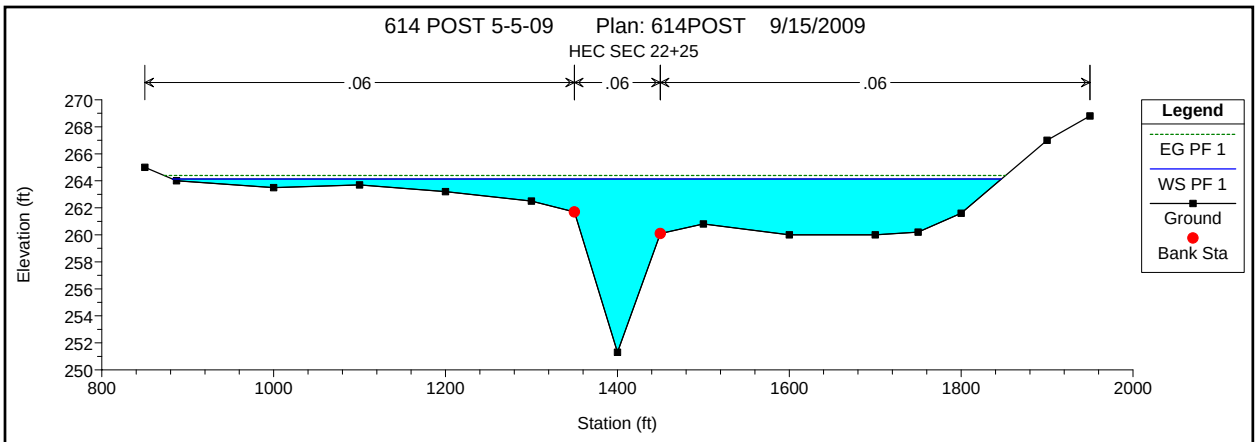

614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 28+46
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

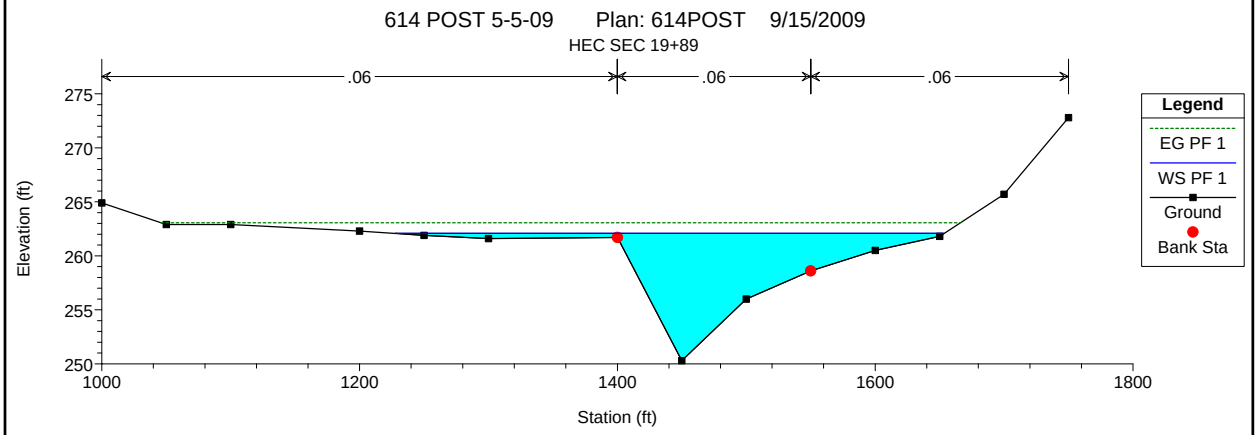

614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 25+95
.06
.06
.6
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

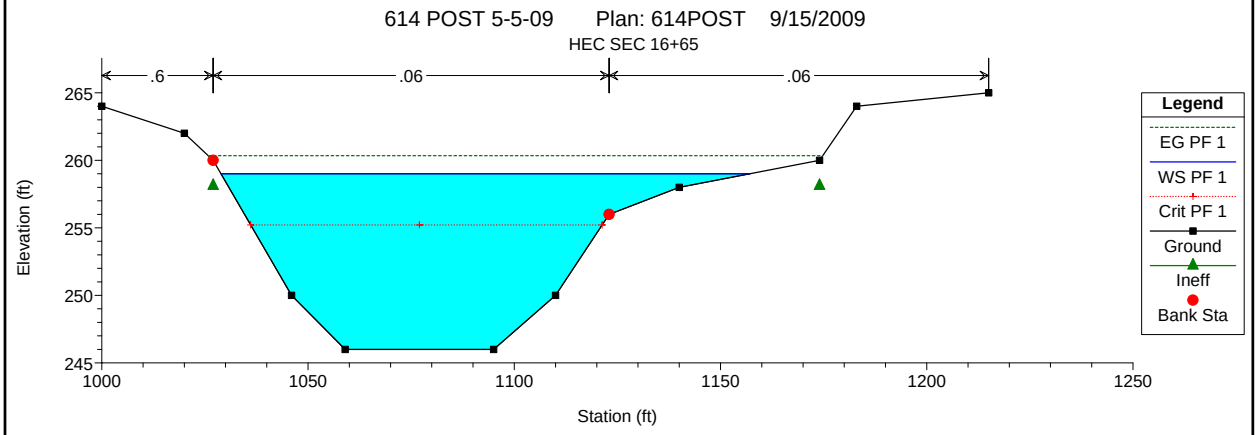

614 POST 5-5-09 Plan: 614POST 9/15/2009
EX. SR 76 BRIDGE
.06
.06
.6
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

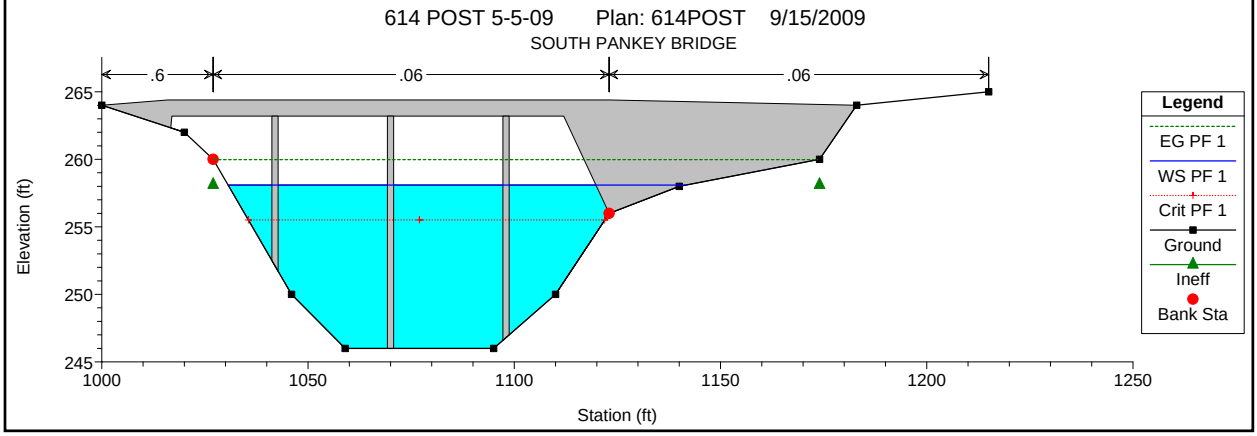

614 POST 5-5-09 Plan: 614POST 9/15/2009
EX. SR 76 BRIDGE
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 24+41
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta


614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 22+25
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

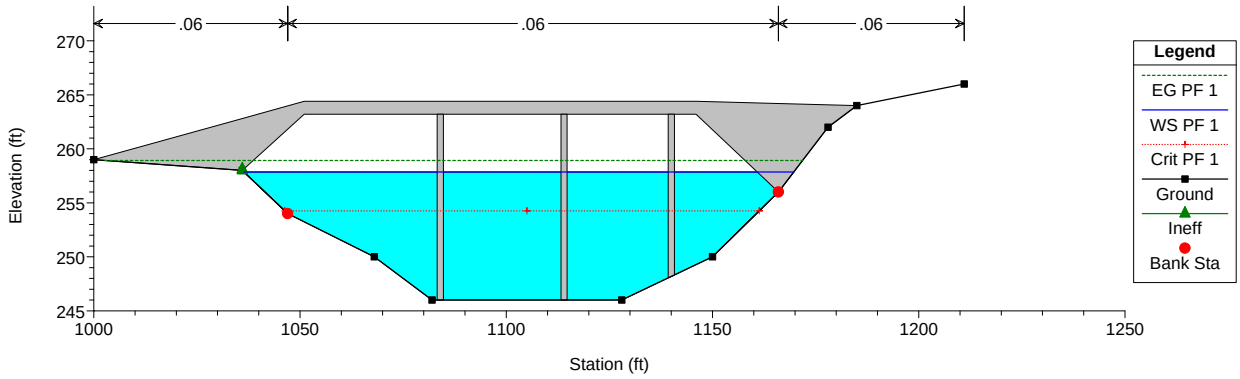

614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 19+89
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


614 POST 5-5-09 Plan: 614POST 9/15/2009
HEC SEC 16+65
.6
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


614 POST 5-5-09 Plan: 614POST 9/15/2009
SOUTH PANKEY BRIDGE
.6
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

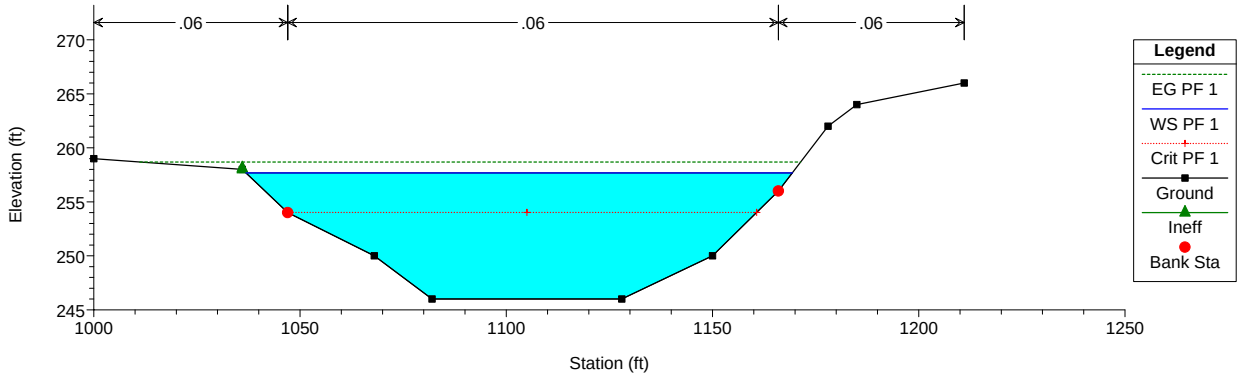
614 POST 5-5-09 Plan: 614POST 9/15/2009

SOUTH PANKEY BRIDGE



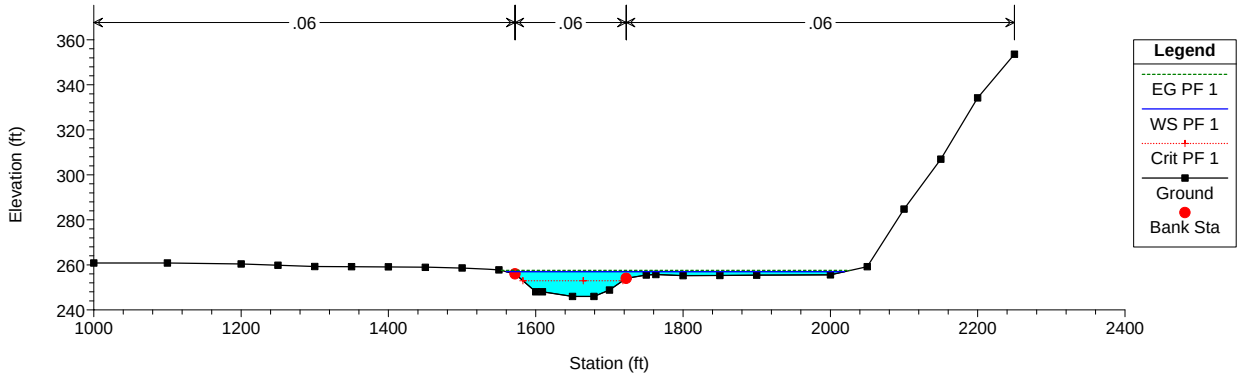
614 POST 5-5-09 Plan: 614POST 9/15/2009

HEC SEC 15+80



614 POST 5-5-09 Plan: 614POST 9/15/2009

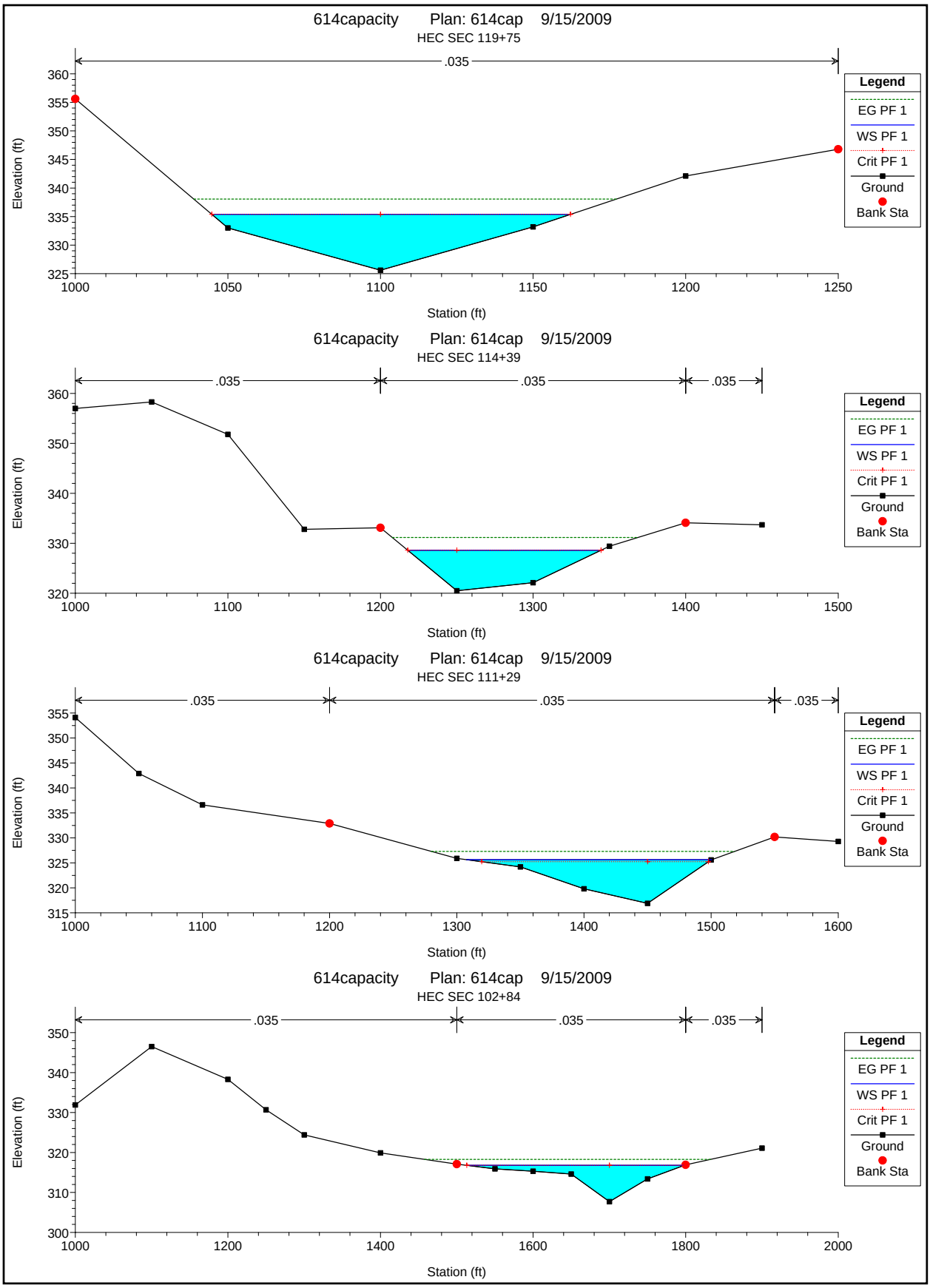
HEC SEC 13+74

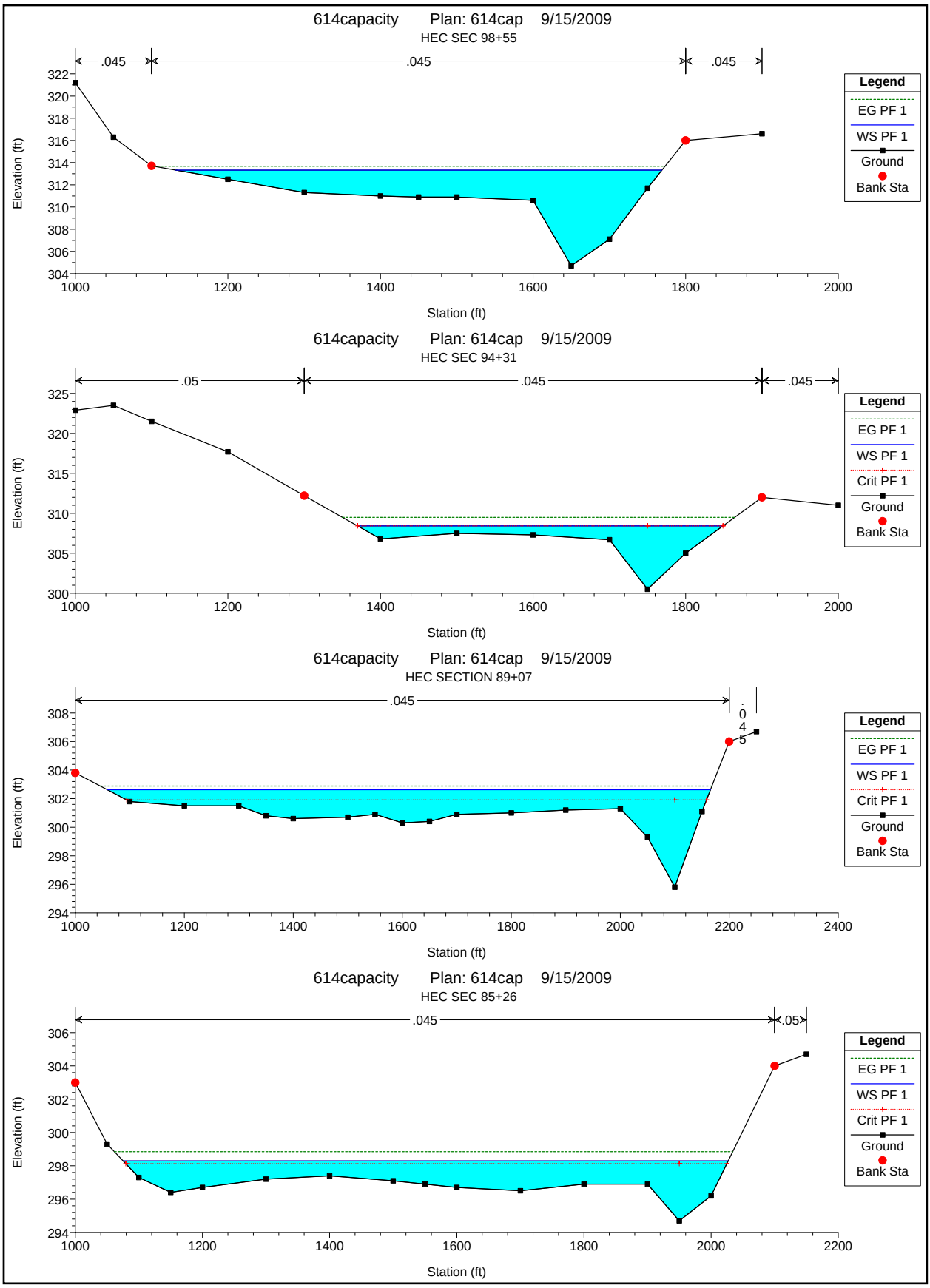


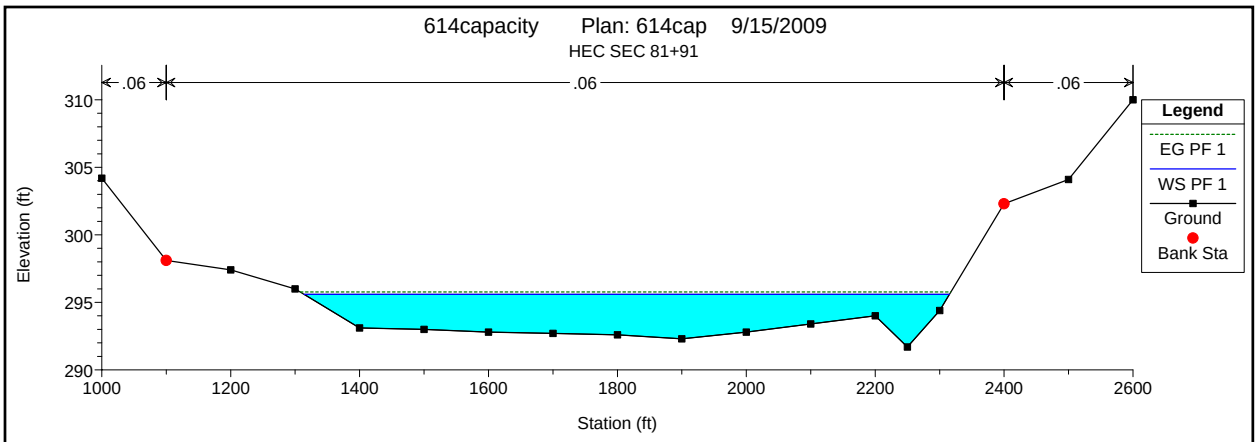
SECTION 9C:
HORSE RANCH CREEK HEC-RAS CALCS
CAPACITY CONDITIONS

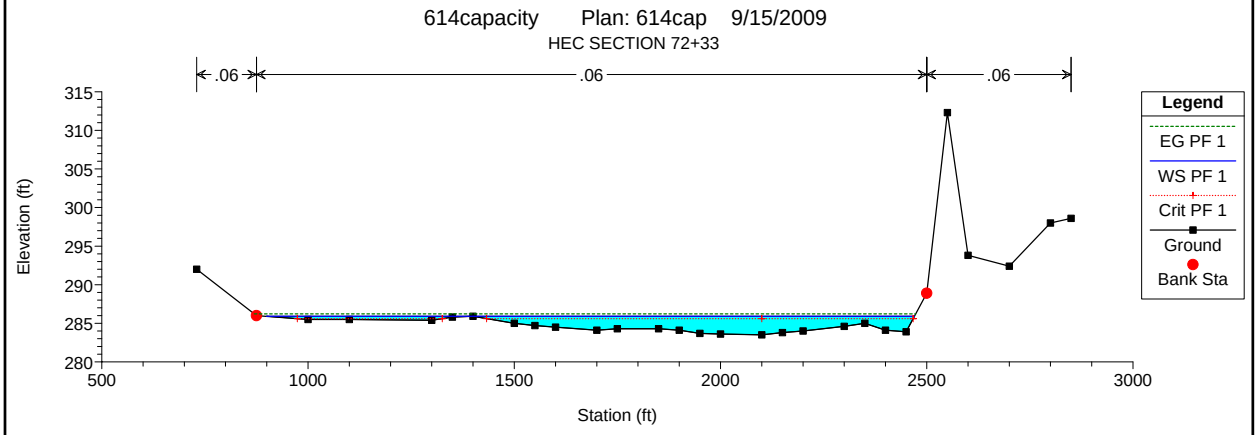
HEC-RAS Plan: 614capacity River: HRC Reach: 1 Profile: PF 1

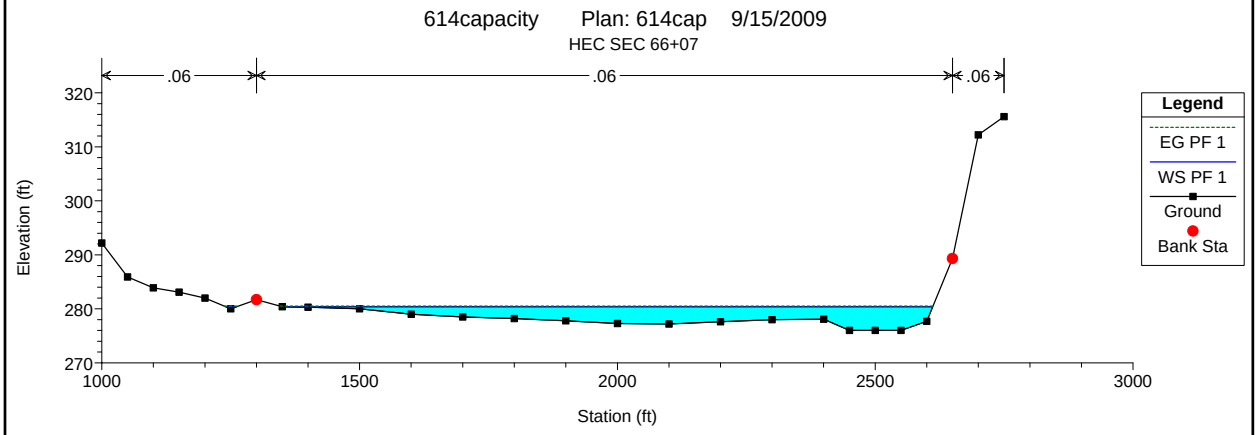
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	11975	PF 1	8168.00	325.60	335.38	335.38	338.05	0.010547	13.12	622.73	117.52	1.00
1	11439	PF 1	8203.00	320.50	328.61	328.61	331.15	0.010654	12.81	640.56	126.72	1.00
1	11129	PF 1	8238.00	316.90	325.64	325.23	327.30	0.009018	10.34	796.50	192.79	0.90
1	10284	PF 1	8274.00	307.70	316.78	316.78	318.28	0.012678	9.82	842.53	285.21	1.01
1	9855	PF 1	8309.00	304.70	313.32		313.67	0.005392	4.75	1749.14	637.15	0.51
1	9431	PF 1	8344.00	300.50	308.42	308.42	309.49	0.023692	8.31	1003.54	478.87	1.01
1	8907	PF 1	8379.00	295.80	302.63	301.91	302.89	0.006754	4.09	2048.85	1106.88	0.53
1	8526	PF 1	8414.00	294.70	298.30	298.13	298.85	0.019113	5.95	1415.09	951.80	0.86
1	8191	PF 1	8449.00	291.70	295.59		295.76	0.005220	3.33	2539.15	1001.03	0.37
1	7233	PF 1	8485.00	283.50	285.90	285.60	286.22	0.026162	4.52	1879.27	1570.29	0.73
1	6607	PF 1	8520.00	276.00	280.39		280.52	0.004575	2.93	2909.59	1275.56	0.34
1	6241	PF 1	8555.00	273.90	277.76		277.86	0.013283	2.44	3437.24	1157.59	0.24
1	5846	PF 1	8590.00	270.10	274.54		274.60	0.006233	1.80	4407.18	1893.69	0.17
1	5134	PF 1	8626.00	264.00	273.98		274.00	0.000372	0.78	9018.07	1689.78	0.05
1	4583	PF 1	8661.00	263.00	273.84		273.86	0.000180	0.61	9073.26	1517.14	0.03
1	4059	PF 1	8696.00	261.30	273.73		273.76	0.000177	0.61	7600.02	1192.88	0.03
1	3750	PF 1	8731.00	257.90	273.56		273.65	0.000529	1.25	4066.54	747.73	0.06
1	3646	PF 1	8766.00	256.00	273.44		273.57	0.000739	1.66	3274.59	445.96	0.07
1	3510	PF 1	8800.00	255.40	272.50	266.51	273.21	0.002853	6.99	1395.23	163.82	0.35
1	3476		Bridge									
1	3447	PF 1	8800.00	255.30	271.55	266.01	272.49	0.003583	8.03	1201.30	127.50	0.39
1	3050	PF 1	8800.00	252.25	268.98		269.69	0.018223	5.51	1630.19	769.83	0.33
1	2846	PF 1	8800.00	252.30	267.90		268.04	0.003462	2.75	2900.69	673.79	0.15
1	2595	PF 1	8800.00	251.40	265.91	260.83	266.80	0.004888	7.57	1162.92	123.81	0.43
1	2525		Bridge									
1	2441	PF 1	8800.00	249.30	265.31		265.56	0.001724	4.90	2933.31	1120.14	0.26
1	2225	PF 1	8800.00	251.30	264.93		265.06	0.002579	2.12	3382.60	1009.30	0.13
1	1989	PF 1	8800.00	250.30	263.47		263.80	0.013376	4.54	1984.00	635.66	0.28
1	1665	PF 1	8800.00	246.00	259.46	255.22	260.66	0.006165	8.88	1033.74	136.71	0.49
1	1624		Bridge									
1	1580	PF 1	8800.00	246.00	258.36	254.02	259.23	0.004559	7.53	1194.02	147.50	0.43
1	1374	PF 1	8800.00	246.00	257.00	252.96	257.40	0.016645	5.27	1756.42	459.67	0.32

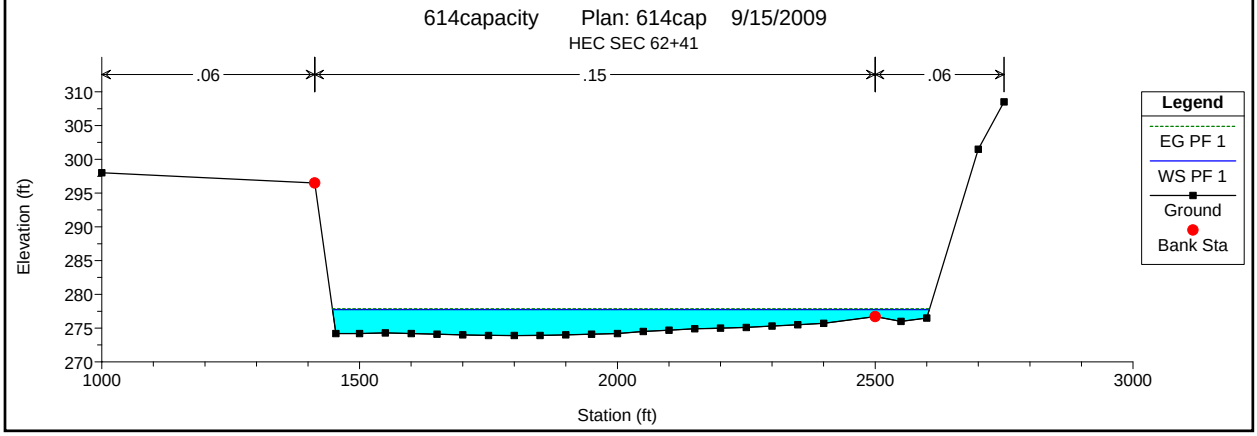

614capacity Plan: 614cap 9/15/2009
HEC SEC 119+75
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SEC 114+39
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SEC 111+29
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SEC 102+84
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

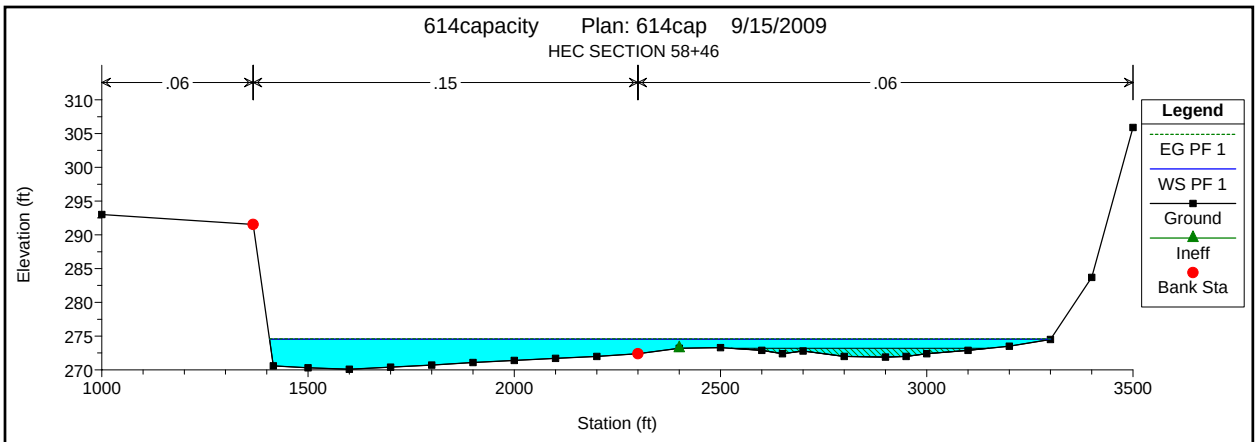

614capacity Plan: 614cap 9/15/2009
HEC SEC 98+55
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SEC 94+31
.05
.045
.045
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SECTION 89+07
.045
.045
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SEC 85+26
.045
.05
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

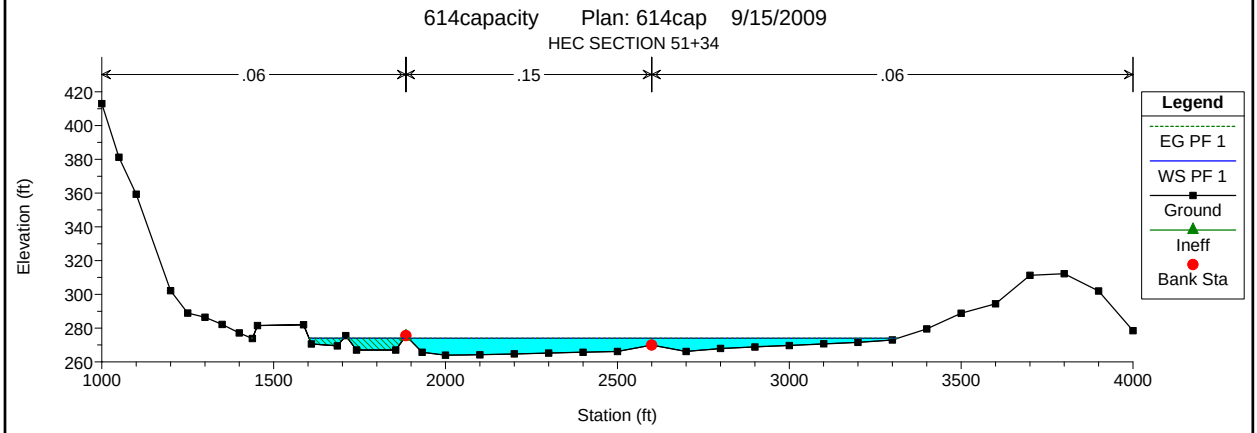

614capacity Plan: 614cap 9/15/2009
HEC SEC 81+91
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

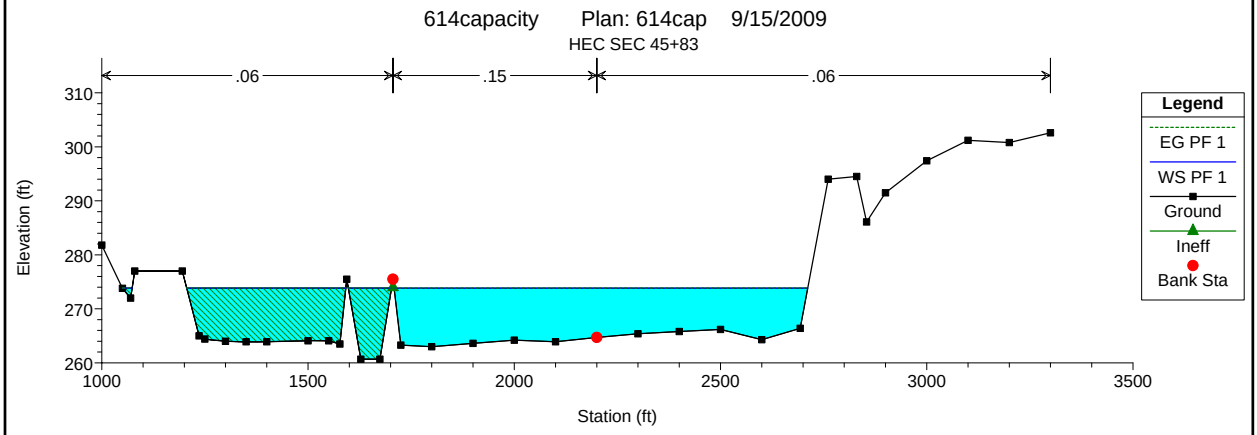

614capacity Plan: 614cap 9/15/2009
HEC SECTION 72+33
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

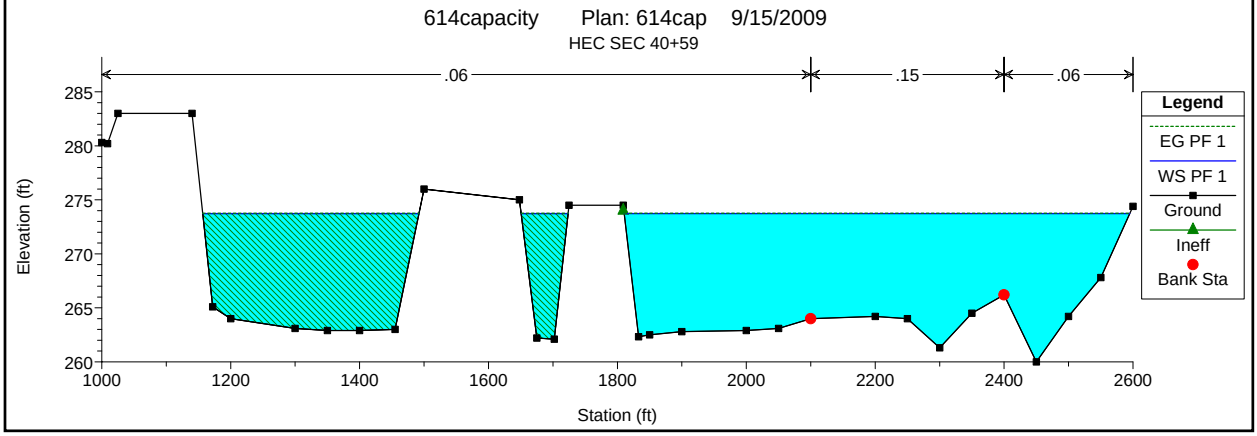

614capacity Plan: 614cap 9/15/2009
HEC SEC 66+07
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


614capacity Plan: 614cap 9/15/2009
HEC SEC 62+41
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


614capacity Plan: 614cap 9/15/2009
HEC SECTION 58+46
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta

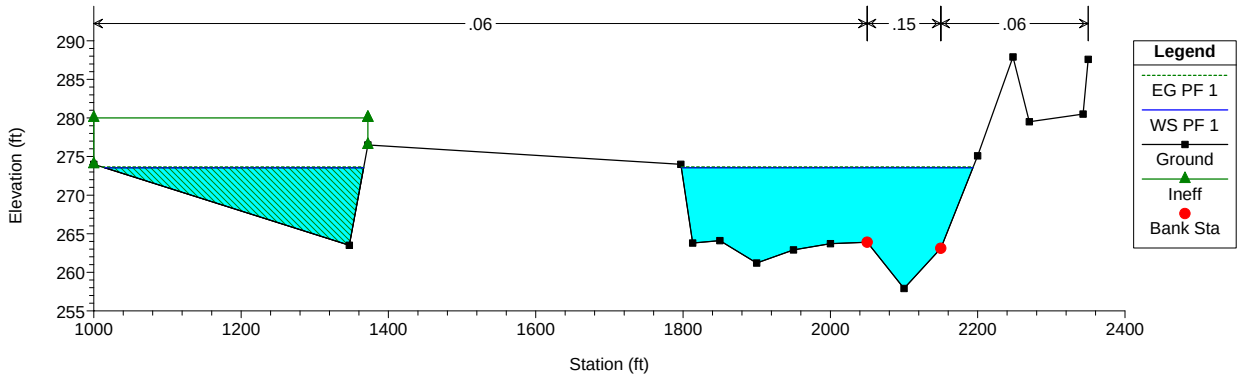

614capacity Plan: 614cap 9/15/2009
HEC SECTION 51+34
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta


614capacity Plan: 614cap 9/15/2009
HEC SEC 45+83
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta


614capacity Plan: 614cap 9/15/2009
HEC SEC 40+59
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta

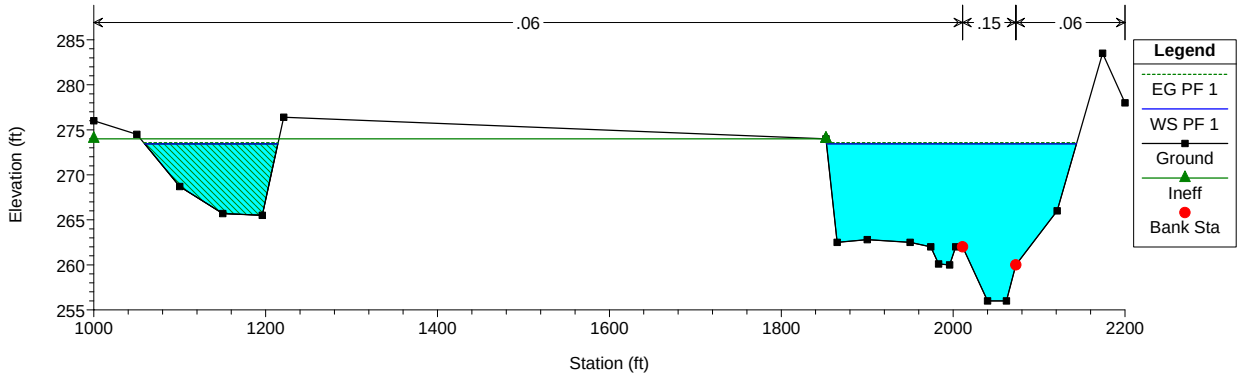
614capacity Plan: 614cap 9/15/2009

HEC SEC 37+50



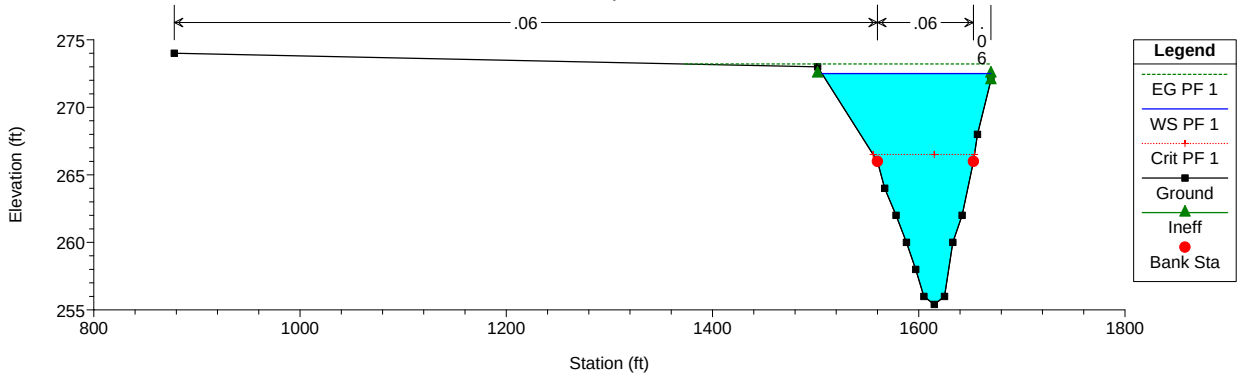
614capacity Plan: 614cap 9/15/2009

HEC SEC 36+46



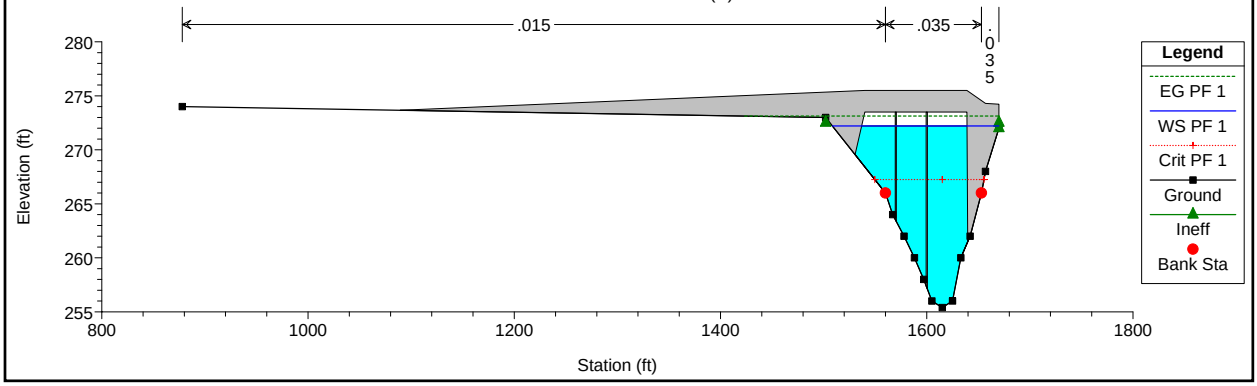
614capacity Plan: 614cap 9/15/2009

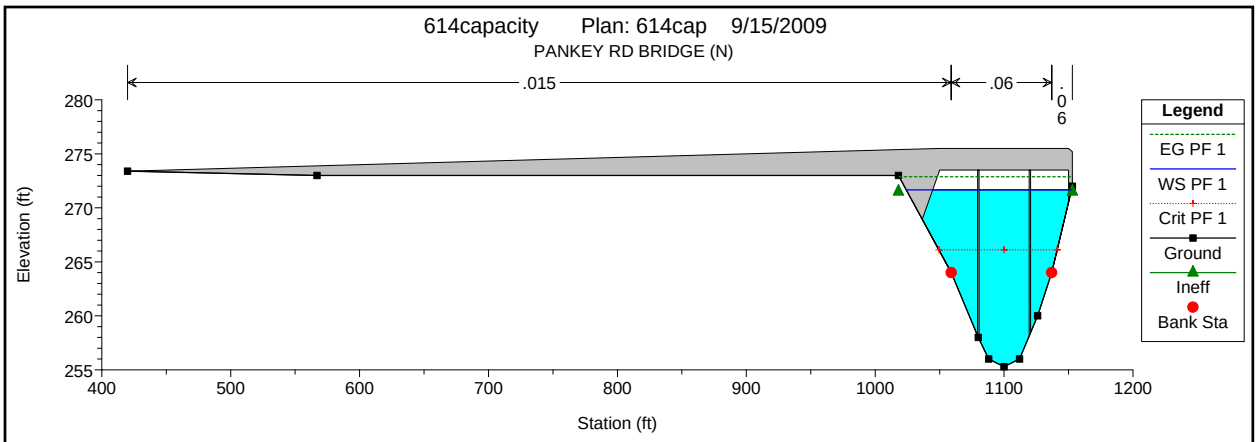
U/S Pankey North 35+10

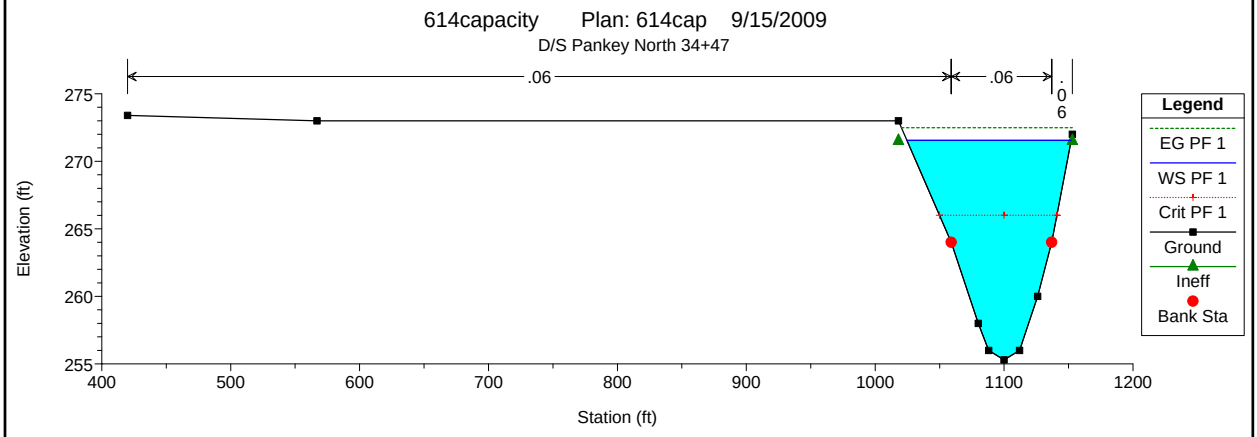


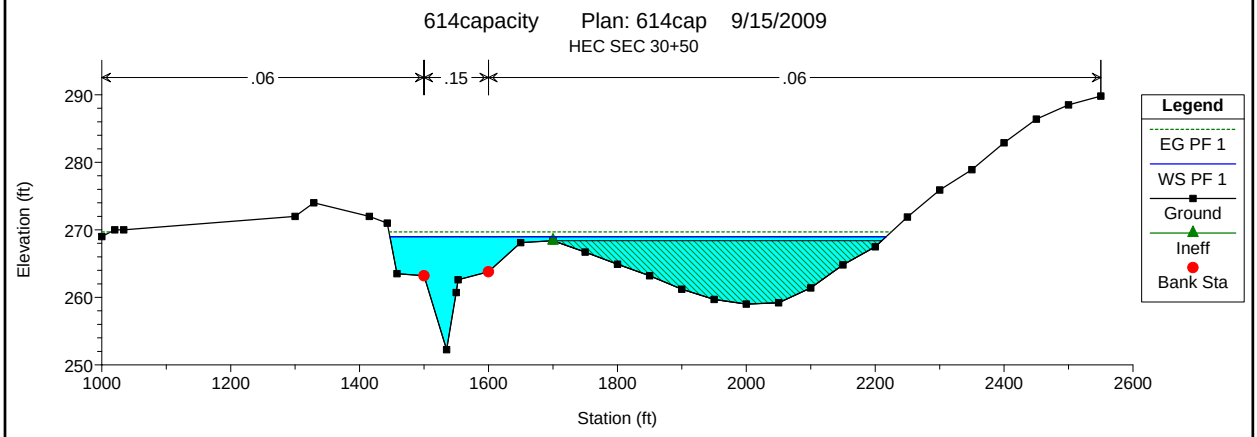
614capacity Plan: 614cap 9/15/2009

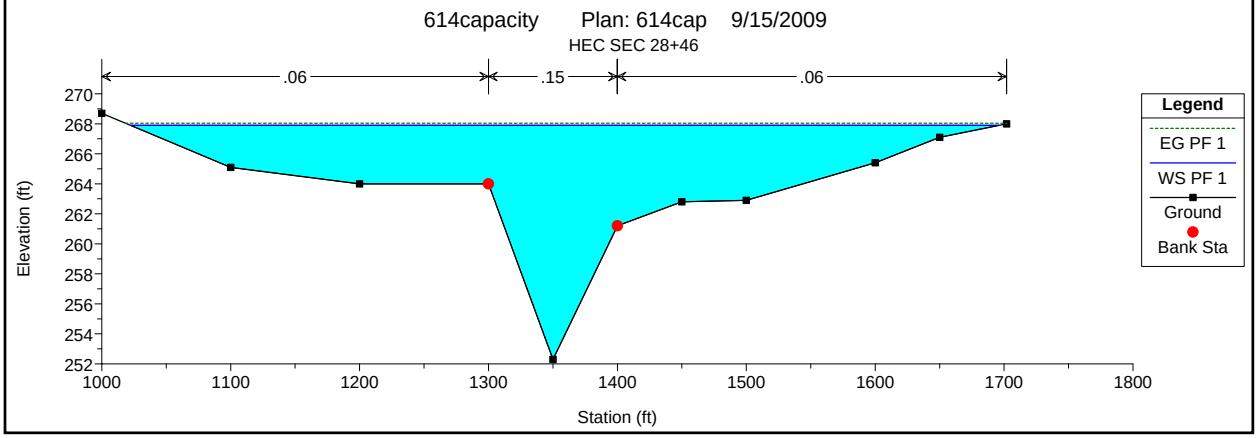
PANKEY RD BRIDGE (N)

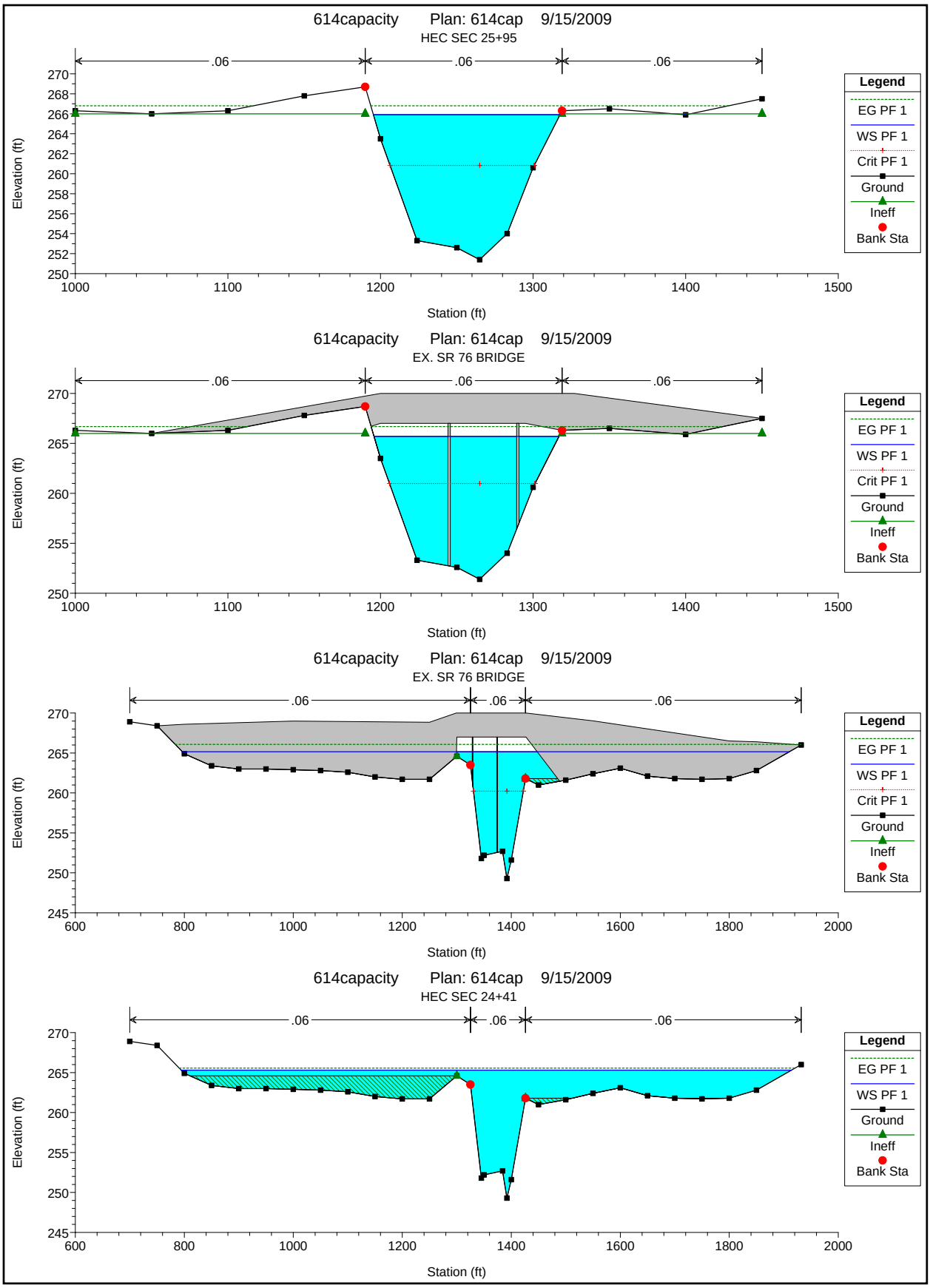


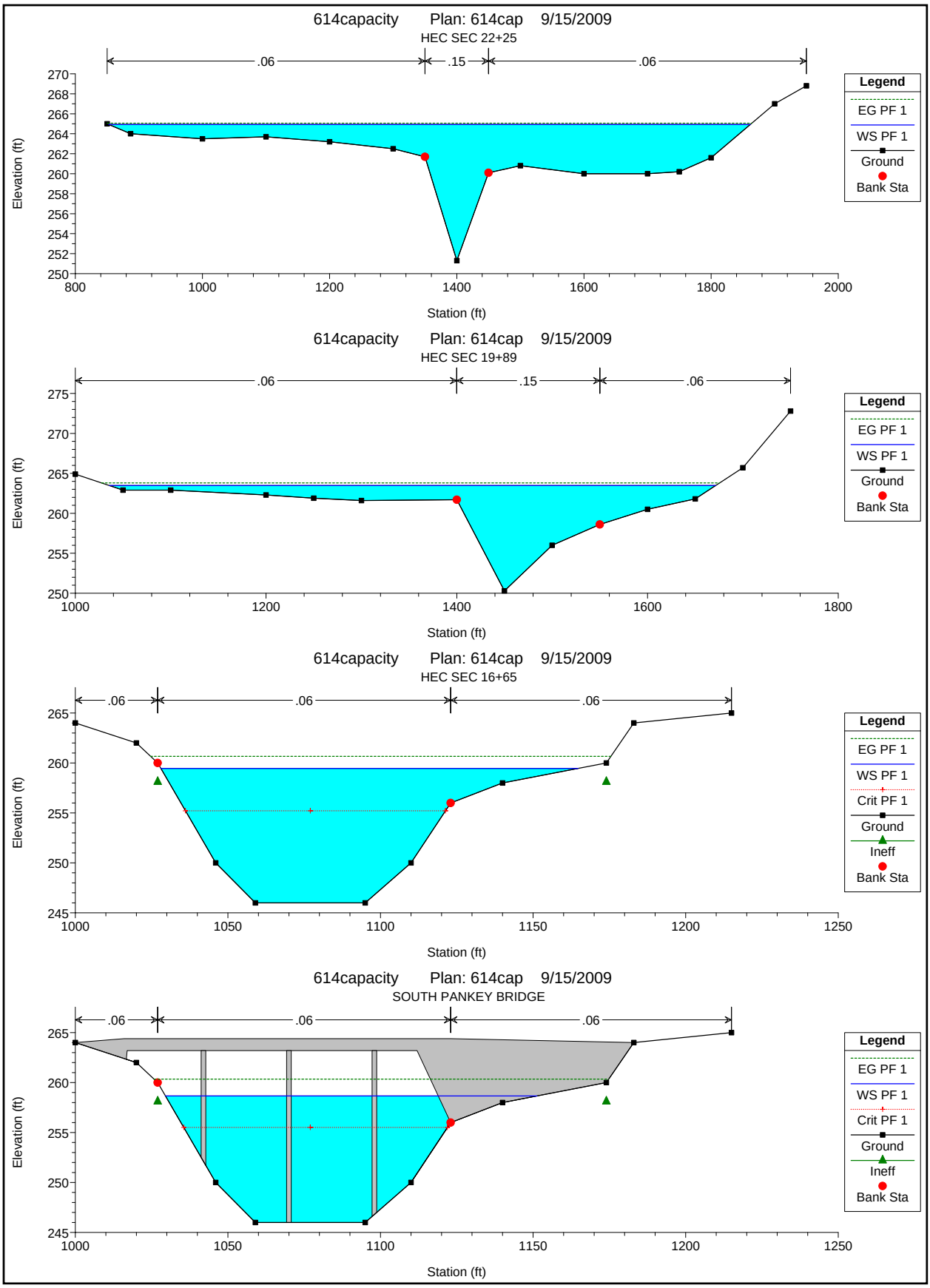

614capacity Plan: 614cap 9/15/2009
PANKEY RD BRIDGE (N)
.015
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

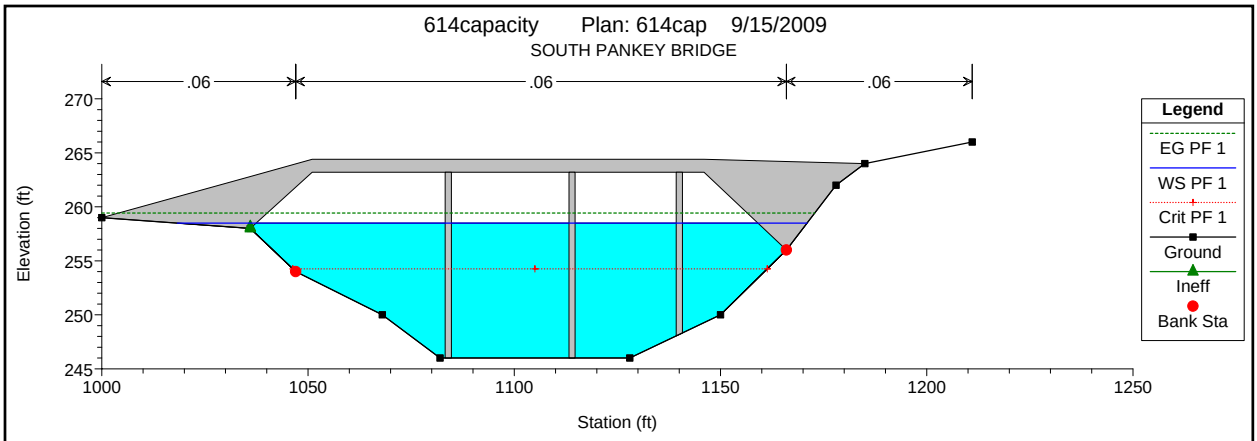

614capacity Plan: 614cap 9/15/2009
D/S Pankey North 34+47
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

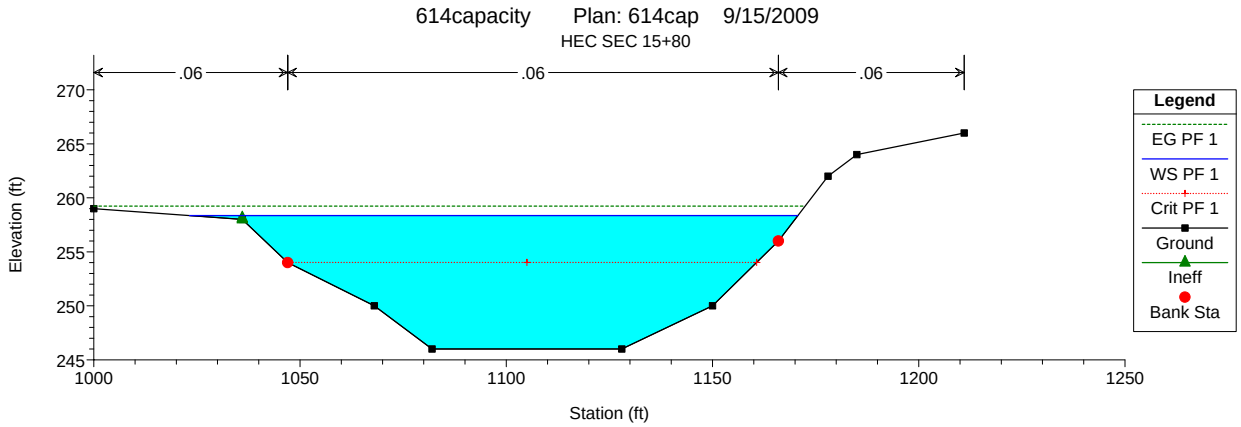

614capacity Plan: 614cap 9/15/2009
HEC SEC 30+50
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta

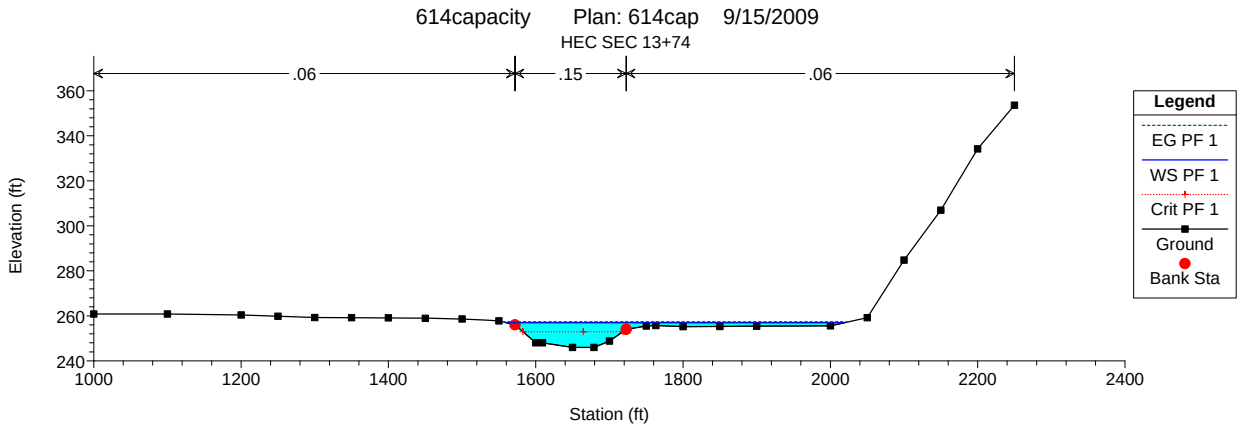

614capacity Plan: 614cap 9/15/2009
HEC SEC 28+46
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


614capacity Plan: 614cap 9/15/2009
HEC SEC 25+95
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
614capacity Plan: 614cap 9/15/2009
EX. SR 76 BRIDGE
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
614capacity Plan: 614cap 9/15/2009
EX. SR 76 BRIDGE
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SEC 24+41
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta

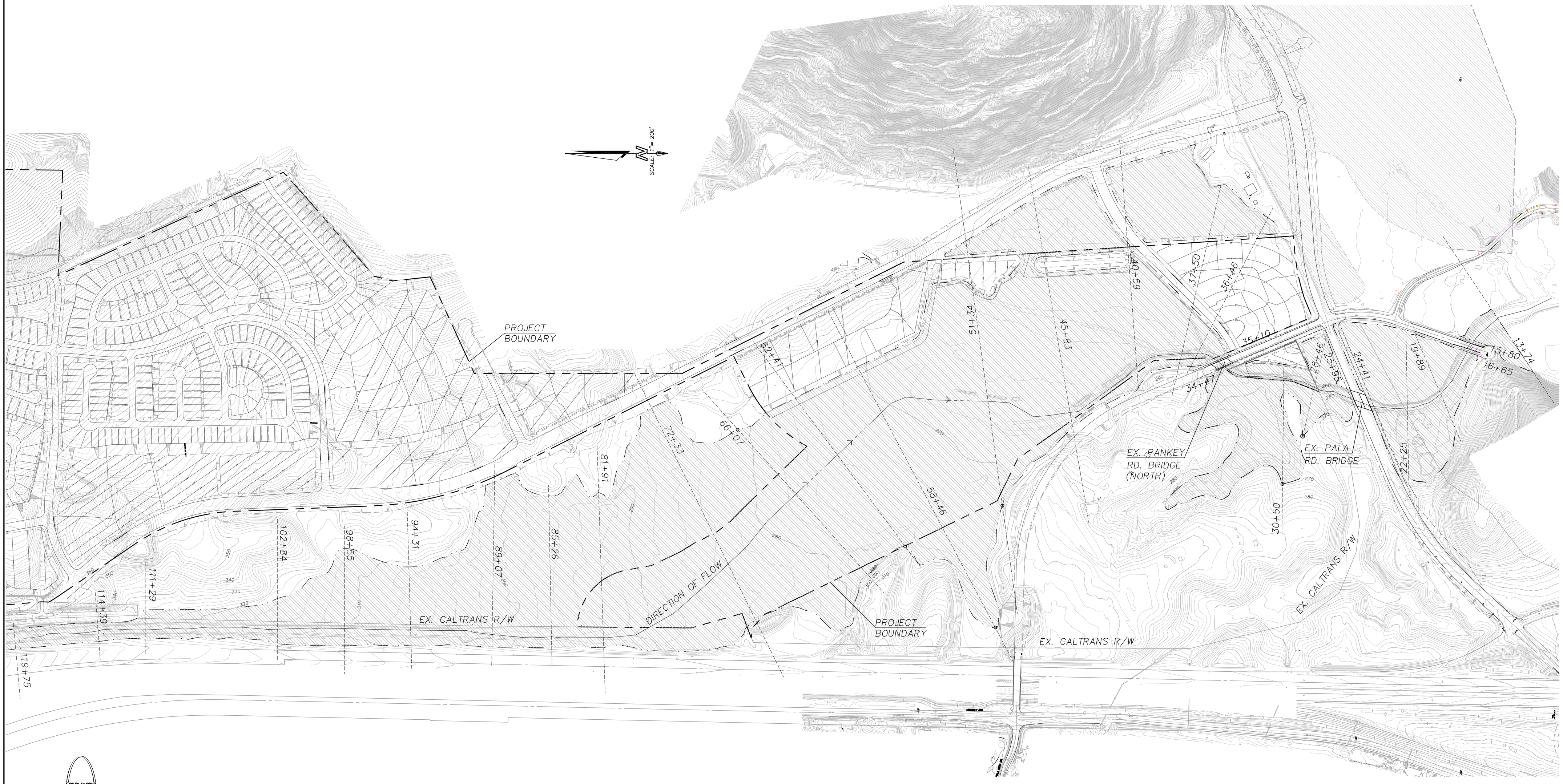

614capacity Plan: 614cap 9/15/2009
HEC SEC 22+25
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SEC 19+89
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
614capacity Plan: 614cap 9/15/2009
HEC SEC 16+65
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
614capacity Plan: 614cap 9/15/2009
SOUTH PANKEY BRIDGE
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


614capacity Plan: 614cap 9/15/2009
SOUTH PANKEY BRIDGE
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


614capacity Plan: 614cap 9/15/2009
HEC SEC 15+80
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


614capacity Plan: 614cap 9/15/2009
HEC SEC 13+74
.06
.15
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

CAMPUS PARK
HECRAS SECTIONS & FLOOD LIMITS
POST-DEVELOPMENT CAPACITY CONDITIONS



LANDMARK CONSULTING

H-3.TIF

SECTION 9D:
EXISTING CULVERT/BRIDGE HYDRAULIC CALCS

The existing 5’x8’ culvert’s flow line elevations as well as the internal bridge cross sections of the Pankey Road (north and south) are obtain from recent field survey shots on the NGVD 29 vertical datum. Also, as-built plans were obtained from Caltrans for reference as well.

Plan: 614capacity HRC 1 RS: 3476 Profile: PF 1

E.G. US. (ft)	273.21	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	272.50	E.G. Elev (ft)	273.13	272.88
Q Total (cfs)	8800.00	W.S. Elev (ft)	272.21	271.66
Q Bridge (cfs)	8800.00	Crit W.S. (ft)	267.25	266.11
Q Weir (cfs)		Max Chl Dpth (ft)	16.81	16.36
Weir Sta Lft (ft)		Vel Total (ft/s)	7.42	7.60
Weir Sta Rgt (ft)		Flow Area (sq ft)	1186.32	1157.36
Weir Submerg		Froude # Chl	0.32	0.33
Weir Max Depth (ft)		Specif Force (cu ft)	9511.39	9539.94
Min El Weir Flow (ft)	273.41	Hydr Depth (ft)	11.86	11.20
Min El Prs (ft)	273.50	W.P. Total (ft)	192.37	185.15
Delta EG (ft)	0.71	Conv. Total (cfs)	201387.1	119079.7
Delta WS (ft)	0.94	Top Width (ft)	100.01	103.35
BR Open Area (sq ft)	1313.45	Frctn Loss (ft)	0.15	0.25
BR Open Vel (ft/s)	7.60	C & E Loss (ft)	0.09	0.14
Coef of Q		Shear Total (lb/sq ft)	0.74	2.13
Br Sel Method	Energy only	Power Total (lb/ft s)	5.45	16.20

Plan: 614capacity HRC 1 RS: 2525 Profile: PF 1

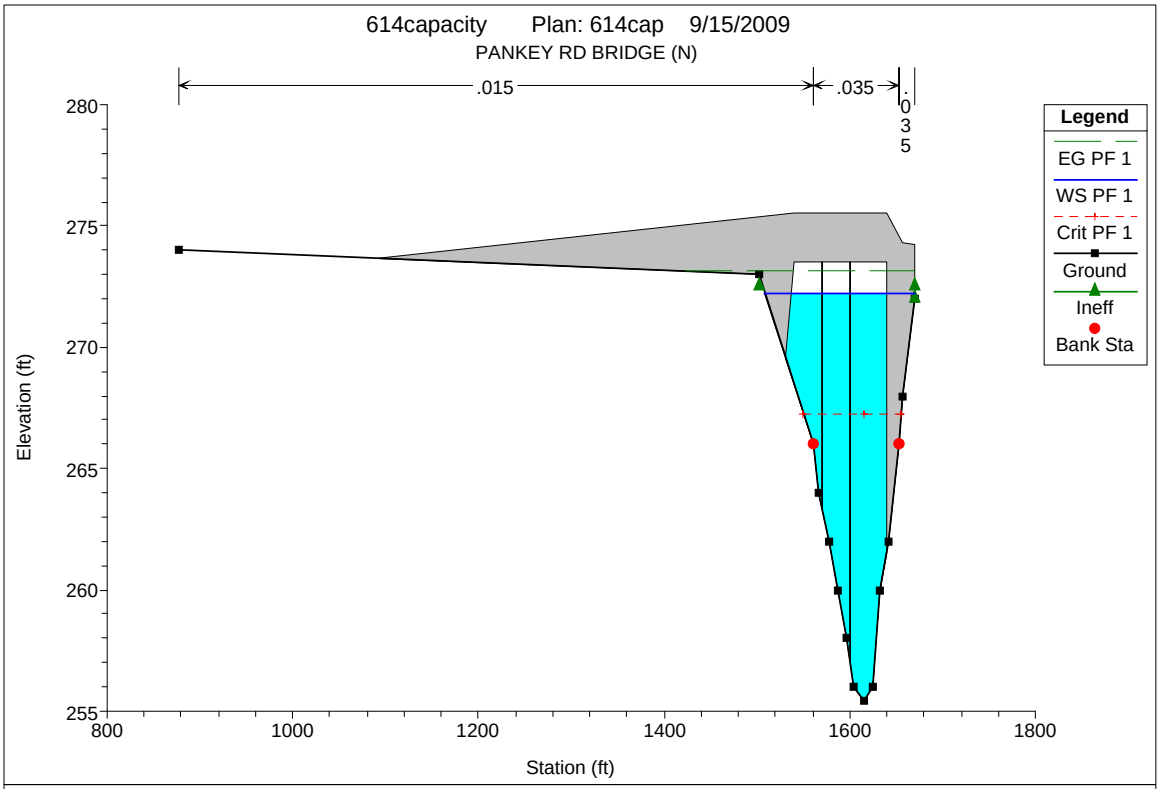
E.G. US. (ft)	266.80	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	265.91	E.G. Elev (ft)	266.68	266.08
Q Total (cfs)	8800.00	W.S. Elev (ft)	265.70	265.16
Q Bridge (cfs)	8800.00	Crit W.S. (ft)	260.98	260.22
Q Weir (cfs)		Max Chl Dpth (ft)	14.30	15.86
Weir Sta Lft (ft)		Vel Total (ft/s)	7.97	7.11
Weir Sta Rgt (ft)		Flow Area (sq ft)	1103.82	1238.53
Weir Submerg		Froude # Chl	0.46	0.31
Weir Max Depth (ft)		Specif Force (cu ft)	8489.47	8804.53
Min El Weir Flow (ft)	266.01	Hydr Depth (ft)	9.34	8.53
Min El Prs (ft)	267.00	W.P. Total (ft)	166.84	268.02
Delta EG (ft)	1.24	Conv. Total (cfs)	96340.7	109723.4
Delta WS (ft)	0.60	Top Width (ft)	118.22	145.14
BR Open Area (sq ft)	1252.04	Frctn Loss (ft)	0.57	0.19
BR Open Vel (ft/s)	7.97	C & E Loss (ft)	0.04	0.33
Coef of Q		Shear Total (lb/sq ft)	3.45	1.86
Br Sel Method	Energy only	Power Total (lb/ft s)	27.47	13.18

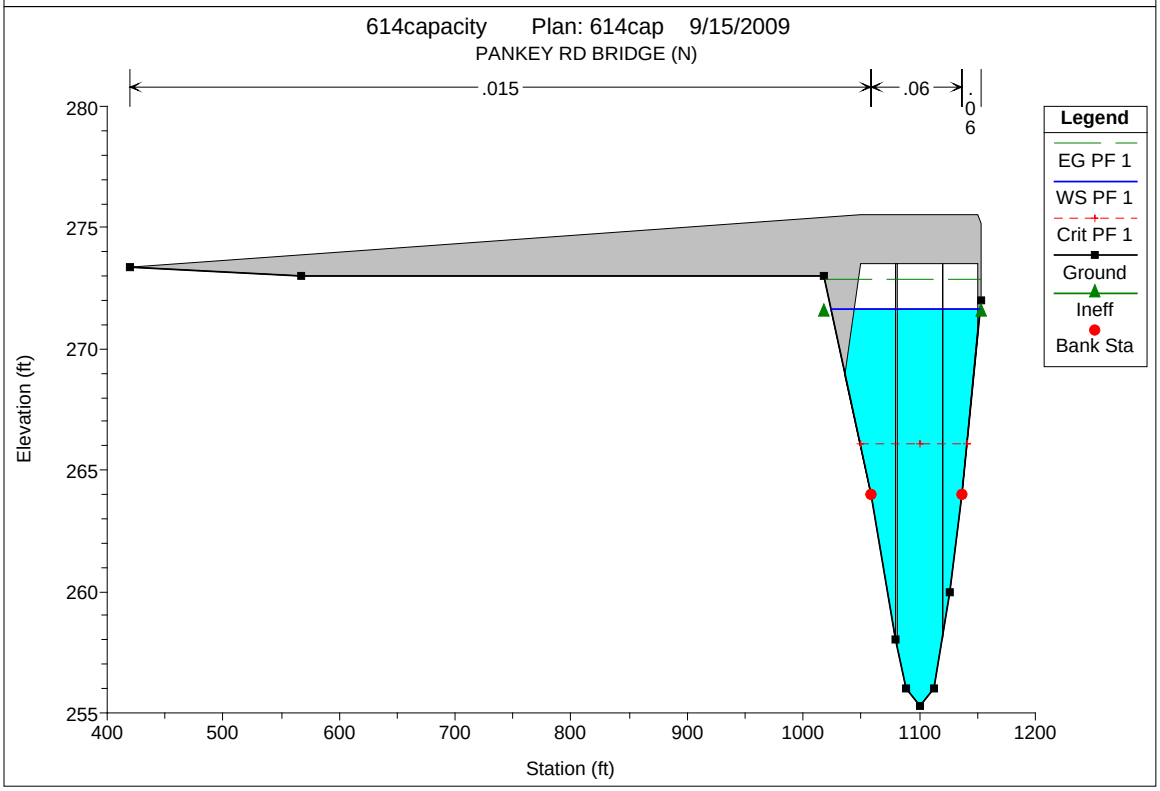
Plan: 614capacity HRC 1 RS: 1624 Profile: PF 1

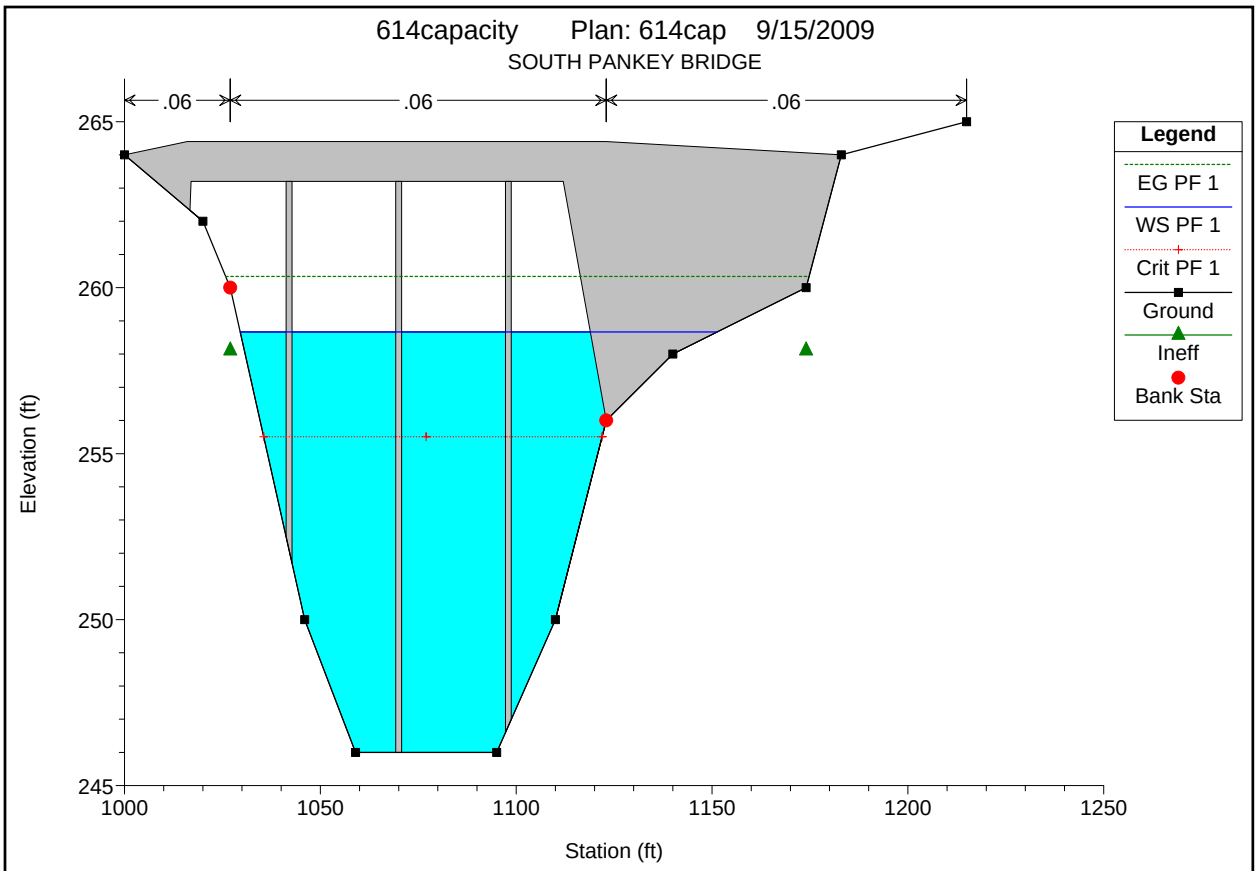
E.G. US. (ft)	260.66	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	259.46	E.G. Elev (ft)	260.34	259.43
Q Total (cfs)	8800.00	W.S. Elev (ft)	258.66	258.49
Q Bridge (cfs)	8800.00	Crit W.S. (ft)	255.51	254.25
Q Weir (cfs)		Max Chl Dpth (ft)	12.66	12.49
Weir Sta Lft (ft)		Vel Total (ft/s)	10.38	7.71
Weir Sta Rgt (ft)		Flow Area (sq ft)	847.40	1142.03
Weir Submerg		Froude # Chl	0.51	0.38
Weir Max Depth (ft)		Specif Force (cu ft)	7506.73	8154.92
Min El Weir Flow (ft)	264.01	Hydr Depth (ft)	9.98	9.75
Min El Prs (ft)	263.20	W.P. Total (ft)	160.34	208.01
Delta EG (ft)	1.43	Conv. Total (cfs)	63675.0	89432.6
Delta WS (ft)	1.10	Top Width (ft)	84.89	117.16
BR Open Area (sq ft)	1245.23	Frctn Loss (ft)	0.54	0.17
BR Open Vel (ft/s)	10.38	C & E Loss (ft)	0.37	0.03

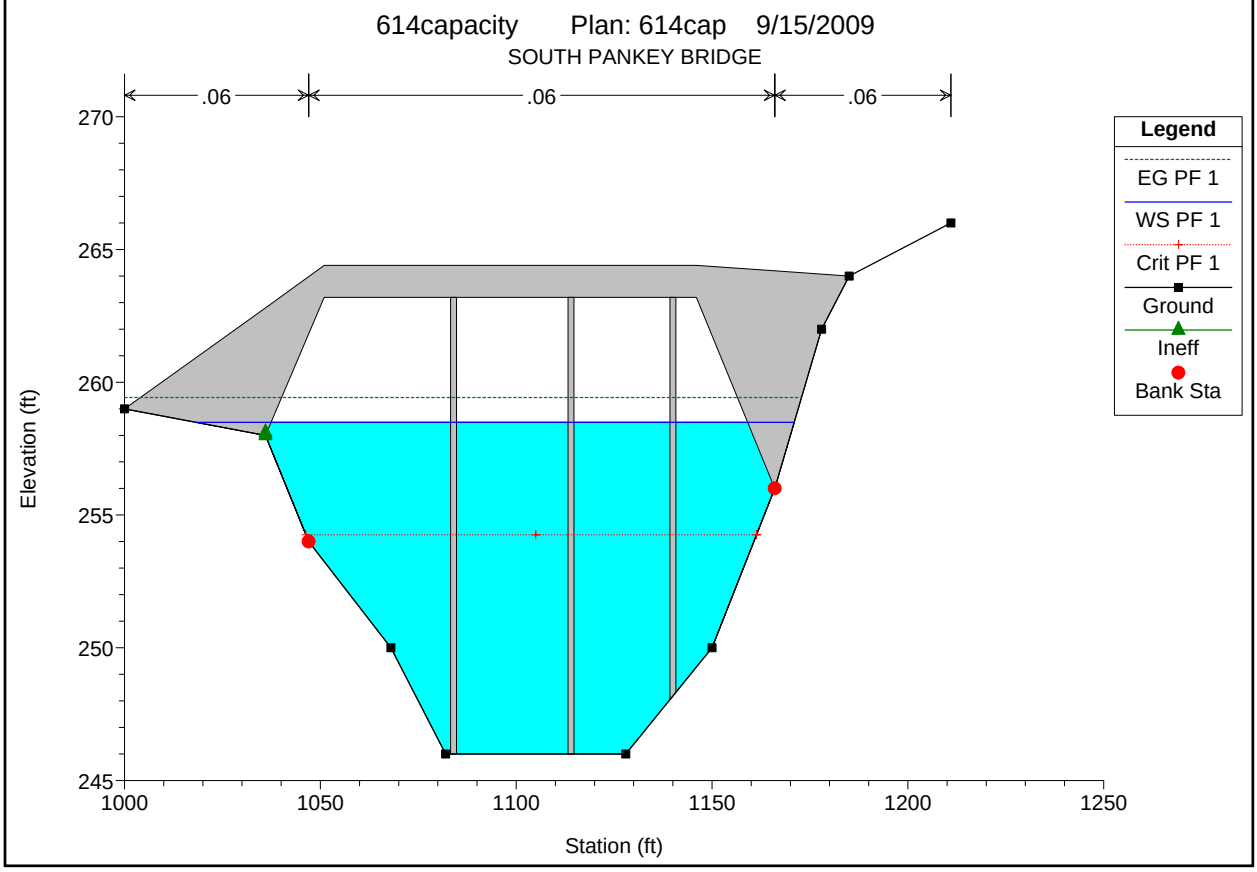
Plan: 614capacity HRC 1 RS: 1624 Profile: PF 1 (Continued)

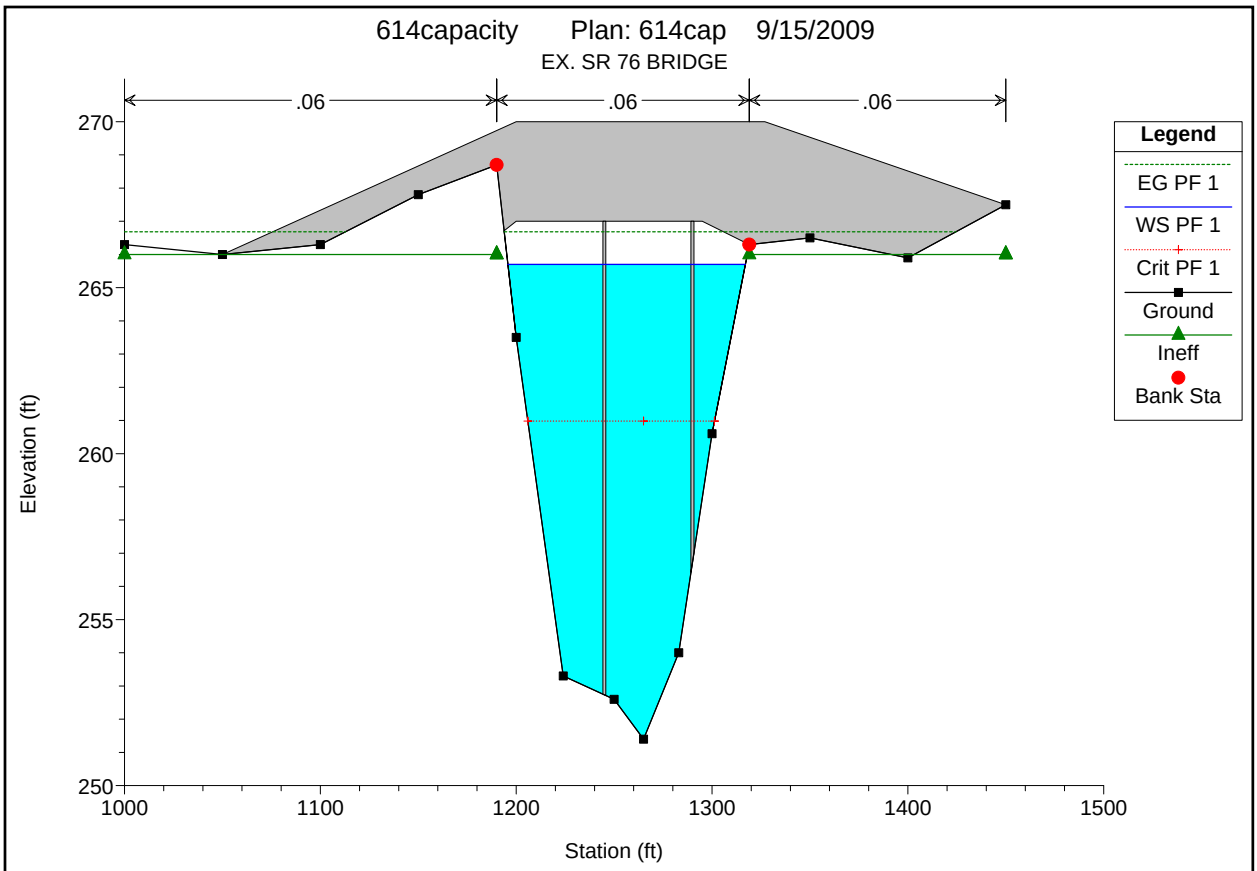
Coef of Q		Shear Total (lb/sq ft)	6.30	3.32
Br Sel Method	Energy only	Power Total (lb/ft s)	65.44	25.57

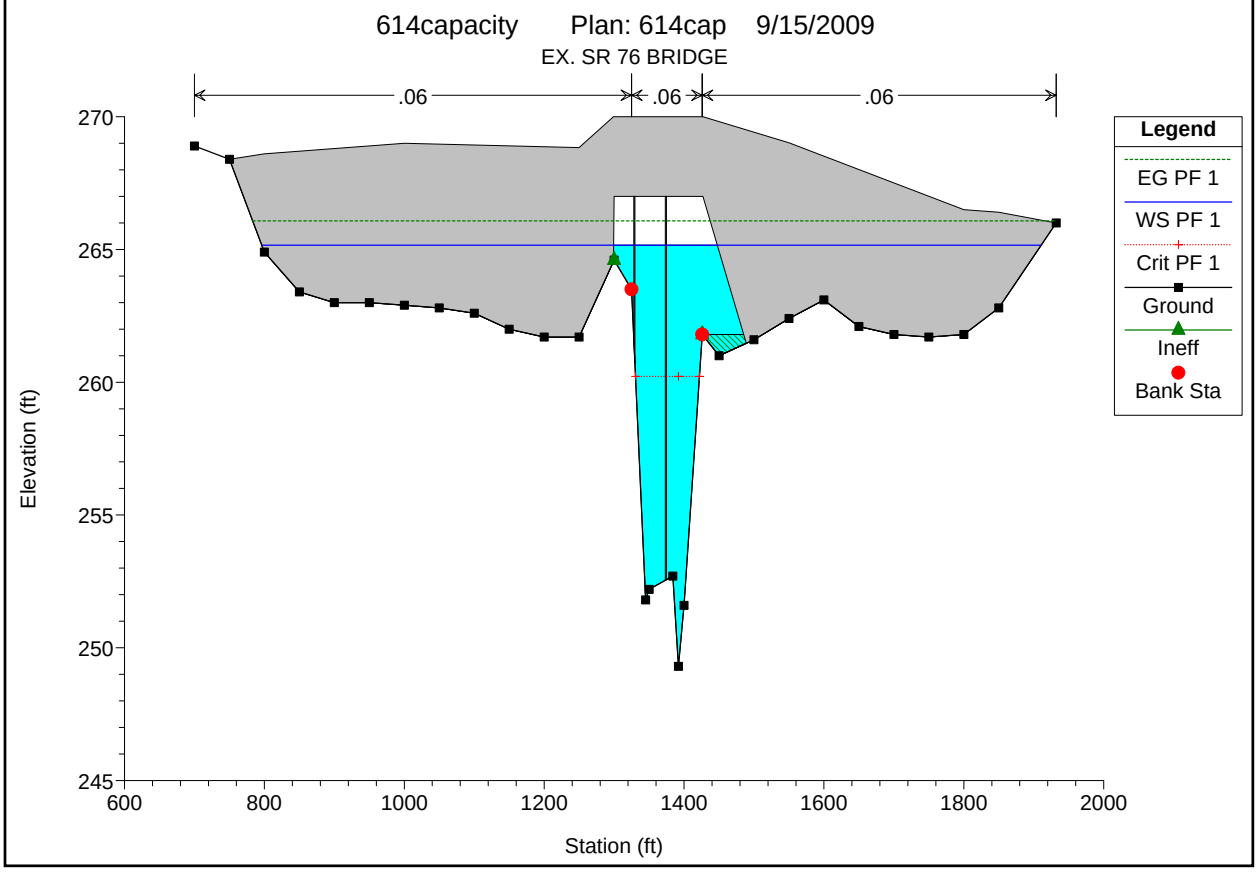

614capacity Plan: 614cap 9/15/2009
PANKEY RD BRIDGE (N)
.015
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
280
275
270
265
260
255
800
1000
1200
1400
1600
1800


614capacity Plan: 614cap 9/15/2009
PANKEY RD BRIDGE (N)
.015
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
280
275
270
265
260
255
400
500
600
700
800
900
1000
1100
1200


614capacity Plan: 614cap 9/15/2009
SOUTH PANKEY BRIDGE
.06
.06
.06
Elevation (ft)
265
260
255
250
245
1000
1050
1100
1150
1200
1250
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


614capacity Plan: 614cap 9/15/2009
SOUTH PANKEY BRIDGE
.06
.06
.06
Elevation (ft)
270
265
260
255
250
245
1000
1050
1100
1150
1200
1250
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

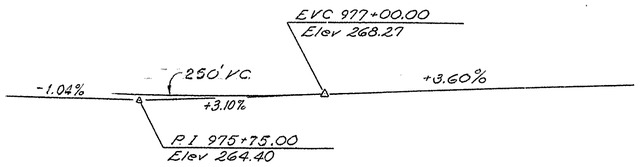

614capacity Plan: 614cap 9/15/2009
EX. SR 76 BRIDGE
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
270
265
260
255
250
1000
1100
1200
1300
1400
1500
Station (ft)


614capacity Plan: 614cap 9/15/2009
EX. SR 76 BRIDGE
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
270
265
260
255
250
245
600
800
1000
1200
1400
1600
1800
2000
Station (ft)

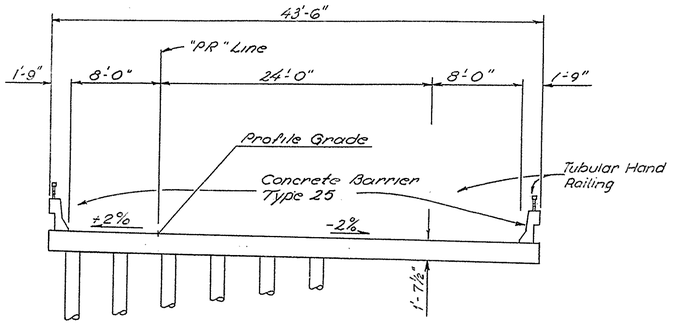
DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	15	R45.9/R48.1	158	208

R C Tassano 9012
CHIEF, OFFICE OF STRUCTURES DESIGN — REGISTERED CIVIL ENGINEER NUMBER

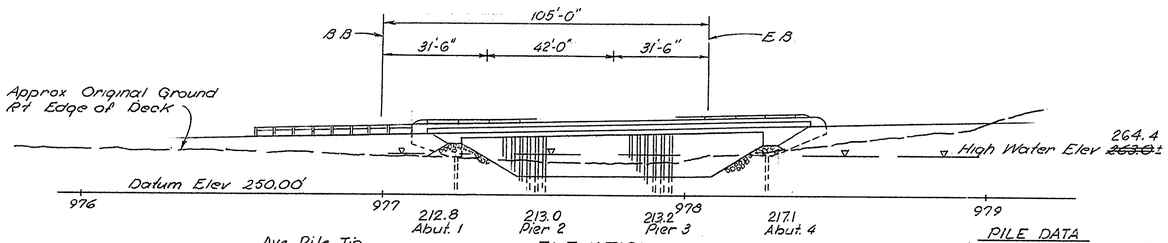
DATE APPROVED February 5, 1979



PROFILE GRADE
NO SCALE

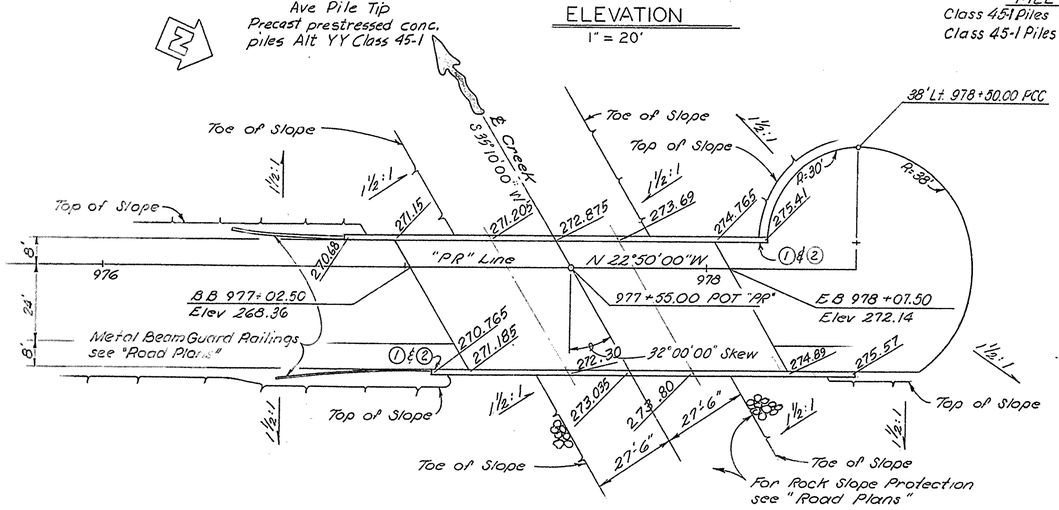


TYPICAL SECTION
3/16" = 1'-0"



ELEVATION
1" = 20'

PILE DATA
Class 45-1 Piles Specified Tip 213.0 - Abut 1, Pier 2 & Pier 3
Class 45-1 Piles Specified Tip 220.0 - Abut 5



ELEVATION
1" = 20'

Note
① = Paint "Horse Ranch Creek Bridge."
② = Paint "57C-323" & Year Constructed.

Standard Plan Sheet No.
Detail No.

FOR GENERAL NOTES SEE "Deck Contour" sheet

LIVE LOADING HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOADING

DATUM: NGVD 29

INDEX TO PLANS

SHEET NO.	TITLE
1	GENERAL PLAN
2	DECK CONTOURS
3	FOUNDATION PLAN
4	ABUTMENT & PIER DETAILS
5	PIER PILE DETAILS - CLASS 45-1
6	SLAB SECTION & REINFORCEMENT DETAILS
7	SLAB REINFORCEMENT DETAILS
8	LOG OF TEST BORINGS

STANDARD PLANS DATED MARCH, 1977

A62-DB	EXCAVATION AND BACKFILL - LIMITS OF PAYMENT (BRIDGE)
B0-1	BRIDGE DETAILS
B11-51	TUBULAR HAND RAILING.
B11-53	CONCRETE BARRIER TYPE 25.

APPROXIMATE QUANTITIES

FURNISH PILING (CLASS 45-1)	1,703 LF
DRIVE PILE (CLASS 45)	32 EA
TUBULAR HANDRAILING	275 LF
CONCRETE BARRIER (TYPE 25)	275 LF

FINAL PAY QUANTITIES

STRUCTURE EXCAVATION (BRIDGE)	102 CY
STRUCTURE BACKFILL (BRIDGE)	64 CY
STRUCTURAL CONCRETE, BRIDGE	348 CY
BAR REINFORCING STEEL (BRIDGE)	61,000 LB

AS BUILT
CORRECTION BY John T. Day RE 12781
CONTRACT NO. 11-095094
DATE 6-15-81

BRIDGE DEPARTMENT
... DESIGN SECTION ... 8
Section Supervisor F.R. Quiza 10/78 8909
Project Engineer A. M. Ashraay 9604

DESIGN	By Gonzalez 2-73	Checked Taylor	9/78
DETAILS	By Vern Groth 2-73	Checked Taylor	9/78
LAYOUT	By Gonzalez 2-73	Checked Taylor	9/78
QUANTITIES	By Gonzalez 4-78	Checked F. H. Eshen	9-78
SPECIFICATIONS	By [illegible] HCE IGARL 1/78	Field and Bridge Construction Engineer HKJ	1/79

Approval Recommended by [illegible] Design Engineer — Registered Civil Engr. License No. 8/78

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

HORSE RANCH CREEK BRIDGE
PANKEY(NORTH)
GENERAL PLAN

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
57C-323	CO. RD.		1	8

WO 095091
CU 11203

Disregard prints bearing earlier revision dates

REVISION DATES (PRELIMINARY STAGE ONLY): 3/7/83

158

AS BUILT PLANS
Contract No. 11-095094
Date Completed
Document No.

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.
DATE 1-19-82 SIGNATURE Donald Blackford TITLE SUPERVISOR OF MICROFILM SERVICES
DAS-55-78

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

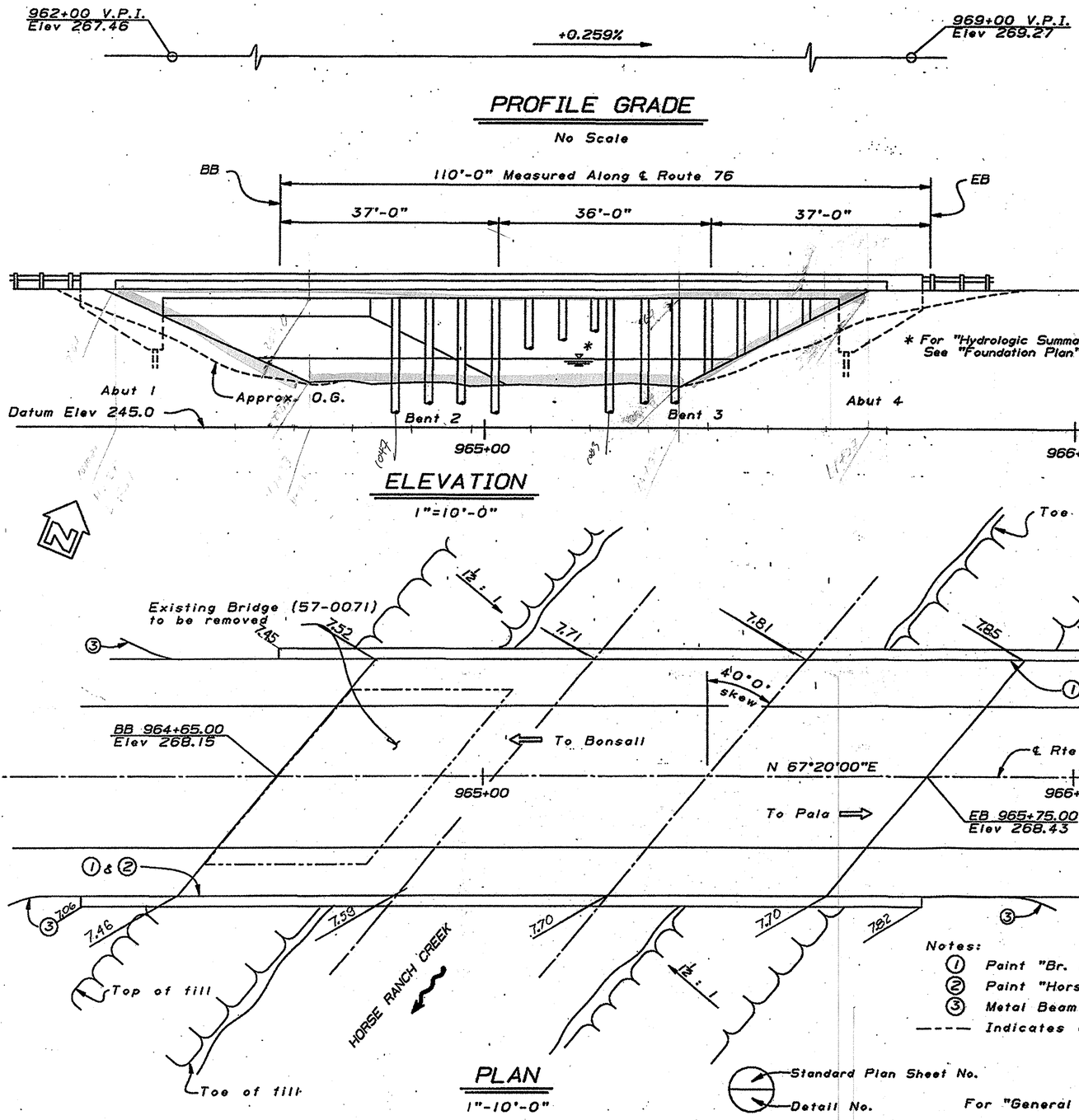
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	76	17.8	26	35

REGISTERED ENGINEER - CIVIL

REGISTERED PROFESSIONAL ENGINEER Norbert Gee No. 47306 Exp. 12-31-95 CIVIL STATE OF CALIFORNIA

7-10-95
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



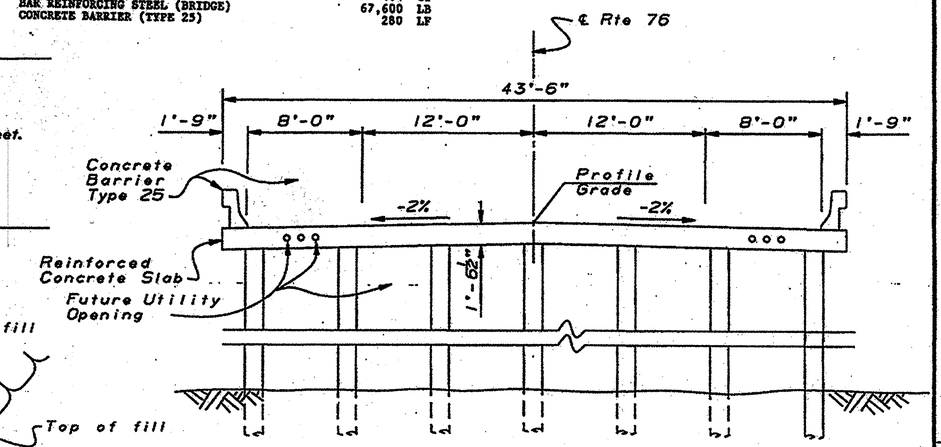
PILE DATA

Location	Design Loading (Service Load)	Specified Tip Elev.	Probable Tip Elev.
Abutment 1	45 ton	218.0	212.0
Bent 2	70 ton	194.0	188.0
Bent 3	70 ton	192.0	186.0
Abutment 4	45 ton	197.0	191.0

Precased Prestressed option used

QUANTITIES

BRIDGE REMOVAL	LUMP	SUM
STRUCTURE EXCAVATION (BRIDGE)	242	CY
STRUCTURE BACKFILL (BRIDGE)	116	CY
FURNISH PILING (CLASS 70)	1,030	LF
DRIVE PILE (CLASS 70)	14	EA
FURNISH PILING (CLASS 45)	684	LF
DRIVE PILE (CLASS 45)	14	EA
STRUCTURAL CONCRETE, BRIDGE	404	CY
BAR REINFORCING STEEL (BRIDGE)	67,600	LB
CONCRETE BARRIER (TYPE 25)	280	LF



TYPICAL SECTION

1"=5'-0"

NO AS BUILT CHANGES
AS BUILT
CORRECTIONS BY Mohamed Fouad
CONTRACT NO. 11-055301
DATE 6-17-96

INDEX TO PLANS

SHEET NO.	TITLE
1	GENERAL PLAN
2	DECK CONTOURS
3	FOUNDATION PLAN
4	ABUTMENT DETAILS
5	BENT DETAILS & TYPICAL SECTION
6	TOP & BOTTOM SLAB REINFORCEMENT
7	SLAB BRIDGE PILE DETAILS
8	SLAB REINFORCEMENT DETAILS
9	LOG OF TEST BORINGS 1 OF 2
10	LOG OF TEST BORINGS 2 OF 2

STANDARD PLANS DATED JULY 1992

A10A	ABBREVIATIONS
A62C	LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE
B0-1	BRIDGE DETAILS
B0-3	BRIDGE DETAILS
B2-5	PILE DETAILS CLASS 45 AND CLASS 70
B11-53	CONCRETE BARRIER TYPE 25

Notes:
1. Paint "Br. No. 57-1029"
2. Paint "Horse Ranch Creek Bridge"
3. Metal Beam Guard Railing, see "Road Plans"

---- Indicates existing structure

Standard Plan Sheet No.
Detail No.

For "General Notes" see "Slab Reinforcement Details" sheet

(360 Ac)

DESIGN ENGINEER	DESIGN	BY Ed Warren	CHECKED N. Gee	LOAD FACTOR DESIGN	LIVE LOADING: HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD
	DETAILS	BY Bruno Jenko 10-93	CHECKED N. Gee	LAYOUT	BY Ed Warren / CHECKED N. Gee
	QUANTITIES	BY M.K. Brady	CHECKED Ed Warren	SPECIFICATIONS	BY / PLANS AND SPECS CHAPTER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 7

BRIDGE NO. 57-1029
POST MILE 17.75

HORSE RANCH CREEK BRIDGE
GENERAL PLAN

CU 11
EA 055301

DS OSD 2138 (CADD 4/89)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 10-30-93 12-27-93 1-7-94 08-26-94 9-22-94 9-30-94 9-30-94 3-1-95

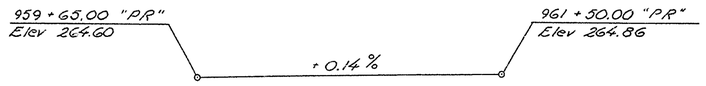
SHEET 1 OF 10

DF - www.fastio.com

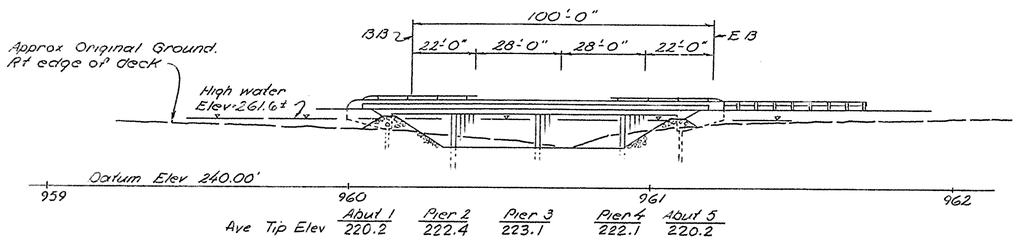
DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	15	R45.9/R48.1	166	208

R.C. Cassidy 9017
CHIEF, OFFICE OF STRUCTURES DESIGN — REGISTERED CIVIL ENGINEER NUMBER

DATE APPROVED February 5, 1979

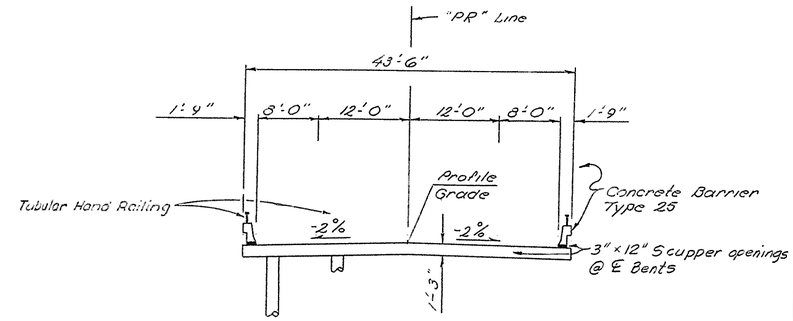


PROFILE GRADE
NO SCALE

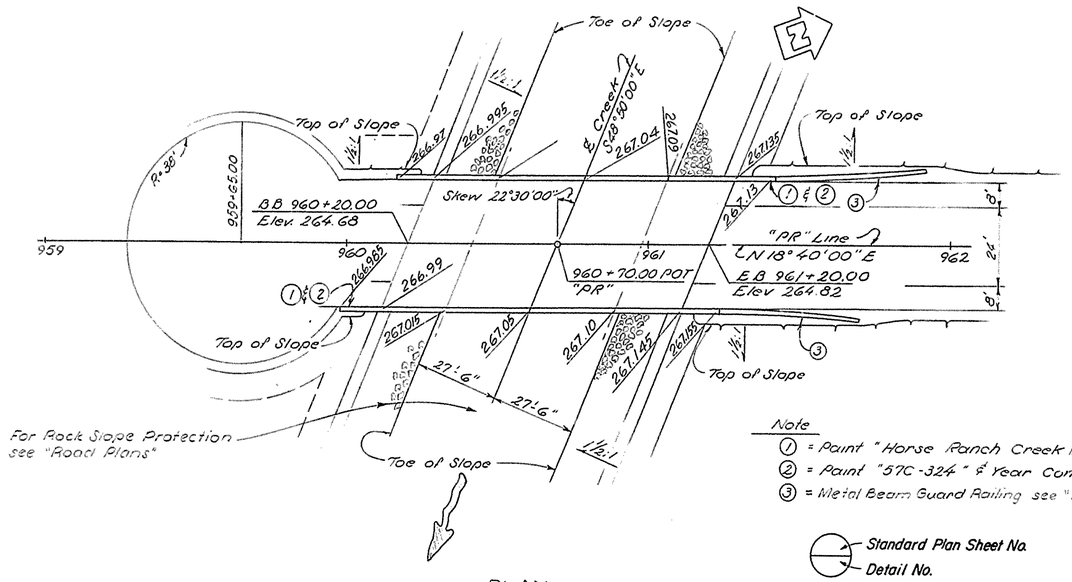


PILE DATA
Class 45-1 Piles Specified Tip 220.0
Precast prestressed Alt YY

ELEVATION
1" = 20'



TYPICAL SECTION
1/8" = 1'-0"



Note
① = Paint "Horse Ranch Creek Bridge"
② = Paint "57C-324" & Year Constructed
③ = Metal Beam Guard Railing see "Road Plans"

Standard Plan Sheet No.
Detail No.

PLAN
1" = 20'

INDEX TO PLANS

SHEET NO.	TITLE
1	GENERAL PLAN
2	DECK CONTOURS
3	FOUNDATION PLAN
4	ABUTMENT AND PIER DETAILS
5	PIER PILE DETAILS - CLASS 45-1
6	SLAB SECTION AND REINFORCEMENT DETAILS
7	SLAB REINFORCEMENT DETAILS
8	LOG OF TEST BORINGS

STANDARD PLANS DATED MARCH, 1977

A62-BB	EXCAVATION AND BACKFILL - LIMITS OF PAYMENT (BRIDGE)
B0-1	BRIDGE DETAILS
B11-51	TUBULAR HAND RAILING
B11-53	CONCRETE BARRIER TYPE 25

APPROXIMATE QUANTITIES

FURNISH PILING (CLASS 45-1)	1,136 LF
DRIVE PILE (CLASS 45)	28 EA
TUBULAR HANDRAILING	253 LF
CONCRETE BARRIER (TYPE 25)	253 LF

FINAL PAY QUANTITIES

STRUCTURE EXCAVATION (BRIDGE)	118 CY
STRUCTURE BACKFILL (BRIDGE)	63 CY
STRUCTURAL CONCRETE, BRIDGE	277 CY
BAR REINFORCING STEEL (BRIDGE)	54,500 LB

(360 Ac)

AS BUILT
CORRECTIONS BY John T. Day P.E. 12781
CONTRACT NO. 11-095094
DATE 6-15-81

FOR GENERAL NOTES SEE "Deck Contours" sheet

LIVE LOADING HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOADING

BRIDGE DEPARTMENT
··· DESIGN SECTION ··· 8
Section Supervisor: F.P. Lang 10/78 8909
Project Engineer: A.M. Delaney 9600

DESIGN	By [illegible] 3-78	Checked	[illegible] 9/78
DETAILS	By Vern Groth 3-78	Checked	[illegible] 9/78
LAYOUT	By [illegible] 3-78	Checked	[illegible] 9/78
QUANTITIES	By [illegible] 9/78	Checked	[illegible] 9/78
SPECIFICATIONS	By [illegible] 1/79	Plans and Bridge Contracts	[illegible] 1/79
Approval Recommended by	[illegible] Design Engineer	Registered Civil Engr. Licensed No.	8/78 Approved

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

HORSE RANCH CREEK BRIDGE
PANKEY(SOUTH)

GENERAL PLAN

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
57C-324	CO. RD.		1	8

WO 095091
CU 11203

Disregard prints bearing earlier revision dates →

REVISION DATES (PRELIMINARY STAGE ONLY): 3/1/78

166

AS BUILT PLANS
Contract No. 11-095094
Date Completed
Document No.

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

DATE 1-19-82 SIGNATURE Donald Blackford TITLE SUPERVISOR OF MICROFILM SERVICES

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

SECTION 9E:
HEC-RAS ROUGHNESS COEFFICIENT ANALYSIS

HECRAS ANALYSIS ROUGHNESS COEFFICIENT (n)

The roughness coefficient of the Horse Ranch Creek has significant effect on the efficiency and capacity of the creek to convey the peak discharge. Based on field observations and the current aerial photo available from the County of San Diego, the roughness coefficient distribution along Horse Ranch Creek in accordance to San Diego County Drainage Design Manual, Tables A-4 and A-5, is as follows:

Manning's n Values					
River Station	Frctn (n)	LB	CHNL	RB	CHANNEL DESCRIPTION
119+75	n	0.035	0.035	0.035	Grass-lined (well maintained)
114+39	n	0.035	0.035	0.035	Grass-lined (well maintained)
111+29	n	0.035	0.035	0.035	Grass-lined (well maintained)
102+84	n	0.035	0.035	0.035	Grass-lined (well maintained)
98+55	n	0.045	0.045	0.045	Grass-lined (not maintained)
94+31	n	0.05	0.045	0.045	Grass-lined (not maintained), scattered brush on LB
89+07	n	0.05	0.045	0.045	Grass-lined (not maintained), scattered brush on LB
85+26	n	0.06	0.045	0.05	Grass-lined (not maintained), Light brush and trees on LB, scattered brush on RB
81+91	n	0.06	0.06	0.06	Light brush and trees
72+33	n	0.06	0.06	0.06	Light brush and trees
66+07	n	0.06	0.06	0.06	Light brush and trees
62+41	n	0.06	0.06	0.06	Light brush and trees
58+46	n	0.06	0.06	0.06	Light brush and trees
51+34	n	0.06	0.06	0.06	Light brush and trees
45+83	n	0.06	0.06	0.06	Light brush and trees
40+59	n	0.06	0.06	0.06	Light brush and trees
37+50	n	0.06	0.06	0.06	Light brush and trees
36+46	n	0.06	0.06	0.06	Light brush and trees
35+10	n	0.06	0.06	0.06	Light brush and trees
34+76	Bridge				
34+47	n	0.06	0.06	0.06	Light brush and trees
30+50	n	0.06	0.06	0.06	Light brush and trees
28+46	n	0.06	0.06	0.06	Light brush and trees
25+95	n	0.06	0.06	0.06	Light brush and trees
25+25	Bridge				
24+41	n	0.06	0.06	0.06	Light brush and trees
22+25	n	0.06	0.06	0.06	Light brush and trees
19+89	n	0.06	0.06	0.06	Light brush and trees
16+65	n	0.06	0.06	0.06	Light brush and trees
16+24	Bridge				
15+80	n	0.06	0.06	0.06	Light brush and trees
13+74	n	0.06	0.06	0.06	Light brush and trees

HECRAS ANALYSIS ROUGHNESS COEFFICIENT (n) CAPACITY CONDITIONS

The roughness coefficient within the channel is increased to 0.15 as expected during the life time of the channel, the bank

Manning's n Values					
River Station	Frctn (n)	LB	CHNL	RB	CHANNEL DESCRIPTION
119+75	n	0.035	0.035	0.035	Grass-lined (well maintained)
114+39	n	0.035	0.035	0.035	Grass-lined (well maintained)
111+29	n	0.035	0.035	0.035	Grass-lined (well maintained)
102+84	n	0.035	0.035	0.035	Grass-lined (well maintained)
98+55	n	0.045	0.045	0.045	Grass-lined (not maintained)
94+31	n	0.05	0.045	0.045	Grass-lined (not maintained), scattered brush on LB
89+07	n	0.05	0.045	0.045	Grass-lined (not maintained), scattered brush on LB
85+26	n	0.06	0.045	0.05	Grass-lined (not maintained), Light brush and trees on LB, scattered brush on RB
81+91	n	0.06	0.06	0.06	Light brush and trees
72+33	n	0.06	0.06	0.06	Light brush and trees
66+07	n	0.06	0.06	0.06	Light brush and trees
62+41	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
58+46	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
51+34	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
45+83	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
40+59	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
37+50	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
36+46	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
35+10	n	0.06	0.06	0.06	Light brush and trees*
34+76	Bridge				
34+47	n	0.06	0.06	0.06	Light brush and trees*
30+50	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
28+46	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
25+95	n	0.06	0.06	0.06	Light brush and trees*
25+25	Bridge				
24+41	n	0.06	0.06	0.06	Light brush and trees*
22+25	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
19+89	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel
16+65	n	0.06	0.06	0.06	Light brush and trees*
16+24	Bridge				
15+80	n	0.06	0.06	0.06	Light brush and trees*
13+74	n	0.06	0.15	0.06	Light brush and trees on banks and dense trees within channel

*** The channel immediately up and downstream of the bridges will be maintained such that no excessive overgrowth will block the entrance and exit of the bridges.**

SECTION 10:
DETENTION BASIN ANALYSIS

HEC-HMS was used to model the entire watershed for both the pre-development and post-development conditions.

Under the post-development conditions, a detention basin is proposed to mitigate the anticipated increase in runoff as a result of the proposed development. The detention basin was modeled in the post-development scenario using HEC-HMS as part of the entire watershed. Then Pondpack‘s Pond Routing analysis was performed in the post-development detention basin simulation.

Pond Routing is a mathematical procedure that models a detention pond (basin)’s response to a given storm event. The pond volume was simulated by entering the design depth versus volume. By routing the On-Site Area in the post-development scenario hydrograph through the proposed basin, the water surface elevation, outflow and storage values can be determined. The inflow hydrograph was developed based on the Rational Method analysis results (see Section 6E) using RatHydro software published by Rich Engineering Company and distributed by the County of San Diego. The hydrograph is imported into Pondpack model and routed through the modeled detention basin.

The detention basin outlet outfall water surface elevation is determined using Pondpack’s Pond Route tail water analysis based on the downstream channel water surface elevation obtained from HEC-RAS analysis in Section 9, the downstream section is Section 45+83, the 100-year water surface elevation is 273.19.

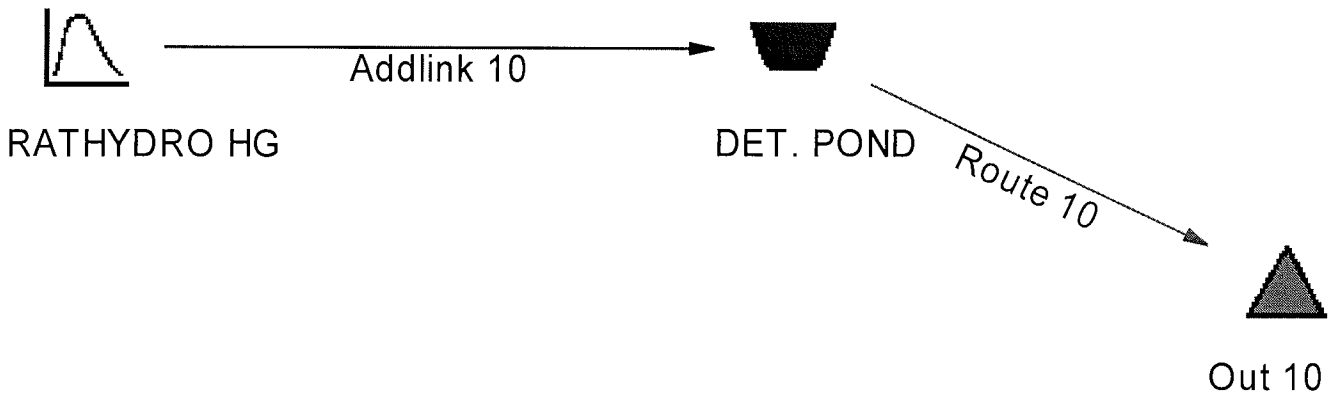
As presented in Section 8 of this report, the post-development peak flow reaching the existing Pankey Road Bridge (north) is less than that under the pre-development conditions. The proposed development will increase the impervious areas and storm conveyance systems that are more efficient such that the time of concentration is less under the post-development conditions. Due to the length of the entire watershed and the fact that the project site is located at the lower end of the watershed, a reduced time of concentration would allow the on-site peak discharge to leave the site sooner than the pre-development conditions, thus, the overall peak flow at the existing bridge decreases slightly under the post-development conditions.

SECTION 10A
DETENTION BASIN ROUTING CALCS

RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 9/15/2009
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 18 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 374.1 ACRES
RUNOFF COEFFICIENT 0.54
PEAK DISCHARGE 842.03 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 41.4
TIME (MIN) = 36	DISCHARGE (CFS) = 44.4
TIME (MIN) = 54	DISCHARGE (CFS) = 46.1
TIME (MIN) = 72	DISCHARGE (CFS) = 50.1
TIME (MIN) = 90	DISCHARGE (CFS) = 52.5
TIME (MIN) = 108	DISCHARGE (CFS) = 58.2
TIME (MIN) = 126	DISCHARGE (CFS) = 61.7
TIME (MIN) = 144	DISCHARGE (CFS) = 70.8
TIME (MIN) = 162	DISCHARGE (CFS) = 76.7
TIME (MIN) = 180	DISCHARGE (CFS) = 93.8
TIME (MIN) = 198	DISCHARGE (CFS) = 106.8
TIME (MIN) = 216	DISCHARGE (CFS) = 156.8
TIME (MIN) = 234	DISCHARGE (CFS) = 171.1
TIME (MIN) = 252	DISCHARGE (CFS) = 842.03
TIME (MIN) = 270	DISCHARGE (CFS) = 125.8
TIME (MIN) = 288	DISCHARGE (CFS) = 84.2
TIME (MIN) = 306	DISCHARGE (CFS) = 65.9
TIME (MIN) = 324	DISCHARGE (CFS) = 55.2
TIME (MIN) = 342	DISCHARGE (CFS) = 48
TIME (MIN) = 360	DISCHARGE (CFS) = 42.8
TIME (MIN) = 378	DISCHARGE (CFS) = 0


Addlink 10
RATHYDRO HG
DET. POND
Route 10
Out 10

==========
JOB TITLE
==========

Project Date: 5/12/2009
Project Engineer: DY
Project Title: CAMPUS PARK
Project Comments:
DETENTION BASIN ROUTING USING AES PEAK FLOW DATA

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01
Executive Summary (Links) 2.02
Network Calcs Sequence 2.03

********** RUNOFF HYDROGRAPHS **********

RATHYDRO HG..... 100
Read HYG 3.01

********** HYG ADDITION **********

OUT 10..... 100
Node: Addition Summary 4.01

********** TIME VS.ELEV **********

DET. POND OUT 100
Time-Elev 5.01

********** TIME VS.VOL **********

DET. POND OUT 100
Time vs. Volume 6.01

Table of Contents (continued)

********** POND VOLUMES **********

DET. POND..... Vol: Elev-Volume 7.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 8.01
Individual Outlet Curves 8.04
Composite Rating Curve 8.30

********** POND ROUTING **********

DET. POND..... Pond E-V-Q Table 9.01

DET. POND IN 100
Node: Pond Inflow Summary 9.08

DET. POND OUT 100
Pond Routing Summary 9.11
Detention Time 9.12
Pond Routed HYG (total out) 9.13

ROUTE 10..... 100
Diverted Hydrograph 9.15

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
DET. POND	IN	POND	100	57.827	R	4.2750	830.29		
DET. POND	OUT	POND	100	47.462	L	4.2750	829.46	275.24	12.005
DET. POND	OUT	POND	100	-.115	L	2.5250	-4.00	(-Q)	
*OUT 10		JCT	100	47.462	L	4.2750	829.46		
*OUT 10		JCT	100	-.001	L	.0000	.00	(-Q)	
RATHYDRO HG		HYG	100	57.832		4.2700	842.03		

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	DET. POND	IN	POND	57.827	R	4.2750	830.29	
	DET. POND	OUT	POND	47.462	L	4.2750	829.46	275.24
	DET. POND	OUT	POND	-.115	L	2.5250	-4.00 (-Q)	
Outfall	OUT 10		JCT	47.462	L	4.2750	829.46	
Outfall	OUT 10		JCT	-.001	L	.0000	.00 (-Q)	
	RATHYDRO HG		HYG	57.832		4.2700	842.03	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADDLINK 10	ADD	UN	57.832		4.2700	842.03	RATHYDRO HG	
		DL	57.832		4.2700	842.03		
		DN	57.827	R	4.2750	830.29	DET. POND	IN
ROUTE 10	PONDrt	UN	57.827	R	4.2750	830.29	DET. POND	IN
ROUTE 10			47.462	L	4.2750	829.46	DET. POND	OUT
ROUTE 10	(-Q)		-.115	L	2.5250	-4.00	DET. POND	OUT
		DL	47.462	L	4.2750	829.46		
	(-Q)	DL	-.001	L	.0000	.00		
		DN	47.462	L	4.2750	829.46	OUT 10	
	(-Q)	DN	-.001	L	.0000	.00	OUT 10	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
Read HYGRATHYDRO HG	HYG Qin RATHYDRO HG	Add Hyd RATHYDRO HG

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node	DNstream Node
Add Hyd ADDLINK 10	HYG Qin RATHYDRO HG	Pond DET. POND IN
POND ROUTE TOTAL OUTFLOW...		
Total Pond Outflow	Pond DET. POND IN	Outflow DET. POND OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...		
Outlet ROUTE 10	Outflow DET. POND OUT	Jct OUT 10

```
HYG file =
HYG ID   = HYG 1
HYG Tag  = 100
-----------------------------------
Peak Discharge =       842.03 cfs
Time to Peak   =       4.2700 hrs
HYG Volume     =       57.832 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .3050 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	41.40	44.40	46.10	50.10
1.5250	52.50	58.20	61.70	70.80	76.70
3.0500	93.80	106.80	156.80	171.10	842.03
4.5750	125.80	84.20	65.90	55.20	48.00
6.1000	42.80	.00			

SUMMARY FOR HYDROGRAPH ADDITION
at Node: OUT 10

HYG Directory: F:\06-14\hydro\pondpack\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
ROUTE 10	DET. POND IN	work_pad.hyg	ROUTE 10	100

INFLOWS TO: OUT 10

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
work_pad.hyg	ROUTE 10	100	47.462	4.2750	829.46

TOTAL FLOW INTO: OUT 10

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
work_pad.hyg	OUT 10	100	47.462	4.2750	829.46

```
TOTAL NODE INFLOW...
HYG file = F:\06-14\hydro\pondpack\work_pad.hyg
HYG ID   = OUT 10
HYG Tag  = 100
-----------------------------------
Peak Discharge =       829.46 cfs
Time to Peak   =       4.2750 hrs
HYG Volume     =       47.462 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
2.5250	-4.00	8.65	16.36	20.83	24.68
2.6500	28.05	31.04	33.83	36.38	38.80
2.7750	41.10	43.34	45.51	47.62	49.69
2.9000	51.72	53.70	76.62	97.32	85.47
3.0250	95.98	91.12	96.54	94.62	97.73
3.1500	97.39	99.42	99.82	101.35	102.10
3.2750	103.38	104.30	105.46	106.46	109.62
3.4000	113.94	117.92	122.11	126.14	130.29
3.5250	134.35	138.47	142.55	146.67	150.75
3.6500	154.86	157.47	158.57	159.80	160.93
3.7750	162.13	163.28	164.47	165.63	166.81
3.9000	167.97	169.15	170.32	190.59	244.29
4.0250	300.85	354.95	410.95	465.32	521.10
4.1500	575.56	631.54	688.26	741.64	798.20
4.2750	829.46	773.60	712.20	656.12	596.41
4.4000	540.31	479.61	422.79	362.75	305.45
4.5250	246.01	188.49	129.82	119.85	121.31
4.6500	114.29	113.55	108.25	106.22	101.86
4.7750	99.10	95.25	92.14	88.52	85.26
4.9000	83.04	81.71	80.09	78.67	77.12
5.0250	75.71	74.24	72.72	71.23	69.73
5.1500	68.23	66.73	65.52	64.63	63.76
5.2750	62.87	62.00	61.12	60.24	59.37
5.4000	58.49	57.61	56.74	55.86	55.07
5.5250	54.82	54.78	54.71	54.60	54.47
5.6500	54.31	54.13	53.92	53.69	53.44
5.7750	53.17	52.88	52.58	52.28	51.96
5.9000	51.64	51.32	50.98	50.65	50.30
6.0250	49.96	49.60	49.24	48.88	48.43
6.1500	47.80	47.00	46.04	44.93	43.68
6.2750	42.29	40.77	39.13	37.34	35.46

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
6.4000	33.44	31.35	29.39	27.46	25.61
6.5250	23.88	22.20	20.47	18.87	17.40
6.6500	16.04	14.15	12.40	10.86	9.52
6.7750	8.34	7.30	6.40	5.60	4.91
6.9000	4.12	3.32	2.67	2.15	1.73
7.0250	1.39	1.12	.90	.73	.58
7.1500	.47	.38	.30	.24	.20
7.2750	.16	.13	.10	.08	.07
7.4000	.05	.04	.03	.03	.02
7.5250	.02	.01	.01	.01	.01
7.6500	.01	.00	.00	.00	.00

TIME vs. ELEVATION (ft)

Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	264.00	264.67	264.70	264.76	264.83
.1250	264.92	265.04	265.18	265.33	265.51
.2500	265.71	265.93	266.06	266.16	266.26
.3750	266.36	266.46	266.56	266.66	266.76
.5000	266.86	266.96	267.06	267.17	267.27
.6250	267.38	267.48	267.59	267.69	267.80
.7500	267.90	268.01	268.07	268.14	268.21
.8750	268.28	268.35	268.42	268.49	268.56
1.0000	268.63	268.70	268.78	268.85	268.92
1.1250	269.00	269.07	269.14	269.22	269.29
1.2500	269.37	269.44	269.52	269.60	269.67
1.3750	269.75	269.83	269.90	269.98	270.05
1.5000	270.12	270.18	270.25	270.31	270.38
1.6250	270.45	270.52	270.59	270.66	270.73
1.7500	270.80	270.87	270.94	271.01	271.09
1.8750	271.16	271.23	271.31	271.38	271.46
2.0000	271.53	271.61	271.68	271.76	271.84
2.1250	271.91	271.99	272.06	272.14	272.21
2.2500	272.28	272.36	272.44	272.51	272.59
2.3750	272.67	272.75	272.83	272.91	272.99
2.5000	273.08	273.15	273.24	273.31	273.37
2.6250	273.43	273.49	273.54	273.59	273.64
2.7500	273.69	273.73	273.77	273.82	273.86
2.8750	273.90	273.94	273.98	274.10	274.16
3.0000	274.13	274.16	274.14	274.16	274.15
3.1250	274.16	274.16	274.17	274.17	274.17
3.2500	274.17	274.18	274.18	274.18	274.19
3.3750	274.20	274.21	274.22	274.23	274.23
3.5000	274.24	274.25	274.26	274.27	274.28
3.6250	274.29	274.30	274.31	274.31	274.31
3.7500	274.31	274.31	274.32	274.32	274.32
3.8750	274.32	274.33	274.33	274.33	274.37
4.0000	274.47	274.56	274.64	274.72	274.80
4.1250	274.87	274.94	275.01	275.08	275.14
4.2500	275.20	275.24	275.17	275.10	275.04
4.3750	274.97	274.90	274.82	274.74	274.66
4.5000	274.57	274.47	274.37	274.24	274.22
4.6250	274.22	274.21	274.21	274.19	274.19
4.7500	274.17	274.17	274.15	274.15	274.14
4.8750	274.13	274.12	274.12	274.11	274.11
5.0000	274.10	274.10	274.09	274.08	274.08
5.1250	274.07	274.06	274.06	274.05	274.05
5.2500	274.04	274.04	274.03	274.03	274.03

TIME vs. ELEVATION (ft)

Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
5.3750	274.02	274.02	274.01	274.01	274.00
5.5000	274.00	274.00	274.00	274.00	274.00
5.6250	273.99	273.99	273.99	273.98	273.98
5.7500	273.97	273.97	273.96	273.96	273.95
5.8750	273.94	273.94	273.93	273.92	273.92
6.0000	273.91	273.90	273.90	273.89	273.88
6.1250	273.87	273.86	273.85	273.83	273.81
6.2500	273.78	273.75	273.72	273.69	273.66
6.3750	273.62	273.59	273.55	273.51	273.48
6.5000	273.45	273.42	273.39	273.37	273.34
6.6250	273.32	273.30	273.28	273.27	273.26
6.7500	273.24	273.23	273.22	273.22	273.21
6.8750	273.20	273.20	273.19	273.19	273.19
7.0000	273.18	273.18	273.18	273.18	273.18
7.1250	273.18	273.18	273.18	273.18	273.18
7.2500	273.18	273.18	273.18	273.18	273.18
7.3750	273.18	273.18	273.18	273.18	273.18
7.5000	273.18	273.18	273.18	273.18	273.18
7.6250	273.18	273.18	273.18	273.18	273.18
7.7500	273.18				

TIME vs. VOLUME (ac-ft)

Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.000	.224	.234	.252	.276
.1250	.307	.346	.391	.443	.502
.2500	.568	.641	.721	.806	.892
.3750	.979	1.065	1.153	1.241	1.329
.5000	1.418	1.508	1.598	1.688	1.779
.6250	1.871	1.962	2.054	2.147	2.239
.7500	2.332	2.425	2.519	2.613	2.707
.8750	2.801	2.896	2.991	3.087	3.183
1.0000	3.280	3.377	3.476	3.575	3.674
1.1250	3.775	3.875	3.976	4.078	4.180
1.2500	4.283	4.387	4.490	4.594	4.699
1.3750	4.804	4.909	5.014	5.120	5.227
1.5000	5.334	5.441	5.549	5.658	5.768
1.6250	5.879	5.991	6.104	6.217	6.332
1.7500	6.448	6.564	6.682	6.800	6.919
1.8750	7.039	7.160	7.280	7.402	7.524
2.0000	7.647	7.770	7.894	8.018	8.143
2.1250	8.268	8.394	8.522	8.651	8.781
2.2500	8.913	9.047	9.181	9.318	9.455
2.3750	9.594	9.735	9.876	10.019	10.162
2.5000	10.305	10.442	10.588	10.713	10.827
2.6250	10.933	11.033	11.127	11.216	11.301
2.7500	11.381	11.459	11.535	11.610	11.683
2.8750	11.754	11.825	11.894	11.940	11.944
3.0000	11.941	11.943	11.943	11.944	11.943
3.1250	11.944	11.944	11.944	11.944	11.945
3.2500	11.945	11.945	11.945	11.945	11.946
3.3750	11.946	11.947	11.947	11.948	11.949
3.5000	11.949	11.950	11.951	11.951	11.952
3.6250	11.952	11.953	11.953	11.954	11.954
3.7500	11.954	11.954	11.954	11.954	11.955
3.8750	11.955	11.955	11.955	11.955	11.958
4.0000	11.964	11.971	11.976	11.982	11.987
4.1250	11.991	11.996	12.000	12.002	12.003
4.2500	12.004	12.005	12.003	12.002	12.001
4.3750	11.998	11.993	11.988	11.983	11.977
4.5000	11.971	11.965	11.958	11.949	11.948
4.6250	11.948	11.947	11.947	11.946	11.945
4.7500	11.945	11.944	11.943	11.943	11.942
4.8750	11.941	11.941	11.941	11.940	11.940
5.0000	11.940	11.940	11.939	11.939	11.938
5.1250	11.938	11.937	11.937	11.936	11.936
5.2500	11.936	11.936	11.935	11.935	11.935

TIME vs. VOLUME (ac-ft)

Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
5.3750	11.934	11.934	11.934	11.934	11.933
5.5000	11.933	11.933	11.931	11.928	11.925
5.6250	11.920	11.915	11.908	11.901	11.893
5.7500	11.884	11.875	11.865	11.855	11.844
5.8750	11.833	11.822	11.811	11.799	11.787
6.0000	11.776	11.763	11.751	11.739	11.726
6.1250	11.711	11.689	11.661	11.628	11.590
6.2500	11.547	11.500	11.448	11.392	11.333
6.3750	11.270	11.204	11.137	11.074	11.015
6.5000	10.960	10.909	10.862	10.818	10.777
6.6250	10.740	10.705	10.674	10.646	10.622
6.7500	10.601	10.583	10.567	10.553	10.540
6.8750	10.529	10.520	10.512	10.506	10.501
7.0000	10.497	10.494	10.491	10.489	10.488
7.1250	10.486	10.485	10.484	10.484	10.483
7.2500	10.482	10.482	10.482	10.482	10.481
7.3750	10.481	10.481	10.481	10.481	10.481
7.5000	10.481	10.481	10.481	10.481	10.481
7.6250	10.481	10.481	10.481	10.481	10.481
7.7500	10.481				

USER DEFINED VOLUME RATING TABLE

Elevation (ft)	Volume (ac-ft)
264.00	.000
266.00	.665
268.00	2.418
270.00	5.145
272.00	8.412
274.00	11.933
275.00	12.000
275.50	12.010
276.00	12.020

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 264.00 ft
Increment = .10 ft
Max. Elev.= 276.00 ft

```
**********************************************
                OUTLET CONNECTIVITY
**********************************************

 ---> Forward Flow Only (UpStream to DnStream)
<---  Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed
```

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Circular	O1	<--->	TW	267.870	276.000
Stand Pipe	R0	--->	TW	273.200	276.000
Orifice-Circular	O0	<--->	TW	264.000	276.000
Weir-Rectangular	W0	--->	TW	274.000	276.000
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = O1
Structure Type    = Orifice-Circular
------------------------------------
# of Openings     =         1
Invert Elev.      =    267.87 ft
Diameter          =    2.2500 ft
Orifice Coeff.    =     1.000
```

```
Structure ID      = R0
Structure Type    = Stand Pipe
------------------------------------
# of Openings     =         1
Invert Elev.      =    273.20 ft
Diameter          =    7.0000 ft
Orifice Area      =   38.4845 sq.ft
Orifice Coeff.    =     1.000
Weir Length       =     21.99 ft
Weir Coeff.       =      .850
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
Orifice H to crest= Yes
```

```
Structure ID      = O0
Structure Type    = Orifice-Circular
------------------------------------
# of Openings     =         1
Invert Elev.      =    264.00 ft
Diameter          =    1.5000 ft
Orifice Coeff.    =     1.000
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = W0
Structure Type    = Weir-Rectangular
------------------------------------
# of Openings     =         1
Crest Elev.       =    274.00 ft
Weir Length       =    600.00 ft
Weir Coeff.       =   .860000

Weir TW effects Table File:
Weir TW effects Table ID:   New Element
  WEIR SUBMERGENCE TABLE

   dHW/dTW    Multiply Q by
 ---------     ---------
   1.0030        1.0000
```

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
264.00	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.10	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.20	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.30	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.40	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.50	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.60	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.70	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.80	-65.33	273.19	.000	
		REVERSE: H =4.20		
264.90	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.00	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.10	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.20	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.30	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.40	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.50	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.60	-65.33	273.19	.000	
		REVERSE: H =4.20		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
265.70	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.80	-65.33	273.19	.000	
		REVERSE: H =4.20		
265.90	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.00	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.10	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.20	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.30	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.40	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.50	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.60	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.70	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.80	-65.33	273.19	.000	
		REVERSE: H =4.20		
266.90	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.00	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.10	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.20	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.30	-65.33	273.19	.000	
		REVERSE: H =4.20		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
267.40	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.50	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.60	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.70	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.80	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.87	-65.33	273.19	.000	
		REVERSE: H =4.20		
267.90	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.00	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.10	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.20	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.30	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.40	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.50	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.60	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.70	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.80	-65.33	273.19	.000	
		REVERSE: H =4.20		
268.90	-65.33	273.19	.000	
		REVERSE: H =4.20		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
269.00	-65.29	273.19	.000	
		REVERSE: H =4.19		
269.10	-64.50	273.19	.000	
		REVERSE: H =4.09		
269.20	-63.71	273.19	.000	
		REVERSE: H =3.99		
269.30	-62.91	273.19	.000	
		REVERSE: H =3.89		
269.40	-62.09	273.19	.000	
		REVERSE: H =3.79		
269.50	-61.27	273.19	.000	
		REVERSE: H =3.69		
269.60	-60.43	273.19	.000	
		REVERSE: H =3.59		
269.70	-59.58	273.19	.000	
		REVERSE: H =3.49		
269.80	-58.73	273.19	.000	
		REVERSE: H =3.39		
269.90	-57.85	273.19	.000	
		REVERSE: H =3.29		
270.00	-56.97	273.19	.000	
		REVERSE: H =3.19		
270.10	-56.07	273.19	.000	
		REVERSE: H =3.09		
270.20	-55.15	273.19	.000	
		REVERSE: H =2.99		
270.30	-54.22	273.19	.000	
		REVERSE: H =2.89		
270.40	-53.28	273.19	.000	
		REVERSE: H =2.79		
270.50	-52.31	273.19	.000	
		REVERSE: H =2.69		
270.60	-51.33	273.19	.000	
		REVERSE: H =2.59		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
270.70	-50.33	273.19	.000	
	REVERSE: H =2.49			
270.80	-49.31	273.19	.000	
	REVERSE: H =2.39			
270.90	-48.27	273.19	.000	
	REVERSE: H =2.29			
271.00	-47.20	273.19	.000	
	REVERSE: H =2.19			
271.10	-46.11	273.19	.000	
	REVERSE: H =2.09			
271.20	-44.99	273.19	.000	
	REVERSE: H =1.99			
271.30	-43.85	273.19	.000	
	REVERSE: H =1.89			
271.40	-42.67	273.19	.000	
	REVERSE: H =1.79			
271.50	-41.46	273.19	.000	
	REVERSE: H =1.69			
271.60	-40.22	273.19	.000	
	REVERSE: H =1.59			
271.70	-38.93	273.19	.000	
	REVERSE: H =1.49			
271.80	-37.60	273.19	.000	
	REVERSE: H =1.39			
271.90	-36.23	273.19	.000	
	REVERSE: H =1.29			
272.00	-34.79	273.19	.000	
	REVERSE: H =1.19			
272.10	-33.30	273.19	.000	
	REVERSE: H =1.09			
272.20	-31.73	273.19	.000	
	REVERSE: H =.99			
272.30	-30.09	273.19	.000	
	REVERSE: H =.89			

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
272.40	-28.35	273.19	.000	
		REVERSE: H =.79		
272.50	-26.49	273.19	.000	
		REVERSE: H =.69		
272.60	-24.50	273.19	.000	
		REVERSE: H =.59		
272.70	-22.33	273.19	.000	
		REVERSE: H =.49		
272.80	-19.92	273.19	.000	
		REVERSE: H =.39		
272.90	-17.18	273.19	.000	
		REVERSE: H =.29		
273.00	-13.90	273.19	.000	
		REVERSE: H =.19		
273.10	-9.57	273.19	.000	
		REVERSE: H =.09		
273.20	3.19	273.19	.000	
		H =.01		
273.30	10.58	273.19	.000	
		H =.11		
273.40	14.62	273.19	.000	
		H =.21		
273.50	17.76	273.19	.000	
		H =.31		
273.60	20.42	273.19	.000	
		H =.41		
273.70	22.78	273.19	.000	
		H =.51		
273.80	24.91	273.19	.000	
		H =.61		
273.90	26.88	273.19	.000	
		H =.71		
274.00	28.71	273.19	.000	
		H =.81		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
274.10	30.43	273.19	.000	
	H =.91			
274.20	32.05	273.19	.000	
	H =1.01			
274.30	33.60	273.19	.000	
	H =1.11			
274.40	35.08	273.19	.000	
	H =1.21			
274.50	36.51	273.19	.000	
	H =1.31			
274.60	37.87	273.19	.000	
	H =1.41			
274.70	39.19	273.19	.000	
	H =1.51			
274.80	40.47	273.19	.000	
	H =1.61			
274.90	41.71	273.19	.000	
	H =1.71			
275.00	42.91	273.19	.000	
	H =1.81			
275.10	44.08	273.19	.000	
	H =1.91			
275.20	45.22	273.19	.000	
	H =2.01			
275.30	46.33	273.19	.000	
	H =2.11			
275.40	47.42	273.19	.000	
	H =2.21			
275.50	48.48	273.19	.000	
	H =2.31			
275.60	49.51	273.19	.000	
	H =2.41			
275.70	50.53	273.19	.000	
	H =2.51			

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
275.80	51.53	273.19	.000	
	H =2.61			
275.90	52.51	273.19	.000	
	H =2.71			
276.00	53.47	273.19	.000	
	H =2.81			

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = R0 (Stand Pipe)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
264.00	.00	REVERSE: Flow is closed off		
264.10	.00	REVERSE: Flow is closed off		
264.20	.00	REVERSE: Flow is closed off		
264.30	.00	REVERSE: Flow is closed off		
264.40	.00	REVERSE: Flow is closed off		
264.50	.00	REVERSE: Flow is closed off		
264.60	.00	REVERSE: Flow is closed off		
264.70	.00	REVERSE: Flow is closed off		
264.80	.00	REVERSE: Flow is closed off		
264.90	.00	REVERSE: Flow is closed off		
265.00	.00	REVERSE: Flow is closed off		
265.10	.00	REVERSE: Flow is closed off		
265.20	.00	REVERSE: Flow is closed off		
265.30	.00	REVERSE: Flow is closed off		
265.40	.00	REVERSE: Flow is closed off		
265.50	.00	REVERSE: Flow is closed off		
265.60	.00	REVERSE: Flow is closed off		
265.70	.00	REVERSE: Flow is closed off		
265.80	.00	REVERSE: Flow is closed off		
265.90	.00	REVERSE: Flow is closed off		
266.00	.00	REVERSE: Flow is closed off		
266.10	.00	REVERSE: Flow is closed off		
266.20	.00	REVERSE: Flow is closed off		
266.30	.00	REVERSE: Flow is closed off		
266.40	.00	REVERSE: Flow is closed off		
266.50	.00	REVERSE: Flow is closed off		
266.60	.00	REVERSE: Flow is closed off		
266.70	.00	REVERSE: Flow is closed off		
266.80	.00	REVERSE: Flow is closed off		
266.90	.00	REVERSE: Flow is closed off		
267.00	.00	REVERSE: Flow is closed off		
267.10	.00	REVERSE: Flow is closed off		
267.20	.00	REVERSE: Flow is closed off		
267.30	.00	REVERSE: Flow is closed off		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = R0 (Stand Pipe)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
267.40	.00	REVERSE: Flow is closed off		
267.50	.00	REVERSE: Flow is closed off		
267.60	.00	REVERSE: Flow is closed off		
267.70	.00	REVERSE: Flow is closed off		
267.80	.00	REVERSE: Flow is closed off		
267.87	.00	REVERSE: Flow is closed off		
267.90	.00	REVERSE: Flow is closed off		
268.00	.00	REVERSE: Flow is closed off		
268.10	.00	REVERSE: Flow is closed off		
268.20	.00	REVERSE: Flow is closed off		
268.30	.00	REVERSE: Flow is closed off		
268.40	.00	REVERSE: Flow is closed off		
268.50	.00	REVERSE: Flow is closed off		
268.60	.00	REVERSE: Flow is closed off		
268.70	.00	REVERSE: Flow is closed off		
268.80	.00	REVERSE: Flow is closed off		
268.90	.00	REVERSE: Flow is closed off		
269.00	.00	REVERSE: Flow is closed off		
269.10	.00	REVERSE: Flow is closed off		
269.20	.00	REVERSE: Flow is closed off		
269.30	.00	REVERSE: Flow is closed off		
269.40	.00	REVERSE: Flow is closed off		
269.50	.00	REVERSE: Flow is closed off		
269.60	.00	REVERSE: Flow is closed off		
269.70	.00	REVERSE: Flow is closed off		
269.80	.00	REVERSE: Flow is closed off		
269.90	.00	REVERSE: Flow is closed off		
270.00	.00	REVERSE: Flow is closed off		
270.10	.00	REVERSE: Flow is closed off		
270.20	.00	REVERSE: Flow is closed off		
270.30	.00	REVERSE: Flow is closed off		
270.40	.00	REVERSE: Flow is closed off		
270.50	.00	REVERSE: Flow is closed off		
270.60	.00	REVERSE: Flow is closed off		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = R0 (Stand Pipe)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
270.70	.00	REVERSE: Flow is closed off		
270.80	.00	REVERSE: Flow is closed off		
270.90	.00	REVERSE: Flow is closed off		
271.00	.00	REVERSE: Flow is closed off		
271.10	.00	REVERSE: Flow is closed off		
271.20	.00	REVERSE: Flow is closed off		
271.30	.00	REVERSE: Flow is closed off		
271.40	.00	REVERSE: Flow is closed off		
271.50	.00	REVERSE: Flow is closed off		
271.60	.00	REVERSE: Flow is closed off		
271.70	.00	REVERSE: Flow is closed off		
271.80	.00	REVERSE: Flow is closed off		
271.90	.00	REVERSE: Flow is closed off		
272.00	.00	REVERSE: Flow is closed off		
272.10	.00	REVERSE: Flow is closed off		
272.20	.00	REVERSE: Flow is closed off		
272.30	.00	REVERSE: Flow is closed off		
272.40	.00	REVERSE: Flow is closed off		
272.50	.00	REVERSE: Flow is closed off		
272.60	.00	REVERSE: Flow is closed off		
272.70	.00	REVERSE: Flow is closed off		
272.80	.00	REVERSE: Flow is closed off		
272.90	.00	REVERSE: Flow is closed off		
273.00	.00	REVERSE: Flow is closed off		
273.10	.00	REVERSE: Flow is closed off		
273.20	.00	273.19	.000	
		Weir: H =.00ft		
273.30	.59	273.19	.000	
		Weir: H =.10ft		
273.40	1.67	273.19	.000	
		Weir: H =.20ft		
273.50	3.07	273.19	.000	
		Weir: H =.30ft		
273.60	4.73	273.19	.000	
		Weir: H =.40ft		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = R0 (Stand Pipe)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
273.70	6.61	273.19	.000	
		Weir: H =.50ft		
273.80	8.69	273.19	.000	
		Weir: H =.60ft		
273.90	10.95	273.19	.000	
		Weir: H =.70ft		
274.00	13.37	273.19	.000	
		Weir: H =.80ft		
274.10	15.96	273.19	.000	
		Weir: H =.90ft		
274.20	18.69	273.19	.000	
		Weir: H =1.00ft		
274.30	21.56	273.19	.000	
		Weir: H =1.10ft		
274.40	24.57	273.19	.000	
		Weir: H =1.20ft		
274.50	27.71	273.19	.000	
		Weir: H =1.30ft		
274.60	30.96	273.19	.000	
		Weir: H =1.40ft		
274.70	34.34	273.19	.000	
		Weir: H =1.50ft		
274.80	37.83	273.19	.000	
		Weir: H =1.60ft		
274.90	41.43	273.19	.000	
		Weir: H =1.70ft		
275.00	45.14	273.19	.000	
		Weir: H =1.80ft		
275.10	48.95	273.19	.000	
		Weir: H =1.90ft		
275.20	52.87	273.19	.000	
		Weir: H =2.00ft		
275.30	56.88	273.19	.000	
		Weir: H =2.10ft		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = R0 (Stand Pipe)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
275.40	61.00	273.19	.000	
	Weir: H =2.20ft			
275.50	65.20	273.19	.000	
	Weir: H =2.30ft			
275.60	69.50	273.19	.000	
	Weir: H =2.40ft			
275.70	73.89	273.19	.000	
	Weir: H =2.50ft			
275.80	78.36	273.19	.000	
	Weir: H =2.60ft			
275.90	82.93	273.19	.000	
	Weir: H =2.70ft			
276.00	87.58	273.19	.000	
	Weir: H =2.80ft			

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
264.00	-41.18	273.19	.000	
		REVERSE: H =8.44		
264.10	-41.18	273.19	.000	
		REVERSE: H =8.44		
264.20	-41.18	273.19	.000	
		REVERSE: H =8.44		
264.30	-41.18	273.19	.000	
		REVERSE: H =8.44		
264.40	-41.18	273.19	.000	
		REVERSE: H =8.44		
264.50	-41.18	273.19	.000	
		REVERSE: H =8.44		
264.60	-41.18	273.19	.000	
		REVERSE: H =8.44		
264.70	-41.18	273.19	.000	
		REVERSE: H =8.44		
264.80	-41.06	273.19	.000	
		REVERSE: H =8.39		
264.90	-40.81	273.19	.000	
		REVERSE: H =8.29		
265.00	-40.57	273.19	.000	
		REVERSE: H =8.19		
265.10	-40.32	273.19	.000	
		REVERSE: H =8.09		
265.20	-40.07	273.19	.000	
		REVERSE: H =7.99		
265.30	-39.82	273.19	.000	
		REVERSE: H =7.89		
265.40	-39.56	273.19	.000	
		REVERSE: H =7.79		
265.50	-39.31	273.19	.000	
		REVERSE: H =7.69		
265.60	-39.05	273.19	.000	
		REVERSE: H =7.59		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
265.70	-38.80	273.19	.000	
		REVERSE: H =7.49		
265.80	-38.54	273.19	.000	
		REVERSE: H =7.39		
265.90	-38.27	273.19	.000	
		REVERSE: H =7.29		
266.00	-38.01	273.19	.000	
		REVERSE: H =7.19		
266.10	-37.75	273.19	.000	
		REVERSE: H =7.09		
266.20	-37.48	273.19	.000	
		REVERSE: H =6.99		
266.30	-37.21	273.19	.000	
		REVERSE: H =6.89		
266.40	-36.94	273.19	.000	
		REVERSE: H =6.79		
266.50	-36.67	273.19	.000	
		REVERSE: H =6.69		
266.60	-36.39	273.19	.000	
		REVERSE: H =6.59		
266.70	-36.11	273.19	.000	
		REVERSE: H =6.49		
266.80	-35.83	273.19	.000	
		REVERSE: H =6.39		
266.90	-35.55	273.19	.000	
		REVERSE: H =6.29		
267.00	-35.27	273.19	.000	
		REVERSE: H =6.19		
267.10	-34.98	273.19	.000	
		REVERSE: H =6.09		
267.20	-34.69	273.19	.000	
		REVERSE: H =5.99		
267.30	-34.40	273.19	.000	
		REVERSE: H =5.89		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
267.40	-34.11	273.19	.000	
		REVERSE: H =5.79		
267.50	-33.81	273.19	.000	
		REVERSE: H =5.69		
267.60	-33.52	273.19	.000	
		REVERSE: H =5.59		
267.70	-33.21	273.19	.000	
		REVERSE: H =5.49		
267.80	-32.91	273.19	.000	
		REVERSE: H =5.39		
267.87	-32.70	273.19	.000	
		REVERSE: H =5.32		
267.90	-32.60	273.19	.000	
		REVERSE: H =5.29		
268.00	-32.29	273.19	.000	
		REVERSE: H =5.19		
268.10	-31.98	273.19	.000	
		REVERSE: H =5.09		
268.20	-31.67	273.19	.000	
		REVERSE: H =4.99		
268.30	-31.35	273.19	.000	
		REVERSE: H =4.89		
268.40	-31.02	273.19	.000	
		REVERSE: H =4.79		
268.50	-30.70	273.19	.000	
		REVERSE: H =4.69		
268.60	-30.37	273.19	.000	
		REVERSE: H =4.59		
268.70	-30.04	273.19	.000	
		REVERSE: H =4.49		
268.80	-29.70	273.19	.000	
		REVERSE: H =4.39		
268.90	-29.36	273.19	.000	
		REVERSE: H =4.29		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
269.00	-29.02	273.19	.000	
	REVERSE: H =4.19			
269.10	-28.67	273.19	.000	
	REVERSE: H =4.09			
269.20	-28.32	273.19	.000	
	REVERSE: H =3.99			
269.30	-27.96	273.19	.000	
	REVERSE: H =3.89			
269.40	-27.60	273.19	.000	
	REVERSE: H =3.79			
269.50	-27.23	273.19	.000	
	REVERSE: H =3.69			
269.60	-26.86	273.19	.000	
	REVERSE: H =3.59			
269.70	-26.48	273.19	.000	
	REVERSE: H =3.49			
269.80	-26.10	273.19	.000	
	REVERSE: H =3.39			
269.90	-25.71	273.19	.000	
	REVERSE: H =3.29			
270.00	-25.32	273.19	.000	
	REVERSE: H =3.19			
270.10	-24.92	273.19	.000	
	REVERSE: H =3.09			
270.20	-24.51	273.19	.000	
	REVERSE: H =2.99			
270.30	-24.10	273.19	.000	
	REVERSE: H =2.89			
270.40	-23.68	273.19	.000	
	REVERSE: H =2.79			
270.50	-23.25	273.19	.000	
	REVERSE: H =2.69			
270.60	-22.81	273.19	.000	
	REVERSE: H =2.59			

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
270.70	-22.37	273.19	.000	
		REVERSE: H =2.49		
270.80	-21.91	273.19	.000	
		REVERSE: H =2.39		
270.90	-21.45	273.19	.000	
		REVERSE: H =2.29		
271.00	-20.98	273.19	.000	
		REVERSE: H =2.19		
271.10	-20.49	273.19	.000	
		REVERSE: H =2.09		
271.20	-20.00	273.19	.000	
		REVERSE: H =1.99		
271.30	-19.49	273.19	.000	
		REVERSE: H =1.89		
271.40	-18.97	273.19	.000	
		REVERSE: H =1.79		
271.50	-18.43	273.19	.000	
		REVERSE: H =1.69		
271.60	-17.87	273.19	.000	
		REVERSE: H =1.59		
271.70	-17.30	273.19	.000	
		REVERSE: H =1.49		
271.80	-16.71	273.19	.000	
		REVERSE: H =1.39		
271.90	-16.10	273.19	.000	
		REVERSE: H =1.29		
272.00	-15.46	273.19	.000	
		REVERSE: H =1.19		
272.10	-14.80	273.19	.000	
		REVERSE: H =1.09		
272.20	-14.10	273.19	.000	
		REVERSE: H =.99		
272.30	-13.37	273.19	.000	
		REVERSE: H =.89		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
272.40	-12.60	273.19	.000	
		REVERSE: H =.79		
272.50	-11.78	273.19	.000	
		REVERSE: H =.69		
272.60	-10.89	273.19	.000	
		REVERSE: H =.59		
272.70	-9.92	273.19	.000	
		REVERSE: H =.49		
272.80	-8.85	273.19	.000	
		REVERSE: H =.39		
272.90	-7.63	273.19	.000	
		REVERSE: H =.29		
273.00	-6.18	273.19	.000	
		REVERSE: H =.19		
273.10	-4.25	273.19	.000	
		REVERSE: H =.09		
273.20	1.42	273.19	.000	
		H =.01		
273.30	4.70	273.19	.000	
		H =.11		
273.40	6.50	273.19	.000	
		H =.21		
273.50	7.89	273.19	.000	
		H =.31		
273.60	9.08	273.19	.000	
		H =.41		
273.70	10.12	273.19	.000	
		H =.51		
273.80	11.07	273.19	.000	
		H =.61		
273.90	11.94	273.19	.000	
		H =.71		
274.00	12.76	273.19	.000	
		H =.81		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
274.10	13.52	273.19	.000	
	H =.91			
274.20	14.25	273.19	.000	
	H =1.01			
274.30	14.93	273.19	.000	
	H =1.11			
274.40	15.59	273.19	.000	
	H =1.21			
274.50	16.22	273.19	.000	
	H =1.31			
274.60	16.83	273.19	.000	
	H =1.41			
274.70	17.42	273.19	.000	
	H =1.51			
274.80	17.99	273.19	.000	
	H =1.61			
274.90	18.54	273.19	.000	
	H =1.71			
275.00	19.07	273.19	.000	
	H =1.81			
275.10	19.59	273.19	.000	
	H =1.91			
275.20	20.10	273.19	.000	
	H =2.01			
275.30	20.59	273.19	.000	
	H =2.11			
275.40	21.07	273.19	.000	
	H =2.21			
275.50	21.54	273.19	.000	
	H =2.31			
275.60	22.01	273.19	.000	
	H =2.41			
275.70	22.46	273.19	.000	
	H =2.51			

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
275.80	22.90	273.19	.000	
	H =2.61			
275.90	23.34	273.19	.000	
	H =2.71			
276.00	23.76	273.19	.000	
	H =2.81			

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
264.00	.00	REVERSE: Flow is closed off		
264.10	.00	REVERSE: Flow is closed off		
264.20	.00	REVERSE: Flow is closed off		
264.30	.00	REVERSE: Flow is closed off		
264.40	.00	REVERSE: Flow is closed off		
264.50	.00	REVERSE: Flow is closed off		
264.60	.00	REVERSE: Flow is closed off		
264.70	.00	REVERSE: Flow is closed off		
264.80	.00	REVERSE: Flow is closed off		
264.90	.00	REVERSE: Flow is closed off		
265.00	.00	REVERSE: Flow is closed off		
265.10	.00	REVERSE: Flow is closed off		
265.20	.00	REVERSE: Flow is closed off		
265.30	.00	REVERSE: Flow is closed off		
265.40	.00	REVERSE: Flow is closed off		
265.50	.00	REVERSE: Flow is closed off		
265.60	.00	REVERSE: Flow is closed off		
265.70	.00	REVERSE: Flow is closed off		
265.80	.00	REVERSE: Flow is closed off		
265.90	.00	REVERSE: Flow is closed off		
266.00	.00	REVERSE: Flow is closed off		
266.10	.00	REVERSE: Flow is closed off		
266.20	.00	REVERSE: Flow is closed off		
266.30	.00	REVERSE: Flow is closed off		
266.40	.00	REVERSE: Flow is closed off		
266.50	.00	REVERSE: Flow is closed off		
266.60	.00	REVERSE: Flow is closed off		
266.70	.00	REVERSE: Flow is closed off		
266.80	.00	REVERSE: Flow is closed off		
266.90	.00	REVERSE: Flow is closed off		
267.00	.00	REVERSE: Flow is closed off		
267.10	.00	REVERSE: Flow is closed off		
267.20	.00	REVERSE: Flow is closed off		
267.30	.00	REVERSE: Flow is closed off		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
267.40	.00	REVERSE: Flow is closed off		
267.50	.00	REVERSE: Flow is closed off		
267.60	.00	REVERSE: Flow is closed off		
267.70	.00	REVERSE: Flow is closed off		
267.80	.00	REVERSE: Flow is closed off		
267.87	.00	REVERSE: Flow is closed off		
267.90	.00	REVERSE: Flow is closed off		
268.00	.00	REVERSE: Flow is closed off		
268.10	.00	REVERSE: Flow is closed off		
268.20	.00	REVERSE: Flow is closed off		
268.30	.00	REVERSE: Flow is closed off		
268.40	.00	REVERSE: Flow is closed off		
268.50	.00	REVERSE: Flow is closed off		
268.60	.00	REVERSE: Flow is closed off		
268.70	.00	REVERSE: Flow is closed off		
268.80	.00	REVERSE: Flow is closed off		
268.90	.00	REVERSE: Flow is closed off		
269.00	.00	REVERSE: Flow is closed off		
269.10	.00	REVERSE: Flow is closed off		
269.20	.00	REVERSE: Flow is closed off		
269.30	.00	REVERSE: Flow is closed off		
269.40	.00	REVERSE: Flow is closed off		
269.50	.00	REVERSE: Flow is closed off		
269.60	.00	REVERSE: Flow is closed off		
269.70	.00	REVERSE: Flow is closed off		
269.80	.00	REVERSE: Flow is closed off		
269.90	.00	REVERSE: Flow is closed off		
270.00	.00	REVERSE: Flow is closed off		
270.10	.00	REVERSE: Flow is closed off		
270.20	.00	REVERSE: Flow is closed off		
270.30	.00	REVERSE: Flow is closed off		
270.40	.00	REVERSE: Flow is closed off		
270.50	.00	REVERSE: Flow is closed off		
270.60	.00	REVERSE: Flow is closed off		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
270.70	.00	REVERSE: Flow is closed off		
270.80	.00	REVERSE: Flow is closed off		
270.90	.00	REVERSE: Flow is closed off		
271.00	.00	REVERSE: Flow is closed off		
271.10	.00	REVERSE: Flow is closed off		
271.20	.00	REVERSE: Flow is closed off		
271.30	.00	REVERSE: Flow is closed off		
271.40	.00	REVERSE: Flow is closed off		
271.50	.00	REVERSE: Flow is closed off		
271.60	.00	REVERSE: Flow is closed off		
271.70	.00	REVERSE: Flow is closed off		
271.80	.00	REVERSE: Flow is closed off		
271.90	.00	REVERSE: Flow is closed off		
272.00	.00	REVERSE: Flow is closed off		
272.10	.00	REVERSE: Flow is closed off		
272.20	.00	REVERSE: Flow is closed off		
272.30	.00	REVERSE: Flow is closed off		
272.40	.00	REVERSE: Flow is closed off		
272.50	.00	REVERSE: Flow is closed off		
272.60	.00	REVERSE: Flow is closed off		
272.70	.00	REVERSE: Flow is closed off		
272.80	.00	REVERSE: Flow is closed off		
272.90	.00	REVERSE: Flow is closed off		
273.00	.00	REVERSE: Flow is closed off		
273.10	.00	REVERSE: Flow is closed off		
273.20	.00	273.19	.000	
		HW & TW below Inv.El.=274.000		
273.30	.00	273.19	.000	
		HW & TW below Inv.El.=274.000		
273.40	.00	273.19	.000	
		HW & TW below Inv.El.=274.000		
273.50	.00	273.19	.000	
		HW & TW below Inv.El.=274.000		
273.60	.00	273.19	.000	
		HW & TW below Inv.El.=274.000		

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
273.70	.00	273.19	.000	HW & TW below Inv.El.=274.000
273.80	.00	273.19	.000	HW & TW below Inv.El.=274.000
273.90	.00	273.19	.000	HW & TW below Inv.El.=274.000
274.00	.00	273.19	.000	H=.00; Htw=.00; Qfree=.00; K=1.000
274.10	16.32	273.19	.000	H=.10; Htw=.00; Qfree=16.32; K=1.000
274.20	46.16	273.19	.000	H=.20; Htw=.00; Qfree=46.16; K=1.000
274.30	84.78	273.19	.000	H=.30; Htw=.00; Qfree=84.78; K=1.000
274.40	130.54	273.19	.000	H=.40; Htw=.00; Qfree=130.54; K=1.000
274.50	182.43	273.19	.000	H=.50; Htw=.00; Qfree=182.43; K=1.000
274.60	239.82	273.19	.000	H=.60; Htw=.00; Qfree=239.82; K=1.000
274.70	302.21	273.19	.000	H=.70; Htw=.00; Qfree=302.21; K=1.000
274.80	369.21	273.19	.000	H=.80; Htw=.00; Qfree=369.21; K=1.000
274.90	440.56	273.19	.000	H=.90; Htw=.00; Qfree=440.56; K=1.000
275.00	516.00	273.19	.000	H=1.00; Htw=.00; Qfree=516.00; K=1.000
275.10	595.31	273.19	.000	H=1.10; Htw=.00; Qfree=595.31; K=1.000
275.20	678.31	273.19	.000	H=1.20; Htw=.00; Qfree=678.31; K=1.000
275.30	764.82	273.19	.000	H=1.30; Htw=.00; Qfree=764.82; K=1.000

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
275.40	854.75	273.19	.000	
		H=1.40; Htw=.00; Qfree=854.75; K=1.000		
275.50	947.95	273.19	.000	
		H=1.50; Htw=.00; Qfree=947.95; K=1.000		
275.60	1044.32	273.19	.000	
		H=1.60; Htw=.00; Qfree=1044.32; K=1.000		
275.70	1143.74	273.19	.000	
		H=1.70; Htw=.00; Qfree=1143.74; K=1.000		
275.80	1246.10	273.19	.000	
		H=1.80; Htw=.00; Qfree=1246.10; K=1.000		
275.90	1351.38	273.19	.000	
		H=1.90; Htw=.00; Qfree=1351.38; K=1.000		
276.00	1459.47	273.19	.000	
		H=2.00; Htw=.00; Qfree=1459.47; K=1.000		

***** COMPOSITE OUTFLOW SUMMARY ****

CUMULATIVE HGL CONVERGENCE ERROR .000 (+/- ft)

WS Elev, Total Q			Notes	
			Converge	
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
264.00	-106.51	273.19	.000	O1 +O0
264.10	-106.51	273.19	.000	O1 +O0
264.20	-106.51	273.19	.000	O1 +O0
264.30	-106.51	273.19	.000	O1 +O0
264.40	-106.51	273.19	.000	O1 +O0
264.50	-106.51	273.19	.000	O1 +O0
264.60	-106.51	273.19	.000	O1 +O0
264.70	-106.51	273.19	.000	O1 +O0
264.80	-106.39	273.19	.000	O1 +O0
264.90	-106.14	273.19	.000	O1 +O0
265.00	-105.89	273.19	.000	O1 +O0
265.10	-105.65	273.19	.000	O1 +O0
265.20	-105.40	273.19	.000	O1 +O0
265.30	-105.14	273.19	.000	O1 +O0
265.40	-104.89	273.19	.000	O1 +O0
265.50	-104.64	273.19	.000	O1 +O0
265.60	-104.38	273.19	.000	O1 +O0
265.70	-104.12	273.19	.000	O1 +O0
265.80	-103.86	273.19	.000	O1 +O0
265.90	-103.60	273.19	.000	O1 +O0
266.00	-103.34	273.19	.000	O1 +O0
266.10	-103.07	273.19	.000	O1 +O0
266.20	-102.80	273.19	.000	O1 +O0
266.30	-102.54	273.19	.000	O1 +O0
266.40	-102.26	273.19	.000	O1 +O0
266.50	-101.99	273.19	.000	O1 +O0
266.60	-101.72	273.19	.000	O1 +O0
266.70	-101.44	273.19	.000	O1 +O0
266.80	-101.16	273.19	.000	O1 +O0
266.90	-100.88	273.19	.000	O1 +O0
267.00	-100.59	273.19	.000	O1 +O0
267.10	-100.31	273.19	.000	O1 +O0
267.20	-100.02	273.19	.000	O1 +O0
267.30	-99.73	273.19	.000	O1 +O0
267.40	-99.44	273.19	.000	O1 +O0
267.50	-99.14	273.19	.000	O1 +O0

***** COMPOSITE OUTFLOW SUMMARY ****

CUMULATIVE HGL CONVERGENCE ERROR .000 (+/- ft)

WS Elev, Total Q			Notes	
			Converge	
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
267.60	-98.84	273.19	.000	O1 +O0
267.70	-98.54	273.19	.000	O1 +O0
267.80	-98.24	273.19	.000	O1 +O0
267.87	-98.02	273.19	.000	O1 +O0
267.90	-97.93	273.19	.000	O1 +O0
268.00	-97.62	273.19	.000	O1 +O0
268.10	-97.31	273.19	.000	O1 +O0
268.20	-96.99	273.19	.000	O1 +O0
268.30	-96.67	273.19	.000	O1 +O0
268.40	-96.35	273.19	.000	O1 +O0
268.50	-96.03	273.19	.000	O1 +O0
268.60	-95.70	273.19	.000	O1 +O0
268.70	-95.36	273.19	.000	O1 +O0
268.80	-95.03	273.19	.000	O1 +O0
268.90	-94.69	273.19	.000	O1 +O0
269.00	-94.30	273.19	.000	O1 +O0
269.10	-93.17	273.19	.000	O1 +O0
269.20	-92.03	273.19	.000	O1 +O0
269.30	-90.87	273.19	.000	O1 +O0
269.40	-89.69	273.19	.000	O1 +O0
269.50	-88.50	273.19	.000	O1 +O0
269.60	-87.29	273.19	.000	O1 +O0
269.70	-86.07	273.19	.000	O1 +O0
269.80	-84.83	273.19	.000	O1 +O0
269.90	-83.56	273.19	.000	O1 +O0
270.00	-82.28	273.19	.000	O1 +O0
270.10	-80.98	273.19	.000	O1 +O0
270.20	-79.66	273.19	.000	O1 +O0
270.30	-78.32	273.19	.000	O1 +O0
270.40	-76.95	273.19	.000	O1 +O0
270.50	-75.56	273.19	.000	O1 +O0
270.60	-74.14	273.19	.000	O1 +O0
270.70	-72.70	273.19	.000	O1 +O0
270.80	-71.22	273.19	.000	O1 +O0
270.90	-69.72	273.19	.000	O1 +O0
271.00	-68.18	273.19	.000	O1 +O0

***** COMPOSITE OUTFLOW SUMMARY ****

CUMULATIVE HGL CONVERGENCE ERROR .000 (+/- ft)

WS Elev, Total Q			Notes	
			Converge	
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
271.10	-66.60	273.19	.000	O1 +O0
271.20	-64.99	273.19	.000	O1 +O0
271.30	-63.34	273.19	.000	O1 +O0
271.40	-61.64	273.19	.000	O1 +O0
271.50	-59.89	273.19	.000	O1 +O0
271.60	-58.09	273.19	.000	O1 +O0
271.70	-56.24	273.19	.000	O1 +O0
271.80	-54.32	273.19	.000	O1 +O0
271.90	-52.33	273.19	.000	O1 +O0
272.00	-50.26	273.19	.000	O1 +O0
272.10	-48.10	273.19	.000	O1 +O0
272.20	-45.84	273.19	.000	O1 +O0
272.30	-43.46	273.19	.000	O1 +O0
272.40	-40.95	273.19	.000	O1 +O0
272.50	-38.27	273.19	.000	O1 +O0
272.60	-35.39	273.19	.000	O1 +O0
272.70	-32.25	273.19	.000	O1 +O0
272.80	-28.77	273.19	.000	O1 +O0
272.90	-24.81	273.19	.000	O1 +O0
273.00	-20.08	273.19	.000	O1 +O0
273.10	-13.82	273.19	.000	O1 +O0
273.20	4.61	273.19	.000	O1 +R0 +O0
273.30	15.87	273.19	.000	O1 +R0 +O0
273.40	22.78	273.19	.000	O1 +R0 +O0
273.50	28.72	273.19	.000	O1 +R0 +O0
273.60	34.23	273.19	.000	O1 +R0 +O0
273.70	39.51	273.19	.000	O1 +R0 +O0
273.80	44.67	273.19	.000	O1 +R0 +O0
273.90	49.77	273.19	.000	O1 +R0 +O0
274.00	54.84	273.19	.000	O1 +R0 +O0 +W0
274.10	76.23	273.19	.000	O1 +R0 +O0 +W0
274.20	111.15	273.19	.000	O1 +R0 +O0 +W0
274.30	154.88	273.19	.000	O1 +R0 +O0 +W0
274.40	205.78	273.19	.000	O1 +R0 +O0 +W0
274.50	262.87	273.19	.000	O1 +R0 +O0 +W0
274.60	325.49	273.19	.000	O1 +R0 +O0 +W0

***** COMPOSITE OUTFLOW SUMMARY ****

CUMULATIVE HGL CONVERGENCE ERROR .000 (+/- ft)

WS Elev, Total Q			Notes	
			Converge	
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
274.70	393.16	273.19	.000	O1 +R0 +O0 +W0
274.80	465.50	273.19	.000	O1 +R0 +O0 +W0
274.90	542.24	273.19	.000	O1 +R0 +O0 +W0
275.00	623.12	273.19	.000	O1 +R0 +O0 +W0
275.10	707.93	273.19	.000	O1 +R0 +O0 +W0
275.20	796.50	273.19	.000	O1 +R0 +O0 +W0
275.30	888.62	273.19	.000	O1 +R0 +O0 +W0
275.40	984.23	273.19	.000	O1 +R0 +O0 +W0
275.50	1083.18	273.19	.000	O1 +R0 +O0 +W0
275.60	1185.34	273.19	.000	O1 +R0 +O0 +W0
275.70	1290.62	273.19	.000	O1 +R0 +O0 +W0
275.80	1398.90	273.19	.000	O1 +R0 +O0 +W0
275.90	1510.15	273.19	.000	O1 +R0 +O0 +W0
276.00	1624.28	273.19	.000	O1 +R0 +O0 +W0

LEVEL POOL ROUTING DATA

HYG Dir = F:\06-14\hydro\pondpack\
Inflow HYG file = work_pad.hyg - DET. POND IN 100
Outflow HYG file = work_pad.hyg - DET. POND OUT 100

Pond Node Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 264.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = -106.51 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= -106.51 cfs
Time Increment = .0250 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
264.00	-106.51	.000	.00	-106.51	-106.51
264.10	-106.51	.033	.00	-106.51	-74.32
264.20	-106.51	.067	.00	-106.51	-42.13
264.30	-106.51	.100	.00	-106.51	-9.95
264.40	-106.51	.133	.00	-106.51	22.23
264.50	-106.51	.166	.00	-106.51	54.42
264.60	-106.51	.200	.00	-106.51	86.61
264.70	-106.51	.233	.00	-106.51	118.80
264.80	-106.39	.266	.00	-106.39	151.10
264.90	-106.14	.299	.00	-106.14	183.53
265.00	-105.89	.333	.00	-105.89	215.97
265.10	-105.65	.366	.00	-105.65	248.40
265.20	-105.40	.399	.00	-105.40	280.84
265.30	-105.14	.432	.00	-105.14	313.27
265.40	-104.89	.465	.00	-104.89	345.71
265.50	-104.64	.499	.00	-104.64	378.15
265.60	-104.38	.532	.00	-104.38	410.60
265.70	-104.12	.565	.00	-104.12	443.04
265.80	-103.86	.598	.00	-103.86	475.48
265.90	-103.60	.632	.00	-103.60	507.93

LEVEL POOL ROUTING DATA

HYG Dir = F:\06-14\hydro\pondpack\
Inflow HYG file = work_pad.hyg - DET. POND IN 100
Outflow HYG file = work_pad.hyg - DET. POND OUT 100

Pond Node Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 264.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = -106.51 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= -106.51 cfs
Time Increment = .0250 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
266.00	-103.34	.665	.00	-103.34	540.38
266.10	-103.07	.753	.00	-103.07	625.50
266.20	-102.80	.840	.00	-102.80	710.62
266.30	-102.54	.928	.00	-102.54	795.71
266.40	-102.26	1.016	.00	-102.26	880.83
266.50	-101.99	1.103	.00	-101.99	965.95
266.60	-101.72	1.191	.00	-101.72	1051.08
266.70	-101.44	1.279	.00	-101.44	1136.21
266.80	-101.16	1.366	.00	-101.16	1221.31
266.90	-100.88	1.454	.00	-100.88	1306.44
267.00	-100.59	1.542	.00	-100.59	1391.58
267.10	-100.31	1.629	.00	-100.31	1476.71
267.20	-100.02	1.717	.00	-100.02	1561.85
267.30	-99.73	1.804	.00	-99.73	1646.97
267.40	-99.44	1.892	.00	-99.44	1732.11
267.50	-99.14	1.980	.00	-99.14	1817.26
267.60	-98.84	2.067	.00	-98.84	1902.41
267.70	-98.54	2.155	.00	-98.54	1987.56
267.80	-98.24	2.243	.00	-98.24	2072.69
267.87	-98.02	2.304	.00	-98.02	2132.30

LEVEL POOL ROUTING DATA

```
HYG Dir          = F:\06-14\hydro\pondpack\
Inflow  HYG file = work_pad.hyg - DET. POND    IN  100
Outflow HYG file = work_pad.hyg - DET. POND    OUT 100

Pond Node   Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   264.00 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =  -106.51 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=  -106.51 cfs
Time Increment     =    .0250 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
267.90	-97.93	2.330	.00	-97.93	2157.84
268.00	-97.62	2.418	.00	-97.62	2243.00
268.10	-97.31	2.554	.00	-97.31	2375.31
268.20	-96.99	2.691	.00	-96.99	2507.62
268.30	-96.67	2.827	.00	-96.67	2639.90
268.40	-96.35	2.963	.00	-96.35	2772.21
268.50	-96.03	3.100	.00	-96.03	2904.53
268.60	-95.70	3.236	.00	-95.70	3036.86
268.70	-95.36	3.372	.00	-95.36	3169.18
268.80	-95.03	3.509	.00	-95.03	3301.48
268.90	-94.69	3.645	.00	-94.69	3433.81
269.00	-94.30	3.782	.00	-94.30	3566.19
269.10	-93.17	3.918	.00	-93.17	3699.32
269.20	-92.03	4.054	.00	-92.03	3832.46
269.30	-90.87	4.191	.00	-90.87	3965.57
269.40	-89.69	4.327	.00	-89.69	4098.74
269.50	-88.50	4.463	.00	-88.50	4231.93
269.60	-87.29	4.600	.00	-87.29	4365.13
269.70	-86.07	4.736	.00	-86.07	4498.35
269.80	-84.83	4.872	.00	-84.83	4631.55

LEVEL POOL ROUTING DATA

HYG Dir = F:\06-14\hydro\pondpack\
Inflow HYG file = work_pad.hyg - DET. POND IN 100
Outflow HYG file = work_pad.hyg - DET. POND OUT 100

Pond Node Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 264.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = -106.51 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= -106.51 cfs
Time Increment = .0250 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
269.90	-83.56	5.009	.00	-83.56	4764.80
270.00	-82.28	5.145	.00	-82.28	4898.08
270.10	-80.98	5.308	.00	-80.98	5057.51
270.20	-79.66	5.472	.00	-79.66	5216.96
270.30	-78.32	5.635	.00	-78.32	5376.39
270.40	-76.95	5.798	.00	-76.95	5535.89
270.50	-75.56	5.962	.00	-75.56	5695.41
270.60	-74.14	6.125	.00	-74.14	5854.96
270.70	-72.70	6.288	.00	-72.70	6014.54
270.80	-71.22	6.452	.00	-71.22	6174.10
270.90	-69.72	6.615	.00	-69.72	6333.74
271.00	-68.18	6.779	.00	-68.18	6493.41
271.10	-66.60	6.942	.00	-66.60	6653.12
271.20	-64.99	7.105	.00	-64.99	6812.86
271.30	-63.34	7.269	.00	-63.34	6972.60
271.40	-61.64	7.432	.00	-61.64	7132.43
271.50	-59.89	7.595	.00	-59.89	7292.31
271.60	-58.09	7.759	.00	-58.09	7452.24
271.70	-56.24	7.922	.00	-56.24	7612.23
271.80	-54.32	8.085	.00	-54.32	7772.23

LEVEL POOL ROUTING DATA

HYG Dir = F:\06-14\hydro\pondpack\
Inflow HYG file = work_pad.hyg - DET. POND IN 100
Outflow HYG file = work_pad.hyg - DET. POND OUT 100

Pond Node Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 264.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = -106.51 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= -106.51 cfs
Time Increment = .0250 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
271.90	-52.33	8.249	.00	-52.33	7932.36
272.00	-50.26	8.412	.00	-50.26	8092.56
272.10	-48.10	8.588	.00	-48.10	8265.15
272.20	-45.84	8.764	.00	-45.84	8437.83
272.30	-43.46	8.940	.00	-43.46	8610.58
272.40	-40.95	9.116	.00	-40.95	8783.52
272.50	-38.27	9.292	.00	-38.27	8956.63
272.60	-35.39	9.468	.00	-35.39	9129.94
272.70	-32.25	9.644	.00	-32.25	9303.50
272.80	-28.77	9.820	.00	-28.77	9477.35
272.90	-24.81	9.996	.00	-24.81	9651.74
273.00	-20.08	10.173	.00	-20.08	9826.90
273.10	-13.82	10.349	.00	-13.82	10003.59
273.20	4.61	10.525	.00	4.61	10192.44
273.30	15.87	10.701	.00	15.87	10374.08
273.40	22.78	10.877	.00	22.78	10551.42
273.50	28.72	11.053	.00	28.72	10727.78
273.60	34.23	11.229	.00	34.23	10903.72
273.70	39.51	11.405	.00	39.51	11079.42
273.80	44.67	11.581	.00	44.67	11254.96

LEVEL POOL ROUTING DATA

HYG Dir = F:\06-14\hydro\pondpack\
Inflow HYG file = work_pad.hyg - DET. POND IN 100
Outflow HYG file = work_pad.hyg - DET. POND OUT 100

Pond Node Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 264.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = -106.51 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= -106.51 cfs
Time Increment = .0250 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
273.90	49.77	11.757	.00	49.77	11430.48
274.00	54.84	11.933	.00	54.84	11605.98
274.10	76.23	11.940	.00	76.23	11633.86
274.20	111.15	11.946	.00	111.15	11675.27
274.30	154.88	11.953	.00	154.88	11725.48
274.40	205.78	11.960	.00	205.78	11782.87
274.50	262.87	11.967	.00	262.87	11846.44
274.60	325.49	11.973	.00	325.49	11915.55
274.70	393.16	11.980	.00	393.16	11989.71
274.80	465.50	11.987	.00	465.50	12068.53
274.90	542.24	11.993	.00	542.24	12151.75
275.00	623.12	12.000	.00	623.12	12239.12
275.10	707.93	12.002	.00	707.93	12325.87
275.20	796.50	12.004	.00	796.50	12416.37
275.30	888.62	12.006	.00	888.62	12510.43
275.40	984.23	12.008	.00	984.23	12607.98
275.50	1083.18	12.010	.00	1083.18	12708.86
275.60	1185.34	12.012	.00	1185.34	12812.95
275.70	1290.62	12.014	.00	1290.62	12920.17
275.80	1398.90	12.016	.00	1398.90	13030.38

LEVEL POOL ROUTING DATA

```
HYG Dir          = F:\06-14\hydro\pondpack\
Inflow  HYG file = work_pad.hyg - DET. POND    IN  100
Outflow HYG file = work_pad.hyg - DET. POND    OUT 100

Pond Node   Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   264.00 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =  -106.51 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=  -106.51 cfs
Time Increment     =    .0250 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
275.90	1510.15	12.018	.00	1510.15	13143.58
276.00	1624.28	12.020	.00	1624.28	13259.64

SUMMARY FOR HYDROGRAPH ADDITION
at Node: DET. POND IN

HYG Directory: F:\06-14\hydro\pondpack\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
WARNING: Missed peak when adding hydrograph...				
ADDLINK 10	RATHYDRO HG	work_pad.hyg	HYG 1	100

INFLOWS TO: DET. POND IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
work_pad.hyg	HYG 1	100	57.832	4.2700	842.03

TOTAL FLOW INTO: DET. POND IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
work_pad.hyg	DET. POND IN	100	57.827	4.2750	830.29

```
TOTAL NODE INFLOW...
HYG file = F:\06-14\hydro\pondpack\work_pad.hyg
HYG ID   = DET. POND    IN
HYG Tag  = 100
-----------------------------------
Peak Discharge =       830.29 cfs
Time to Peak   =       4.2750 hrs
HYG Volume     =       57.827 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	3.39	6.79	10.18	13.57
.1250	16.97	20.36	23.75	27.15	30.54
.2500	33.93	37.33	40.72	41.60	41.84
.3750	42.09	42.33	42.58	42.83	43.07
.5000	43.32	43.56	43.81	44.06	44.30
.6250	44.48	44.62	44.76	44.90	45.04
.7500	45.18	45.32	45.46	45.60	45.74
.8750	45.88	46.02	46.23	46.56	46.89
1.0000	47.21	47.54	47.87	48.20	48.53
1.1250	48.85	49.18	49.51	49.84	50.14
1.2500	50.34	50.53	50.73	50.93	51.12
1.3750	51.32	51.52	51.71	51.91	52.11
1.5000	52.30	52.50	52.97	53.43	53.90
1.6250	54.37	54.84	55.30	55.77	56.24
1.7500	56.70	57.17	57.64	58.11	58.43
1.8750	58.72	59.00	59.29	59.58	59.86
2.0000	60.15	60.44	60.72	61.01	61.30
2.1250	61.59	62.15	62.89	63.64	64.39
2.2500	65.13	65.88	66.62	67.37	68.11
2.3750	68.86	69.61	70.35	70.99	71.48
2.5000	71.96	72.44	72.93	73.41	73.90
2.6250	74.38	74.86	75.35	75.83	76.31
2.7500	76.98	78.38	79.78	81.19	82.59
2.8750	83.99	85.39	86.79	88.19	89.60
3.0000	91.00	92.40	93.80	94.87	95.93
3.1250	97.00	98.06	99.13	100.19	101.26
3.2500	102.32	103.39	104.46	105.52	106.59
3.3750	110.08	114.18	118.28	122.37	126.47
3.5000	130.57	134.67	138.77	142.87	146.96
3.6250	151.06	155.16	157.50	158.68	159.85
3.7500	161.02	162.19	163.36	164.54	165.71

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
3.8750	166.88	168.05	169.22	170.40	193.10
4.0000	248.09	303.09	358.08	413.08	468.07
4.1250	523.06	578.06	633.05	688.05	743.04
4.2500	798.03	830.29	771.58	712.87	654.17
4.3750	595.46	536.75	478.04	419.34	360.63
4.5000	301.92	243.22	184.51	125.80	122.39
4.6250	118.98	115.57	112.16	108.75	105.34
4.7500	101.93	98.52	95.11	91.70	88.29
4.8750	84.88	83.00	81.50	80.00	78.50
5.0000	77.00	75.50	74.00	72.50	71.00
5.1250	69.50	68.00	66.50	65.37	64.50
5.2500	63.62	62.74	61.87	60.99	60.11
5.3750	59.23	58.36	57.48	56.60	55.73
5.5000	54.96	54.37	53.78	53.19	52.60
5.6250	52.01	51.42	50.83	50.24	49.65
5.7500	49.06	48.47	47.91	47.49	47.06
5.8750	46.64	46.21	45.78	45.36	44.93
6.0000	44.50	44.08	43.65	43.23	42.80
6.1250	39.29	35.78	32.28	28.77	25.26
6.2500	21.75	18.24	14.73	11.23	7.72
6.3750	4.21	.70			

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = F:\06-14\hydro\pondpack\
Inflow  HYG file = work_pad.hyg - DET. POND    IN  100
Outflow HYG file = work_pad.hyg - DET. POND    OUT 100

Pond Node   Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   264.00 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =  -106.51 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=  -106.51 cfs
Time Increment     =    .0250 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    830.29 cfs    at    4.2750 hrs
Peak Outflow      =    829.46 cfs    at    4.2750 hrs
-----------------------------------------------------
Peak Elevation    =    275.24 ft
Peak Storage =         12.005 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      57.827
- Infiltration =        .000
- HYG Vol OUT  =      47.462
- Retained Vol =      10.481
                  ----------
Unrouted Vol =        .115 ac-ft  (.200% of Inflow Volume)


WARNING: Inflow hydrograph truncated on right side.
```

DETENTION TIMES SUMMARY

```
HYG Dir          = F:\06-14\hydro\pondpack\
Inflow  HYG file = work_pad.hyg - DET. POND    IN  100
Outflow HYG file = work_pad.hyg - DET. POND    OUT 100

Pond Node   Data = DET. POND
Pond Volume Data = DET. POND
Pond Outlet Data = Outlet 1

No Infiltration

APPROXIMATE DETENTION TIME
--------------------------------------
Tp, Outflow + Infilt.   =    4.2750 hrs
Tp, Total Inflow        =    4.2750 hrs
Peak to Peak            =     .0000 hrs
--------------------------------------
```

POND ROUTED TOTAL OUTFLOW HYG...
HYG file = F:\06-14\hydro\pondpack\work_pad.hyg
HYG ID = DET. POND OUT
HYG Tag = 100

POSITIVE FLOW		NEGATIVE FLOW	
Peak Discharge =	829.46 cfs	Peak Discharge =	-4.00 cfs
Time to Peak =	4.2750 hrs	Time to Peak =	2.5250 hrs
HYG Volume =	47.462 ac-ft	HYG Volume =	-.115 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	-106.51	.00	.00	.00	.00
.1250	.00	.00	.00	.00	.00
.2500	.00	.00	.00	.00	.00
.3750	.00	.00	.00	.00	.00
.5000	.00	.00	.00	.00	.00
.6250	.00	.00	.00	.00	.00
.7500	.00	.00	.00	.00	.00
.8750	.00	.00	.00	.00	.00
1.0000	.00	.00	.00	.00	.00
1.1250	.00	.00	.00	.00	.00
1.2500	.00	.00	.00	.00	.00
1.3750	.00	.00	.00	.00	.00
1.5000	.00	.00	.00	.00	.00
1.6250	.00	.00	.00	.00	.00
1.7500	.00	.00	.00	.00	.00
1.8750	.00	.00	.00	.00	.00
2.0000	.00	.00	.00	.00	.00
2.1250	.00	.00	.00	.00	.00
2.2500	.00	.00	.00	.00	.00
2.3750	.00	.00	.00	.00	.00
2.5000	.00	-4.00	8.65	16.36	20.83
2.6250	24.68	28.05	31.04	33.83	36.38
2.7500	38.80	41.10	43.34	45.51	47.62
2.8750	49.69	51.72	53.70	76.62	97.32
3.0000	85.47	95.98	91.12	96.54	94.62
3.1250	97.73	97.39	99.42	99.82	101.35
3.2500	102.10	103.38	104.30	105.46	106.46
3.3750	109.62	113.94	117.92	122.11	126.14

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
3.5000	130.29	134.35	138.47	142.55	146.67
3.6250	150.75	154.86	157.47	158.57	159.80
3.7500	160.93	162.13	163.28	164.47	165.63
3.8750	166.81	167.97	169.15	170.32	190.59
4.0000	244.29	300.85	354.95	410.95	465.32
4.1250	521.10	575.56	631.54	688.26	741.64
4.2500	798.20	829.46	773.60	712.20	656.12
4.3750	596.41	540.31	479.61	422.79	362.75
4.5000	305.45	246.01	188.49	129.82	119.85
4.6250	121.31	114.29	113.55	108.25	106.22
4.7500	101.86	99.10	95.25	92.14	88.52
4.8750	85.26	83.04	81.71	80.09	78.67
5.0000	77.12	75.71	74.24	72.72	71.23
5.1250	69.73	68.23	66.73	65.52	64.63
5.2500	63.76	62.87	62.00	61.12	60.24
5.3750	59.37	58.49	57.61	56.74	55.86
5.5000	55.07	54.82	54.78	54.71	54.60
5.6250	54.47	54.31	54.13	53.92	53.69
5.7500	53.44	53.17	52.88	52.58	52.28
5.8750	51.96	51.64	51.32	50.98	50.65
6.0000	50.30	49.96	49.60	49.24	48.88
6.1250	48.43	47.80	47.00	46.04	44.93
6.2500	43.68	42.29	40.77	39.13	37.34
6.3750	35.46	33.44	31.35	29.39	27.46
6.5000	25.61	23.88	22.20	20.47	18.87
6.6250	17.40	16.04	14.15	12.40	10.86
6.7500	9.52	8.34	7.30	6.40	5.60
6.8750	4.91	4.12	3.32	2.67	2.15
7.0000	1.73	1.39	1.12	.90	.73
7.1250	.58	.47	.38	.30	.24
7.2500	.20	.16	.13	.10	.08
7.3750	.07	.05	.04	.03	.03
7.5000	.02	.02	.01	.01	.01
7.6250	.01	.01	.00	.00	.00
7.7500	.00				

```
DIVERTED HYDROGRAPH...
HYG file = F:\06-14\hydro\pondpack\work_pad.hyg
HYG ID   = ROUTE 10
HYG Tag  = 100
-----------------------------------
Peak Discharge =       829.46 cfs
Time to Peak   =       4.2750 hrs
HYG Volume     =       47.462 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
2.5250	-4.00	8.65	16.36	20.83	24.68
2.6500	28.05	31.04	33.83	36.38	38.80
2.7750	41.10	43.34	45.51	47.62	49.69
2.9000	51.72	53.70	76.62	97.32	85.47
3.0250	95.98	91.12	96.54	94.62	97.73
3.1500	97.39	99.42	99.82	101.35	102.10
3.2750	103.38	104.30	105.46	106.46	109.62
3.4000	113.94	117.92	122.11	126.14	130.29
3.5250	134.35	138.47	142.55	146.67	150.75
3.6500	154.86	157.47	158.57	159.80	160.93
3.7750	162.13	163.28	164.47	165.63	166.81
3.9000	167.97	169.15	170.32	190.59	244.29
4.0250	300.85	354.95	410.95	465.32	521.10
4.1500	575.56	631.54	688.26	741.64	798.20
4.2750	829.46	773.60	712.20	656.12	596.41
4.4000	540.31	479.61	422.79	362.75	305.45
4.5250	246.01	188.49	129.82	119.85	121.31
4.6500	114.29	113.55	108.25	106.22	101.86
4.7750	99.10	95.25	92.14	88.52	85.26
4.9000	83.04	81.71	80.09	78.67	77.12
5.0250	75.71	74.24	72.72	71.23	69.73
5.1500	68.23	66.73	65.52	64.63	63.76
5.2750	62.87	62.00	61.12	60.24	59.37
5.4000	58.49	57.61	56.74	55.86	55.07
5.5250	54.82	54.78	54.71	54.60	54.47
5.6500	54.31	54.13	53.92	53.69	53.44
5.7750	53.17	52.88	52.58	52.28	51.96
5.9000	51.64	51.32	50.98	50.65	50.30
6.0250	49.96	49.60	49.24	48.88	48.43
6.1500	47.80	47.00	46.04	44.93	43.68
6.2750	42.29	40.77	39.13	37.34	35.46

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0250 hrs
Time on left represents time for first value in each row.

Time hrs					
6.4000	33.44	31.35	29.39	27.46	25.61
6.5250	23.88	22.20	20.47	18.87	17.40
6.6500	16.04	14.15	12.40	10.86	9.52
6.7750	8.34	7.30	6.40	5.60	4.91
6.9000	4.12	3.32	2.67	2.15	1.73
7.0250	1.39	1.12	.90	.73	.58
7.1500	.47	.38	.30	.24	.20
7.2750	.16	.13	.10	.08	.07
7.4000	.05	.04	.03	.03	.02
7.5250	.02	.01	.01	.01	.01
7.6500	.01	.00	.00	.00	.00

Index of Starting Page Numbers for ID Names

----- D -----
DET. POND... 7.01, 9.01
DET. POND IN 100... 9.08
DET. POND OUT 100... 5.01, 6.01,
9.11, 9.12, 9.13

----- O -----
OUT 10 100... 4.01
Outlet 1... 8.01, 8.04, 8.30

----- R -----
RATHYDRO HG 100... 3.01
ROUTE 10 100... 9.15

----- W -----
Watershed... 1.01, 2.01, 2.02, 2.03

SECTION 10B:
DETENTION BASIN OUTLET HYDRAULIC CALCS

BASIN OUTLET PIPE
Worksheet for Pressure Pipe

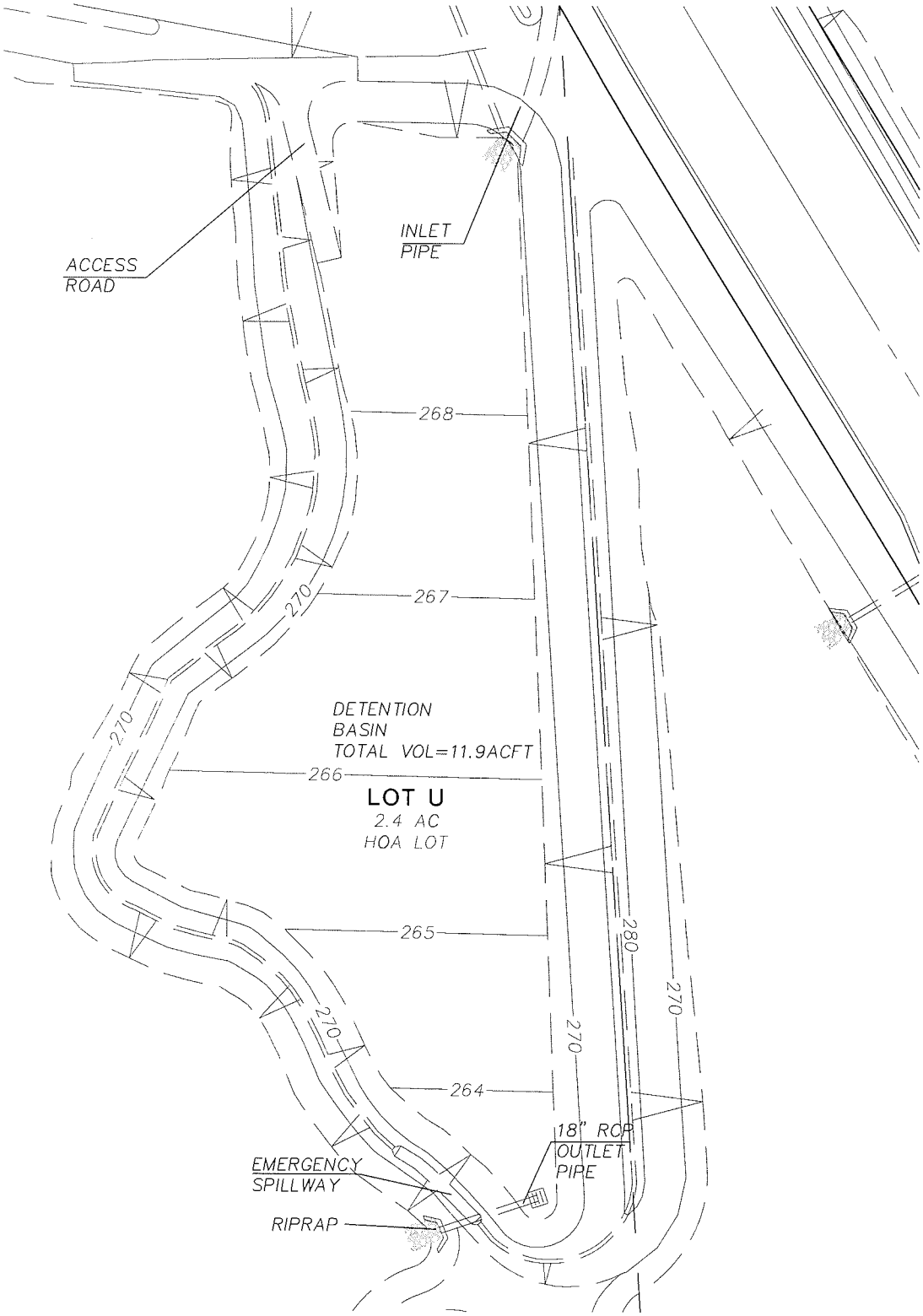
Project Description	
Worksheet	DET BASIN OUTLET 1
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Discharge

Input Data		
Pressure at 1	10.00	feet H20
Pressure at 2	9.40	feet H20
Elevation at 1	264.00	ft
Elevation at 2	262.60	ft
Length	72.00	ft
C Coefficient	140.0	
Diameter	36.0	in

Results		
Discharge	157.13	cfs
Headloss	2.00	ft
Energy Grade at 1	281.68	ft
Energy Grade at 2	279.68	ft
Hydraulic Grade at 1	274.00	ft
Hydraulic Grade at 2	272.00	ft
Flow Area	7.1	ft^2
Wetted Perimeter	9.42	ft
Velocity	22.23	ft/s
Velocity Head	7.68	ft
Friction Slope	2.78	%

SECTION 10C:
PRELIMINARY DETENTION BASIN DESIGN

PRELIMINARY DETENTION BASIN DESIGN



J.N.:

SECTION 11:
SUMMARY

STORMWATER VOLUMES AT POINTS OF DISCHARGE & INTEREST (see Hydrology Maps for Node locations):

DISCHARGE FROM PROJECT SITE PER AES RATIONAL ANALYSIS AND PONDPACK DETENTION BASIN ANALYSIS (SECTIONS 4, 5, 6 & 10)

DIS-CHARGE POINT	PRE-DEVELOPMENT CONDITIONS						DIS-CHARGE POINT	POST-DEVELOPMENT CONDITIONS						PROPOSED MITIGATION
	C	Tc	I	A	V	Q		C	Tc	I	A	V	Q	
Node 108 Upstream of ex. 5'x8' culvert crossing Pankey Rd, (north)	0.35	18.3	4.0	287.6	5.1	420.9	Node 170 Upstream of ex. 5'x8' culvert crossing Pankey Rd, (north)	0.41	16.1	4.4	148.2	9.8	270.9	Discharge into existing lined culvert, runoff rate decreased, no mitigation required.
Node 204	0.35	15.3	4.5	56.1	5.2	88.1	Node 407	0.35	13.7	5.2	105.3	25.9	212.2	Riprap will be placed at outlet to minimize erosion and to dissipate flows. The increase in runoff is due to a temporary diversion of flows to this point. Further mitigation to increased runoff to occur downstream at proposed detention basin.
Node 303	0.35	17.2	4.1	32.1	5.0	46.6	N/A*							
Node 402	0.35	21.8	3.6	142.9	6.1	178.3	N/A*							
Node 502	0.35	21.8	3.6	86.7	6.1	108.3	N/A*							
Node 601	0.35	19.4	3.8	106.5	5.6	147.0	327	0.35	14.3	4.7	21.2	9.0	35.2	Riprap will be placed at outlet to minimize erosion and to dissipate flows. The decrease in runoff is due to a temporary diversion of flows to this point. The diverted runoff is carried in the proposed storm drain main in Horse Ranch Road and into the proposed detention basin
Node 703	0.35	25.8	3.2	14.6	4.1	16.3	N/A*							

* The remainder of the post-development on-site runoff is diverted within the proposed storm drain system in Horse Ranch Creek Road, through the proposed detention basin and discharges offsite upstream of the existing Pankey Road (N) bridge and confluences with the runoff in Horse Ranch Creek. See Section 8 for detailed hydrology analysis of the entire Horse Ranch Creek watershed.

DISCHARGE FROM PROJECT SITE COMBINED WITH HORSE RANCH CREEK RUNOFF PER HEC HMS ANALYSIS (SECTION 8)

DIS-CHARGE POINT	PRE-DEVELOPMENT CONDITIONS						POST-DEVELOPMENT CONDITIONS						PROPOSED MITIGATION
	CN	Peak time (hr.)		A (ac)	V* (fps)	Q (sfc)	Cn			A	V*	Q	
Downstream of ex. 5'x8' culvert crossing Pankey Rd, (north)	88.6	16:45		5850	13.1	8111	88.7	16:45		5848	13.1	8168	Discharge into existing lined culvert, no mitigation required.
Upstream of existing Pankey Road (N) Bridge	86.4	17:05		7343.4	0.84	8802	89.7	17:05		7343.4	7.6	8800	Discharge into existing natural channel,. runoff rate decreased, no mitigation required
Upstream of existing Pala Road Bridge	86.4	17:05		7343.4	8.0	8802	89.7	17:05		7343.4	7.9	8800	Discharge into existing unlined channel, runoff rate decreased, no mitigation required.
Upstream of existing Pankey Road (S) Bridge	86.4	17:05		7343.4	9.4	8802	89.7	17:05		7343.4	9.3	8800	Discharge into existing unlined channel, runoff rate decreased, no mitigation required.

*** Per HECRAS analysis (Section 9)**

As previously discussed, it was assumed and expected that any development upstream from this project (which contributes to Horse Ranch Creek) would have to detain, treat and release the post-development 100-year storm waters such that the quantity, quality and discharge rate, time, location & concentration would substantially resemble the pre-development conditions.

It is expected that the proposed surrounding developments (TM 5354 and TM 5424 and proposed Palomar College) would adhere to the regulation set forth by the San Diego County Drainage Design Manual Section 6.2.1, " ..a detention basin may be required to reduce peak flows to the capacity of the existing downstream facility." The County of San Diego has further stipulated that no increase in runoff is allowed to be discharged from a proposed development and that detention facilities are required for any development to regulate the discharge rate to that under the pre-development conditions. Thus, it is anticipated that the surrounding developments will design their own detention facilities on-site to mitigate their overall discharge such that no adverse affect will occur to downstream drainage facilities, particularly, the existing culvert under Pankey Road (north) and the existing bridge under crossing on Pankey Road (north/south) & SR-76.

Therefore, we did not analyze the post-development conditions for the upstream watersheds – only the existing upstream conditions were considered. Due to our assumption that the proposed upstream projects would have to mitigate any increases in peak runoff back to pre-development levels, it was assumed that any increase in post-development runoff from the three proposed surrounding developments (TM 5354, TM 5424, and proposed Palomar College) would be insignificant and, therefore, was not considered in this report.

At the first discharge point exiting this project (at the existing 5'x8' box culvert under Pankey Road), the pre-development runoff at Node 108 (i.e. 420.8 cfs) is significantly greater than the post-development runoff at Node 107 (i.e. 270.9 cfs). This was primarily due to the temporary diversion of a portion of the watershed

upstream of the box culvert (Bypass Basin 400) that was diverted around the box culvert for water quality consideration. Due to the fact that this existing box culvert was operating under pressure during the existing 100-year runoff storm, this diversion actually allows the existing box culvert to flow under capacity (see the post-development condition pressure flow analysis and headwater depth nomograph in Section 9). Since the diversion only occurs within the project boundary and for only 465' before it joins the historical flow pattern, the impacts are minimal and require no mitigation. Based upon the tail water analysis (in Section 9D), the existing culvert has a capacity of 2136 cfs, even with the outlet under water. The tail water surface elevation is per the HECRAS analysis in Section 9. The required water depth at upstream is 3.3 feet, the upstream water surface elevation is 348.3 which is approximately 7.3'-which is approximately 10.4' lower than the proposed Horse Ranch Creek Road street elevation.

As the runoff exits the existing 5'x8'box culvert, it confluences with the existing upstream Horse Ranch Creek watershed. As mentioned previously, the pre and post-development runoff rates used for Horse Ranch Creek were based upon the HEC HMS program calculations from Section 8 of this report. Based upon this program, the post-development runoff volumes at this point of interest are only 9 cfs more than the pre-development due to the above referenced temporary diversion, thereby, offsetting the increased runoff due to the increased impervious areas upstream of the box culvert. Based upon the HEC-RAS analysis of the existing Horse Ranch Creek channel (constructed by Caltrans), this portion of the existing channel is adequate to handle both the pre and post-development runoff volumes without exceeding the capacity of the channel. Therefore, there are virtually no impacts from the proposed project to this section of the existing channel and the defined channel appears to convey the proposed runoff effectively without harm to surrounding properties.

Based upon the HEC-RAS analysis of the pre and post-development conditions for Horse Ranch Creek (from Stations 62+41 thru 119+75), the water surface elevation and floodplain limits are nearly the same through this section of Horse Ranch Creek. The existing Caltrans channel can adequately handle both the pre and post–development runoff volumes to Section 102+84 where it gradually starts to lose capacity. The runoff breaches the left bank and sheet flows onto the Horse Ranch Creek flood plain. The Caltrans' channel ends approximately 1600 feet further to the south and the runoff is discharged onto the Horse Ranch Creek flood plain. The HECRAS analysis demonstrates that the Caltrans channel gradually loses capacity towards the end of the channel under the pre-development conditions. The post development runoff at the section of the channel where the breach happens is slightly less than that of the pre-development conditions due to the temporary on-site diversion of discharge into the channel along the proposed Horse Ranch Creek Road where most of the on-site discharge is conveyed in the proposed storm drain system in the proposed roadway and discharged into the proposed detention basin analyzed in Section 10. Therefore, the proposed project has no significant impacts to this section of the existing channel and will not alter the existing drainage and hydraulics of the existing channel. Thus no mitigation is required.

As the existing defined channel of Horse Ranch Creek flows further south from the existing 8'x5' culvert (for about 4,000'), the channel banks flatten out and Horse Ranch Creek re-enters the project boundary spreading out across a wide, shallow section of the creek. The majority of the runoff from proposed Basin 200, which historically sheet-flowed westerly over a wide reach of the creek, is diverted in the proposed underground storm drain system to the most southwesterly corner of Basin 200 (at Node 2185) and then, discharges into the creek. The diversion caused by the proposed storm drain system only occurs on-site and will not adversely impact surrounding properties. The post-development condition and capacity condition do not cause an noticeable increase in the water surface elevation until downstream of Station 81+91. The grading proposed in the post-development condition will constrict the floodplain width and, thereby, cause the Horse Ranch Creek water surface elevation to increase between Stations 34+47 and 81+91 under the post-development conditions. The maximum water surface elevation increase is about 4.36' that occurs at section 45+83 as the runoff is backup by the raised Pankey (N) bridge and constricted by the proposed Pankey Place and the berms of the proposed detention basin and percolation pond. This water surface elevation increase will cause additional flooding in the adjacent westerly properties. However, this property is currently vacant and the proposed project planned for this area (Campus Park West - TM 5424) would not be adversely affected by this additional flooding. To

mitigate for this additional flooding, this project will obtain permission from the property owners to allow this additional flooding. No flooding will occur to any existing or proposed streets. No further mitigation measures are proposed for the additional flooding in this area.

In order to mitigate for the overall project's increased runoff volumes, the 100-year peak runoff will be detained in a proposed detention basin just south of the Multi-family-1 site (Lot 539). Based on the Pondpack detention basin analysis in Section 10, the proposed detention basin provides approximately 12.0 acre-feet of storage volume. The basin overtops at the spillway at around 3.1 hours at the peak time. Based on the HEC HMS watershed and flood routing analysis in Section 8, the detention basin will reduce the overall discharge from the site that reaches the downstream Pankey Road and Pala Road Bridges to 8800 cfs, 2 cfs less than the pre-development conditions' 8802 cfs.

Also, based upon the HEC-RAS calculations in Section 9, the post-development water surface elevation essentially returns to pre-development water surface elevation levels at Station 28+46, down stream of the Pankey Bridge (north) prior to Horse Ranch Creek leaving the project boundary. Based upon the HECRAS bridge hydraulics analysis in Section 9A, the Pankey (N) bridge is overtopping under the pre-development conditions. The runoff from Horse Ranch Creek will overtop the bridge and flow across the southerly portions of the the existing Pankey Road. The bridge deck and roadway will be raised to accommodate the peak discharge through the bridge opening without overtopping the roadway. The Pankey (N) bridge will be raised to have a bottom deck elevation of 273.5. Per the capacity analysis in Section 9C and bridge hydraulic analysis in Section 9D, the water surface elevation at the upstream of the bridge is 272.5, the bridge deck will have a 1' of free board.

Although this project requires some grading within the Horse Ranch Creek floodplain (with the construction of MF-3 site, MF-4, Pankey Place, etc.), the negative impacts of that grading can be mitigated in several ways. The grading operation in the floodplain should not occur during the rainy season so that the grading and storm drainage facilities can be constructed without floodwater intrusion. Once the grading operation is completed, the exposed dirt should be immediately hydroseeded, planted and irrigated to allow the most time for soil stabilization and to minimize erosion and silt from leaving the project site. Riprap slope protection (or equivalent) should be installed to one foot above proposed 100-year water surface elevations immediately after the grading within the floodplain to protect manufactured slope embankments which are exposed to flood waters within Horse Ranch Creek.

During construction, there is always the likelihood of erosion and siltation within existing drainage courses. To mitigate for this likelihood, the amount of disturbed areas should be limited so that proper erosions control measures can be installed and any soil movement can be contained. The perimeter of the disturbed area should be contained with silt fences and/or gravel bags to prevent the movement of soil away from the disturbed areas. After every storm event, the erosion control measures should be checked and cleaned of any debris so that they operate efficiently for the next storm event. All erosion control personnel should be properly trained. If construction BMP's and water quality procedures (as outlined in the County's current codes) are followed, the impacts due to construction activities should be properly mitigated for.

Post-construction, all finished slopes should be planted and irrigated as soon as possible after they are completed and all pad areas should be properly stabilized with bonded fiber matrix or similar products. Compliance with the requirements outlined in the County's current grading ordinance should adequately mitigate for these potential impacts. Where underground storm drain pipes outlet into natural terrain, riprap energy dissipaters (or similar devices) should be installed at the pipe outlet to dissipate and slow down concentrated storm water in order to prevent erosion of soil in front of the outlet points and to return the concentrate flows to their pre-development flow patterns as quickly as possible. Also, riprap slope protection (or equivalent) should be placed behind culverts at least one foot above the required headwater depth and at least one foot above floodwater depths on slopes facing floodplains. The riprap slope protection will mitigate any potential soil loss from slope scowering from floodwaters.

There is an existing, off-site, public 12” sewer main (maintained by the Rainbow Municipal Water District) along the westerly boundary of this project which currently sits within the limits of the existing and proposed Horse Ranch Creek floodplain limits. To mitigate for the impacts of the floodplain, watertight manhole covers should be installed (unless they already have them). However, since this project does not propose to utilize this sewer main and is not exposing more of the sewer main to flood waters, the Rainbow Municipal Water District should be responsible for these upgrades.

FLOOD PLAIN:

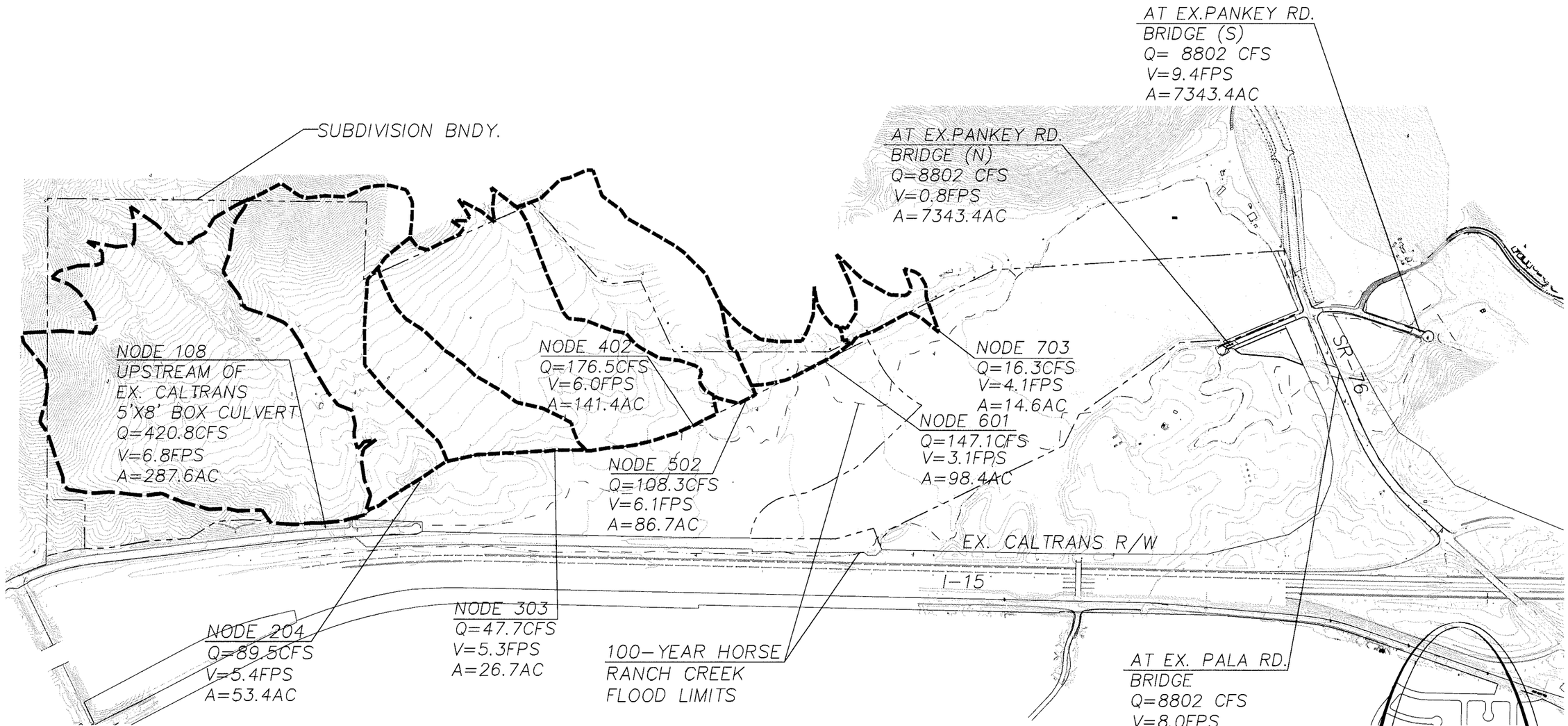
Based on the HEC-RAS analysis presented in Section 9 of this report, from cross sections 51+34 to 36+46, ineffective flood areas were modeled for the areas between the easterly project boundary and the proposed Horse Ranch Creek Road, northerly and southerly of the proposed Pankey Place. The two areas will remain undisturbed.

The area northerly of proposed Pankey Place will be flooded once the flood water in Horse Ranch Creek reaches the 20’ wide gap between the proposed berms of the detention basin and perc pond. The area southerly of proposed Pankey Place will also be flooded once the flood water from Horse Ranch Creek floods the northerly area. A proposed culvert crossing under Pankey Place will allow the flood water from the northerly area to flow into the southerly area. Although this will flow will be reverse from normal, it will occur due to the water surface elevation differential on each side of Pankey Place. As the flood water in Horse Ranch Creek recedes, the floodwaters in these two areas will slowly drain out into the Horse Ranch Creek through this proposed culvert crossing and the through the proposed 20’ gap between the detention basin & perc pond. Even though the easterly portion of the proposed Pankey Place, between Horse Ranch Creek Road and the detention basin/perc pond, will effectively hold back flood water from Horse Ranch Creek, it is not considered a levee since this condition will be temporary until the water surface elevation on each side of Pankey Place balances through the proposed culvert crossing. Per the technical memorandum in the Appendix, dated September 10, 2008, the Federal Highway Administration (FHWA) states that certifying or, otherwise, designating roadway embankments as levees is not acceptable since the embankment of the roadway, in this case, Pankey Place, is not designed to perform as a levee or other flood control facility. In the unlikely event that the roadway fails due to flooding from Horse Ranch Creek, the flood water will breach the roadway and flood an natural area that was already inundated under the pre-development conditions.

Furthermore, these areas northerly and southerly of Pankey Place, between Horse Ranch Creek and the detention basin/perc pond, will be designated as within the 100-year flood limits under both the pre and post conditions (even though the only represent ineffective flow areas). Therefore, any future development within these two areas will have to conform to the regulations and ordinances governing land development within floodplains and there should be no harm to any people or property.

SECTION 11A:
PRE AND POST DEVELOPMENT PROJECT DISCHARGE POINT SUMMARY EXHIBITS

PROJECT DISCHARGE POINT SUMMARY EXHIBIT
CAMPUS PARK

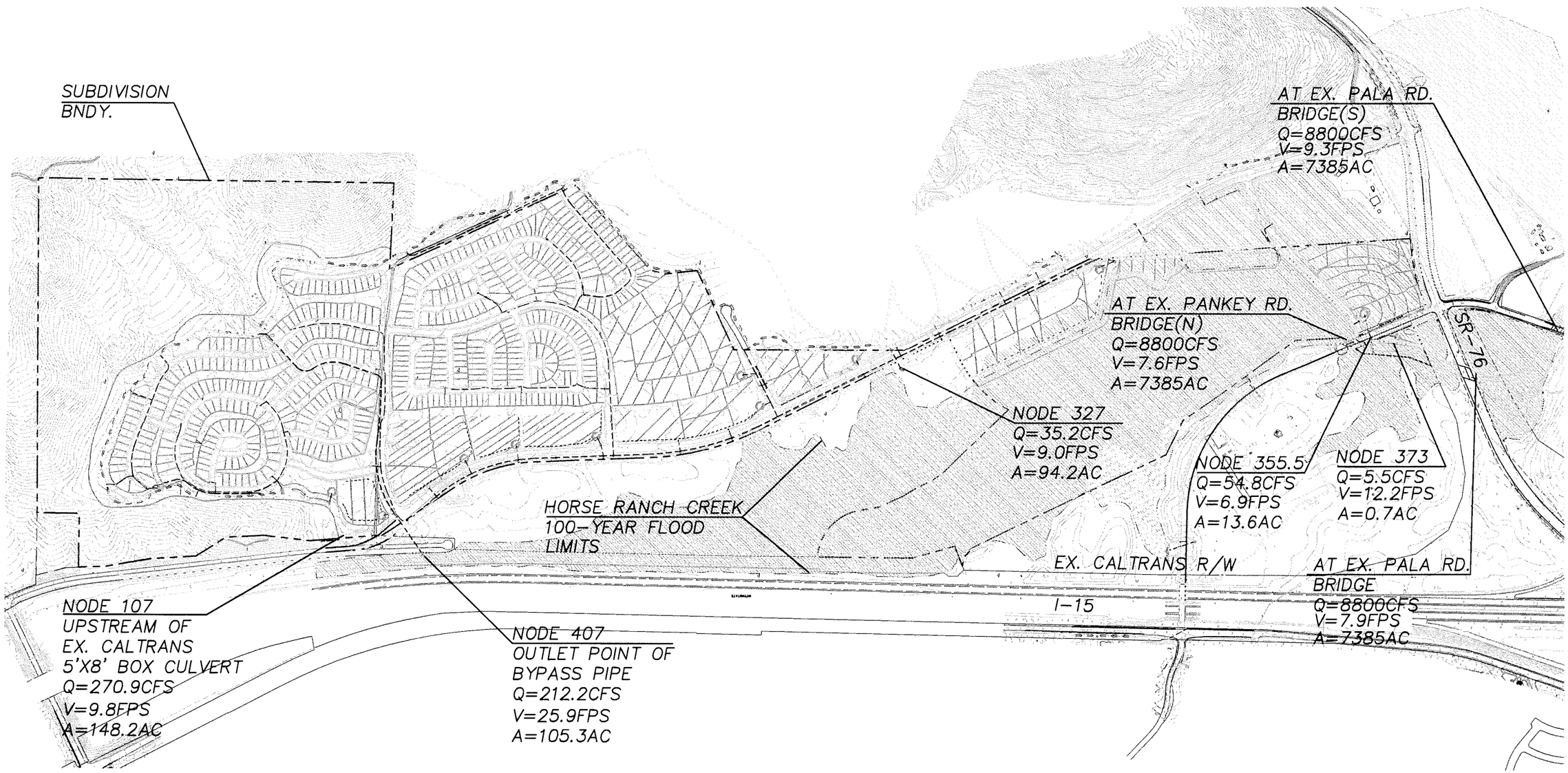


PRE-DEVELOPMENT CONDITIONS

LANDMARK
CONSULTING
PLANNING•ENGINEERING•SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

J.N.:

PROJECT DISCHARGE POINT SUMMARY
CAMPUS PARK



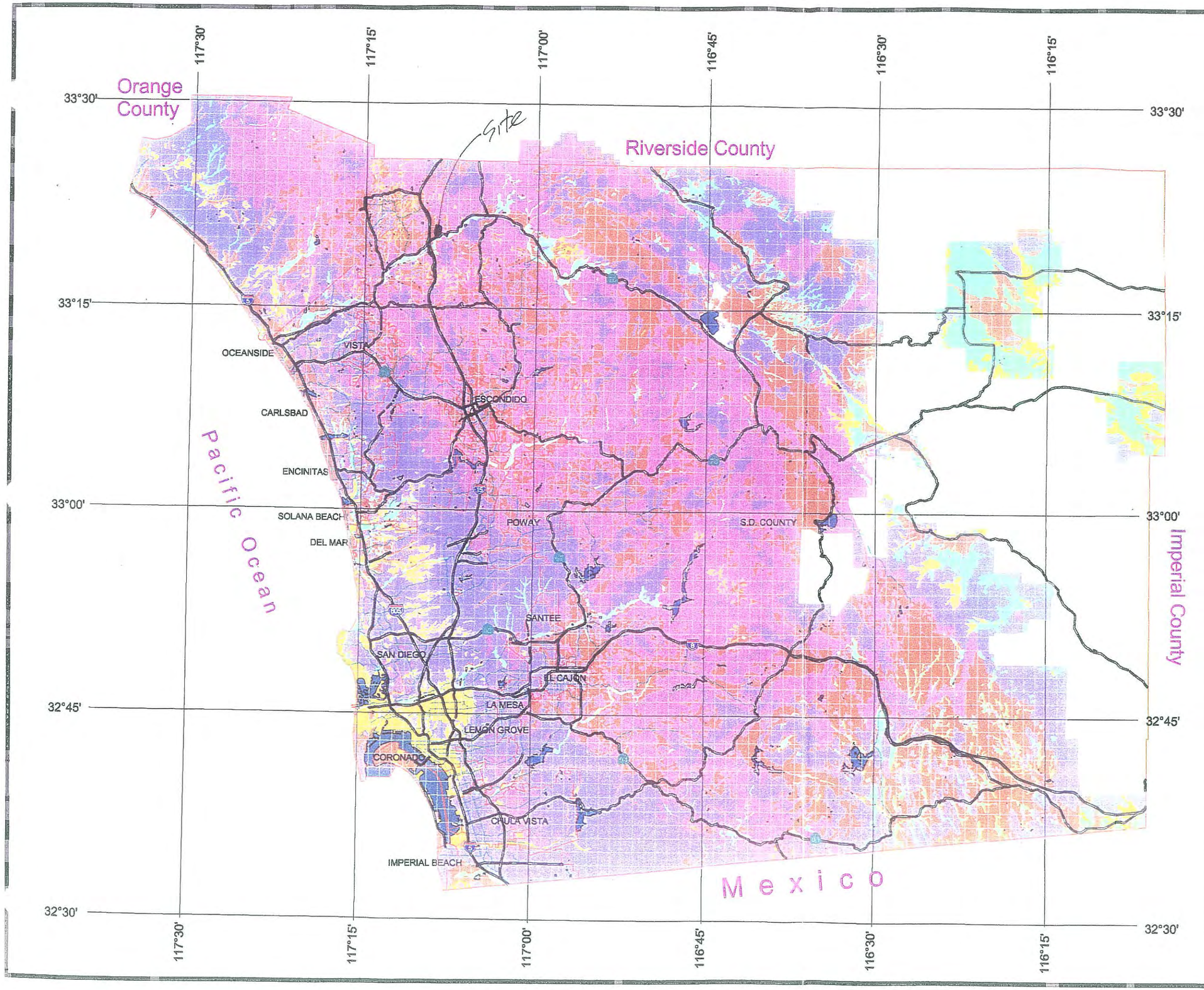
POST-DEVELOPMENT CONDITIONS

J.N.:

SECTION 12:
APPENDIX

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

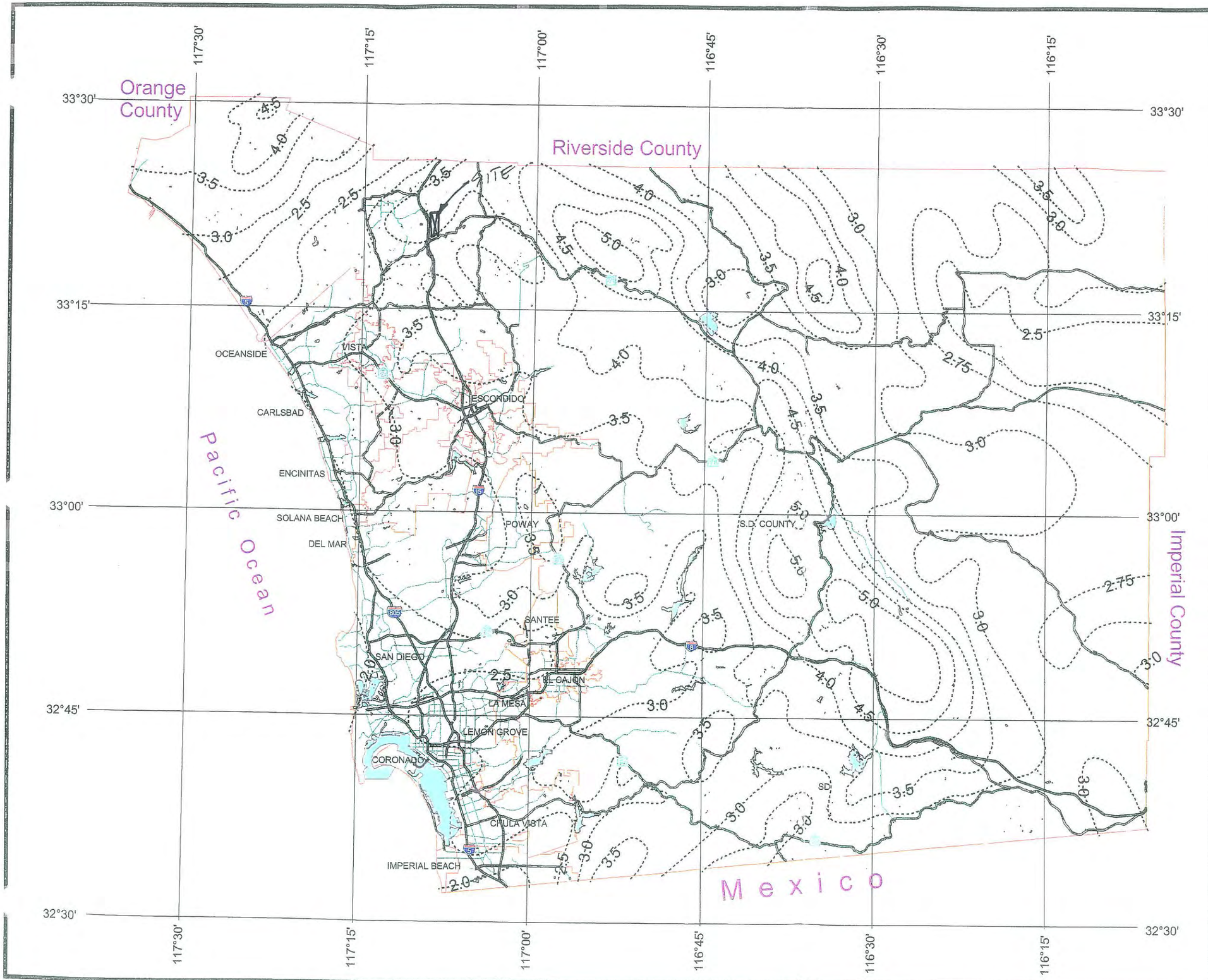
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

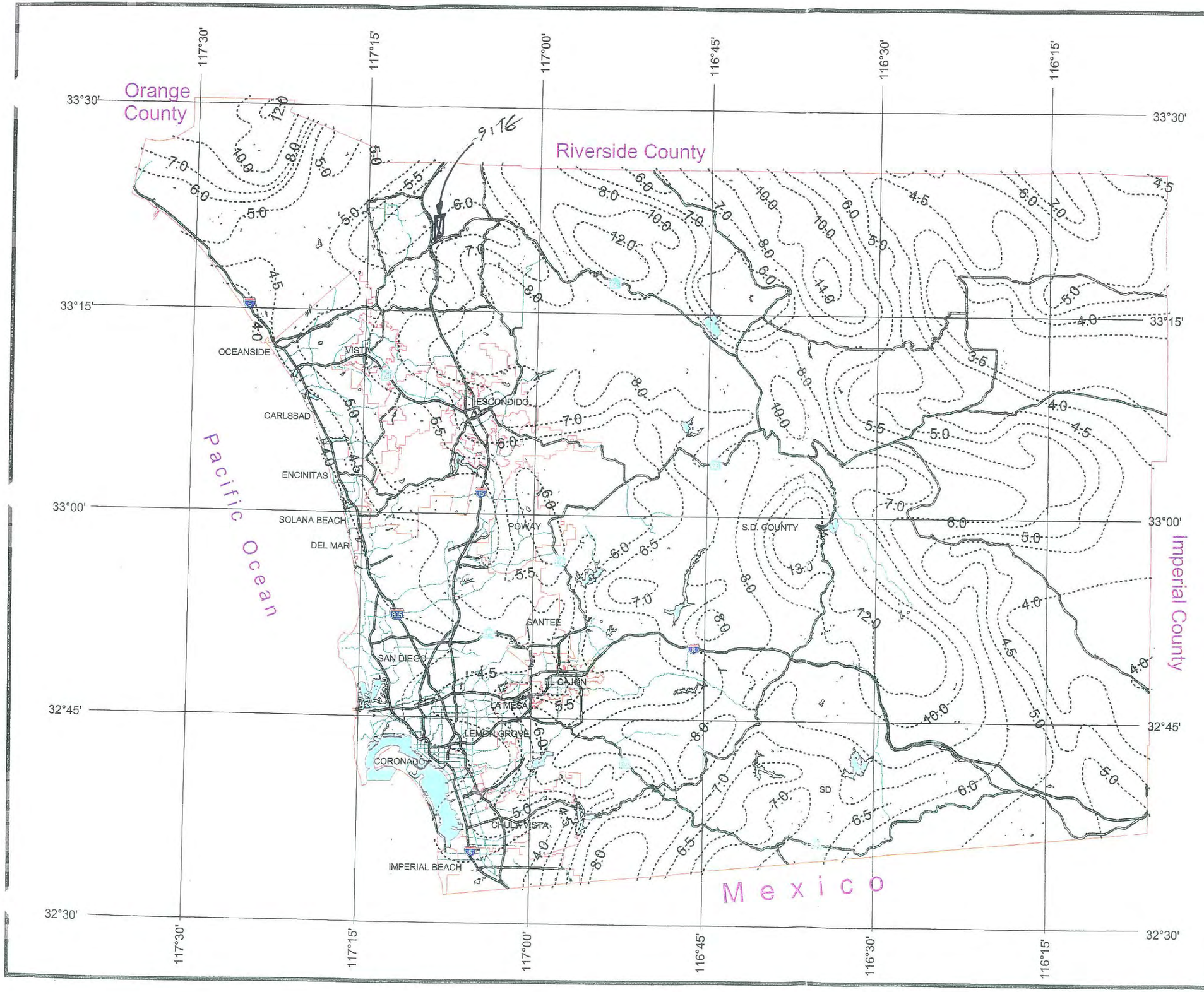
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)



DPW GIS
Department of Public Works Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

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

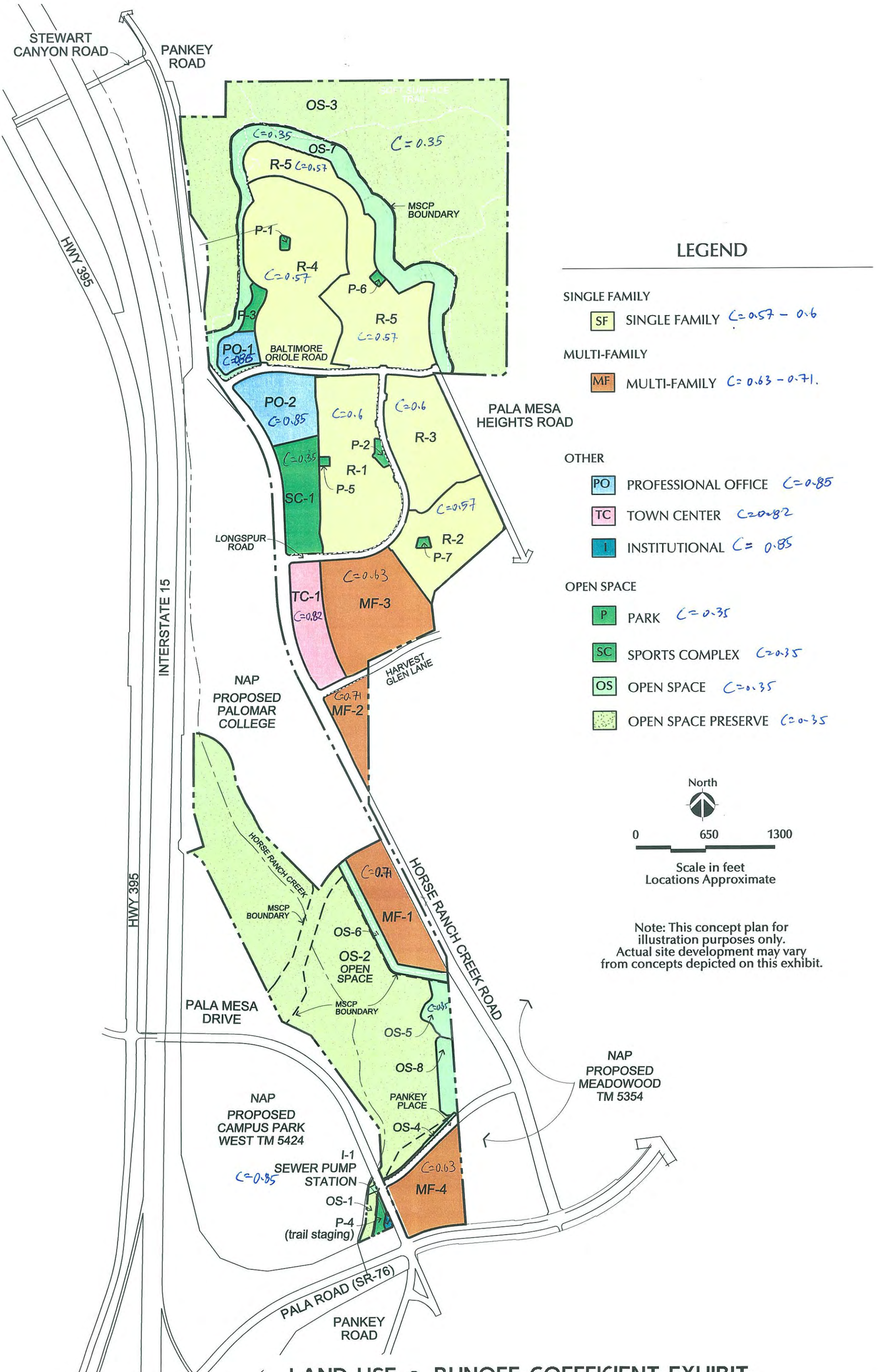
*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area 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

LANDUSE SUMMARY AND C VALUE CHART

Land Use	Planning Area	Description	Acreage (gross)	Acreage (net)	Units	Gross Density (Du/Ac.)
Single Family						
Single Family	R-1	Single Family	23.4		136	5.8
Single Family	R-2	Single Family	14.7		75	5.1
Single Family	R-3	Single Family	16.7		64	3.8
Single Family	R-4	Single Family	31.8		122	3.8
Single Family	R-5	Single Family	27.2		124	4.6
	Subtotal Single Family		**113.8**		**521**	
Multi-Family						
Multi-Family	MF-1	Multi Family	10.8	9.5	192	17.8
Multi-Family	MF-2	Multi Family	5.3	4.2	66	12.5
Multi-Family	MF-3	Multi Family	19.0	16.9	189	9.9
Multi-Family	MF-4	Multi Family	10.3	9.3	108	10.5
	Subtotal Multi Family		**45.4**	**39.9**	**555**	
	Total Residential		**159.2**		**1,076**	
Commercial						
Town Center	TC-1	Town Center	8.1	6.7		62,000
	Subtotal Commercial		**8.1**	**6.7**		**62,000**
Professional Office						
Professional Office	PO-1	Professional Office	2.7	2.6		40,000
Professional Office	PO-2	Professional Office	8.8	7.4		117,000
	Subtotal Professional Office		**11.5**	**10.00**		**157000**
Parks and Open Space						
Park	P-1	Park (HOA)	0.3			
Park	P-2	Park (HOA)	0.5			
Park	P-3	Park (HOA)	1.2			
Park	P-4	Trail Staging Area	0.6			
Park	P-5	Park (HOA)	0.2			
Park	P-6	Park (HOA)	0.3			
Park	P-7	Park (HOA)	0.3			
Sports Complex	SC-1	Active Sports Park	8.5			
Open Space	OS-1	Open Space Preserve	1.1			
Open Space	OS-2	Open Space Preserve	81.0			
Open Space	OS-3	Open Space Preserve	93.7			
Open Space	OS-4	Open Space	0.5			
Open Space	OS-5	Detention Basin	2.4			
Open Space	OS-6	Open Space	3.1			
Open Space	OS-7	Open Space	19.1			
Open Space	OS-8	Detention Basin	2.6			
	Subtotal Parks & Open Space		**215.4**			
Other						
Institutional	I-1	Sewer Pump Station	0.2			
Major Circulation		Roads	21.7			
	Subtotal Other		**21.9**			
	Grand Total		***416.1***			

Notes:
1. Includes HOA open space lots shown on T.M.
2. Gross acreage includes internal neighborhood streets
3. A portion of OS-1 (.1 acres) contains an access easement to adjoining property to west

SITE	REQUIRED C VALUE	USED C VALUE
MF1	0.71	0.71
MF2	0.63	0.71
MF3	0.6	0.63
MF4	0.6	0.63
R1	0.57	0.6
R2	0.57	0.57
R3	0.52	0.6
R4	0.52	0.57
R5	0.57	0.57
PROFESSIONAL OFFICE	0.85	0.85
TOWN CENTER	0.79	0.82
PUMP STATION	0.85	0.85
PARK	0.35	0.35
SPORTS COMPLEX	0.35	0.35
OPEN SPACE	0.35	0.35
OPEN SPACE PRESERVE	0.35	0.35



LAND USE & RUNOFF COEFFICIENT EXHIBIT

Project	Campus Park	**Date**	5/12/09
Client	Landmark Consulting		
Subject	Basin Lag Calculations		

$$T_l = 24 \cdot \bar{n} \cdot \left(\frac{L \cdot L_c}{s^{0.5}} \right)^m$$

Where: T_l = Army Corps of Engineers' Lag Time (hrs)
n = Average Manning's n for watercourse
L = Length of longest watercourse (miles)
L_c = Length along longest watercourse to point opposite centroid (miles)
s = Overall slope of drainage area (feet per mile)
m = Regional constant, equal to 0.38 for San Diego County

Lag Time Calculations

Basin	Upper Elev. (ft)	Lower Elev. (ft)	Length (ft)	Length (mi)	Slope (ft/mi)	Length to Centroid (ft)	Length to Centroid (mi)	Basin "n" Value*	Lag (min)
A	Rational Method Tc at Node 115 (Offsite Study) = 84.2 min, Lag=80% of Tc (Eq 4-24) =								67.4
	1930	340	27171	5.15	309	9854	1.87	0.059	67.4
C	880	270	10603	2.01	304	3403	0.64	0.050	26.8

Onsite	Rational Method Tc at Node 322 (Onsite Study) = 18.3 min, Lag=80% of Tc (Eq 4-24) =	14.6

(*) Note: Basin "n" value for AB was determined so that the Lag was equal to the Rational Method based Lag. Rational Method time of concentration was determined using Manning's "n" of 0.08 for winding channels with weeds and brush for upper reaches, and lower values through golf course. Upper reaches of C are similar to AB, but lower portion is golf course, leading to a lower Basin "n". Lag for Basin C, pre- and post-development was assumed to be equal.

Table A-3

Table A-3 Average Manning Roughness Coefficients for Small Open Channels Conveying Less than 50 cfs[4]

	Design Flow Depth		
Lining Type	**0 – 0.5 ft**	**0.5 – 2.0 ft**	**> 2.0 ft**
Concrete (Poured)	0.015	0.013	0.013
Air Blown Concrete	0.023	0.019	0.016
Grouted Riprap	0.040	0.030	0.028
Stone Masonry	0.042	0.032	0.030
Soil Cement	0.025	0.022	0.020
Bare Soil	0.023	0.020	0.020
Rock Cut	0.045	0.035	0.025
Rock Riprap	Based on Rock Size (See Section 5.7.2)		

Table A-4

Table A-4 Average Manning Roughness Coefficients for Larger Open Channels

Unlined Channels	
Clay Loam	0.023
Sand	0.020
Lined Channels	
Grass Lined (Well-Maintained)	0.035
Grass Lined (Not Maintained)	0.045
Wetland-Bottom Channels (New Channel)	0.023
Wetland-Bottom Channels (Mature Channel)	See Table A-5
Riprap-Lined Channels	See Section 5.7.2
Concrete (Poured)	0.014
Air Blown Mortar (Gunite or Shotcrete)[5]	0.016
Asphaltic Concrete or Bituminous Plant Mix	0.018

For channels with revetments or multiple lining types, use composite Manning roughness coefficient based on component lining materials.

[4] Based on materials and workmanship required by standard specifications.

[5] For air-blown concrete, use n=0.012 (if troweled) and n=0.025 if purposely roughened.

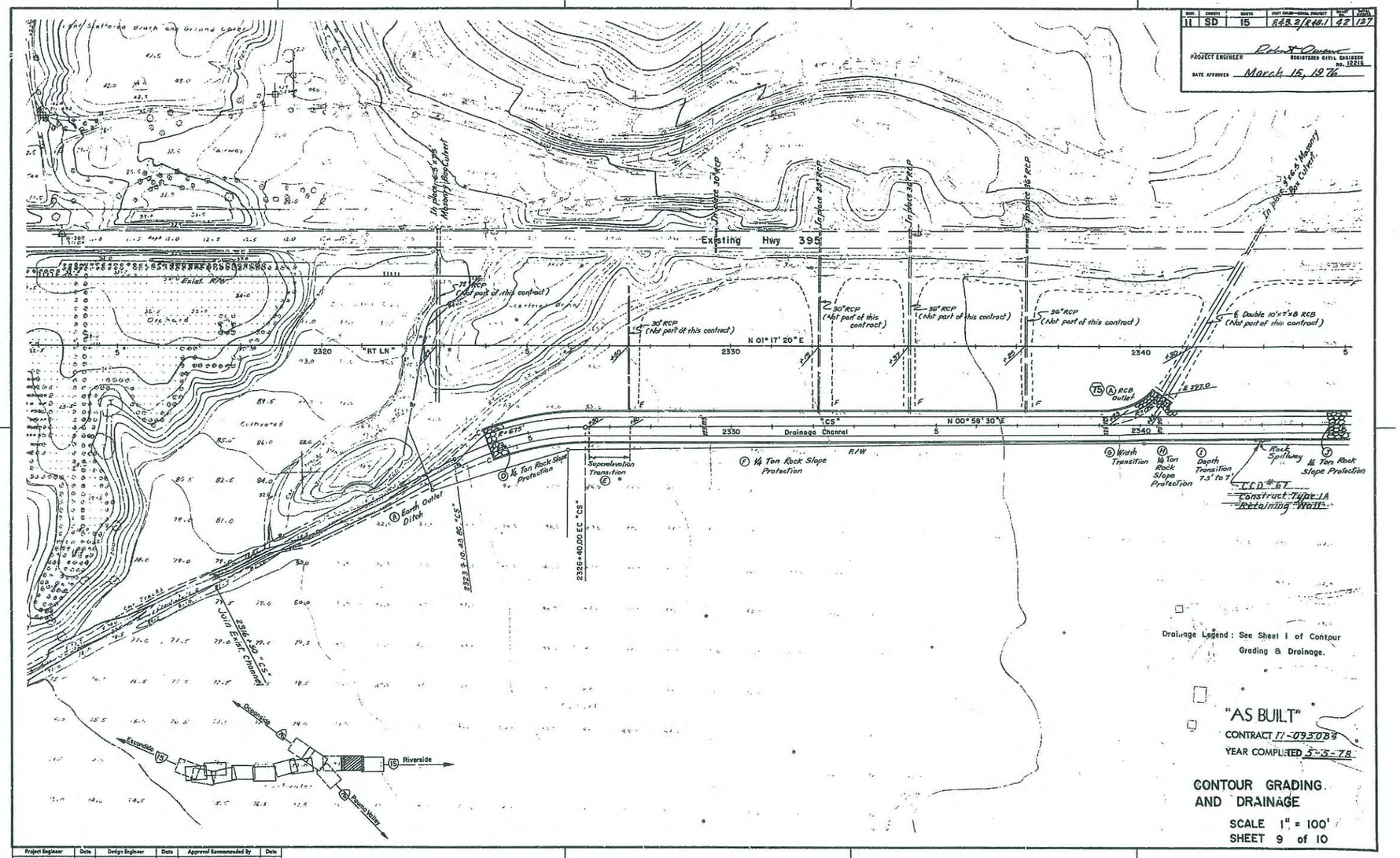
Table A-5 Average Manning Roughness Coefficients for Natural Channels

Minor Streams (Surface Width at Flood Stage < 100 ft)	
Fairly Regular Section	
(A) Some Grass and Weeds, Little or No Brush	0.030
(B) Dense Growth of Weeds, Depth of Flow Materially Greater Than Weed Height	0.040
(C) Some Weeds, Light Brush on Banks	0.040
(D) Some Weeds, Heavy Brush on Banks	0.060
(E) For Trees within Channel with Branches Submerged at High Stage, Increase All Above Values By	0.015
Irregular Section, with Pools, Slight Channel Meander Channels (A) to (E) Above, Increase All Values By	0.015
Mountain Streams; No Vegetation in Channel, Banks Usually Steep, Trees and Brush along Banks Submerged at High Stage	
(A) Bottom, Gravel, Cobbles and Few Boulders	0.050
(B) Bottom, Cobbles with Large Boulders	0.060
Flood Plains (Adjacent To Natural Streams)	
Pasture, No Brush	
(A) Short Grass	0.030
(B) High Grass	0.040
Cultivated Areas	
(A) No Crop	0.040
(B) Mature Row Crops	0.040
(C) Mature Field Crops	0.050
Heavy Weeds, Scattered Brush	0.050
Light Brush and Trees	0.060
Medium To Dense Brush	0.090
Dense Willows	0.170
Cleared Land with Tree Stumps, 100-150 Per Acre	0.060
Heavy Stand of Timber, Little Undergrowth	
(A) Flood Depth below Branches	0.110
(B) Flood Depth Reaches Branches	0.140

DIST.	COUNTY	ROUTE	POST MILES—REAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	8.4/8.2/8.4/1	42	127

PROJECT ENGINEER Robert Owens REGISTERED CIVIL ENGINEER No. 13216

DATE APPROVED March 15, 1976



Project Engineer	Date	Design Engineer	Date	Approval Recommended by	Date
R. Owens		J.M. Damberger		J. O. Grosberger	

FORM WH23A-P7

42

AS BUILT PLANS
Contract No. 11-095084
Date Completed 5-5-78
Document No. 17000 6535

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

DATE 1-28-94 SIGNATURE TITLE

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

SCALE 1" = 50' SCALE 1" = 20' SCALE 1" = 10' or 1" = 100' SCALE 1" = 40'

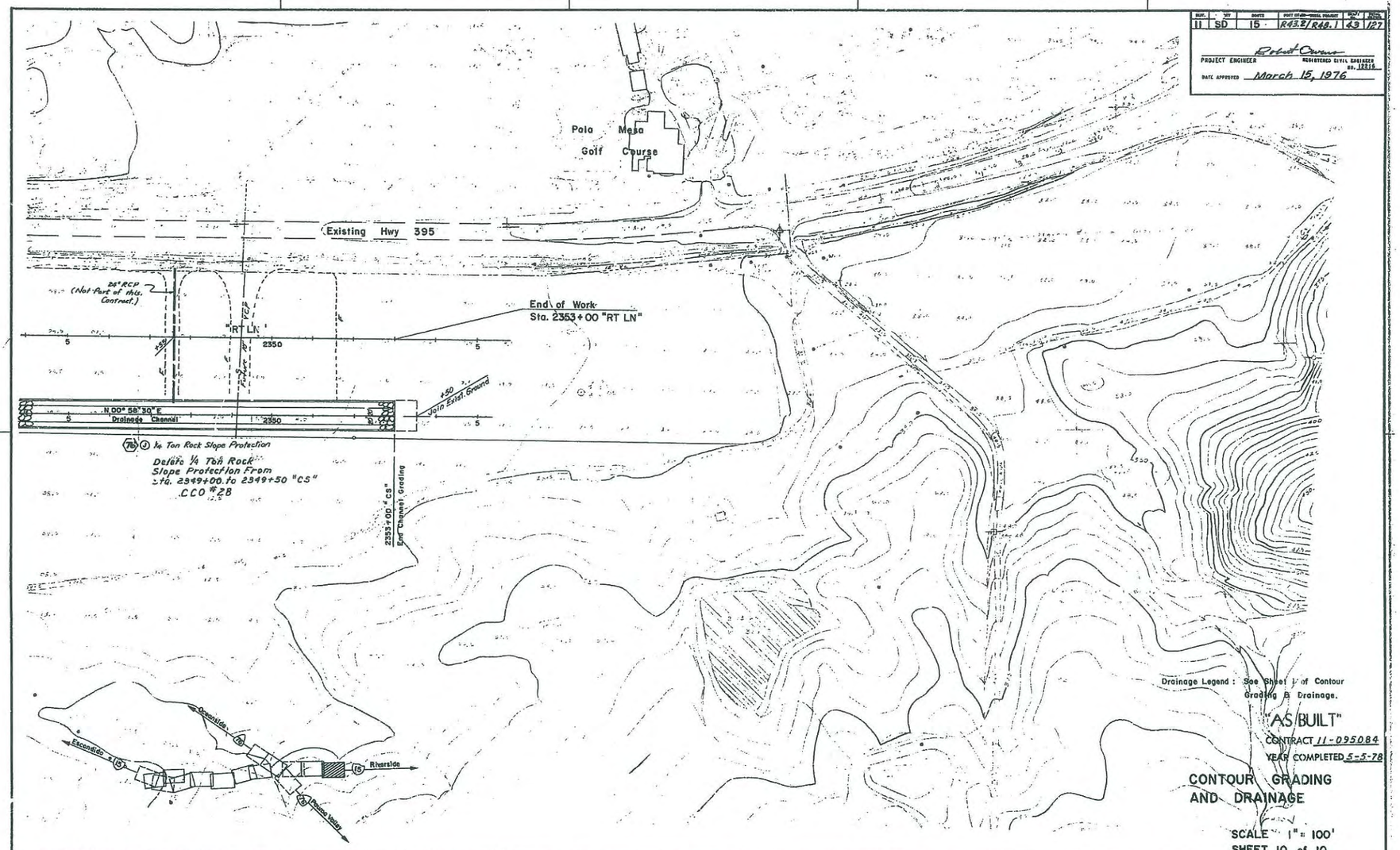
CMNL.

EX CALTRANS

DIST.	CO.	ROUTE	POST OR ABS.	SEQUENTIAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	15	R43.2/R48.1	43	127	

PROJECT ENGINEER Robert Owens REGISTERED CIVIL ENGINEER NO. 12816

DATE APPROVED March 15, 1976



Project Engineer	Date	Design Engineer	Date	Approval Recommended By	Date
R. Owens		J.M. Damberger		J.O. Grasberger	

AS BUILT PLANS
Contract No. 11-095084
Date Completed 5-5-78
Document No. A006535

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

DATE 1/28/80 SIGNATURE TITLE

FORM WH23A-PF

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **ACTION**: Highway Embankments versus Levees and other Flood Control Structures

Date: September 10, 2008

In Reply Refer To: HIBT-20

/s/ Original Signed by
From: King W. Gee
Associate Administrator for Infrastructure

To: Associate Administrator for Federal Lands
Highway Programs
Directors of Field Services
Acting Resource Center Director
Division Administrators

This memorandum provides guidance to our field offices on the distinctions between highway embankments, levees, and other flood control structures. The memorandum also provides background of why these distinctions are important and recommendations in the event that the FHWA encounters questions or issues in this area.

Background:

The Federal Emergency Management Agency (FEMA), primarily through the National Flood Insurance Program (NFIP), works with communities to determine floodplain areas threatened by flood damages and sets appropriate insurance rates for property owners within those areas. The primary means to determine the locations of these flood prone areas are through flood insurance studies (FIS) and associated flood insurance rate maps. By the time the FEMA and the communities began conducting these FIS, much of our Nation's highway system had already been constructed, including embankments within some floodplains.

Recent FEMA map modernization and levee certification initiatives have revealed that for many years some highway embankments may have been either inadvertently or incorrectly designated as levees or other flood control structures. Also, some NFIP communities incorrectly assumed that these embankments provided some level of protection. Until recently, the FHWA was unaware of such assumptions.

Furthermore, there have been recent instances where the FEMA, other floodplain regulators, and communities (hereafter referred to as 'entities') have approached State departments of transportation (DOTs) to request DOT certification of these highway embankments as levees or flood control structures. Some entities have suggested that DOTs need to retrofit these embankments into levees and do so using Federal-aid highway funds, thus allowing for certification. Many times these entities cite significant economic hardship for the community should the DOT not take such actions.

MOVING THE AMERICAN ECONOMY

The FHWA, Floodplains, and Flood Control

For over 50 years, the FHWA has been involved in the planning, design, and construction of the Interstate and other portions of the National Highway System. At times, this required placing highway embankments adjacent to or within floodplains. While the FHWA long recognized that the highway system would cross and interact with floodplains, the system was not designed or intended to serve in a flood control role.

As a consequence, the FHWA does not have flood control standards for highway embankments. However, the FHWA does have regulations and design standards that relate to the interaction of highways and bridges with floodplains. These regulations are found in 23 CFR 650 Subpart A: "Location and Hydraulic Design of Encroachments on Flood Plains."

Design of Highway Embankments

Both new and existing highway embankments reflect the following typical design philosophy and approach:

- Highway embankments do not include design features, such as an internal impervious core and freeboard, required for a levee or other flood control structures;
- The fill material used in the construction of a typical highway embankment is not a sufficient barrier against water; therefore, a highway embankment is subject to piping, seepage, and infiltration; and
- Typical highway embankment construction does not require the same level of geotechnical engineering analysis as required for flood control structures.

Role of FHWA Floodplain Regulations

The FHWA floodplain policies and regulations (23 CFR 650 Subpart A) attempt to keep encroachments (embankments) entirely out of floodplains. Where this was not feasible, regulations and practice required most Interstate embankments to be sufficiently elevated to avoid overtopping by a flood with a 2 percent chance of being exceeded in any given year. This requirement does not imply an embankment provides an additional flood control role. Instead, the intent is to prevent loss of the embankment as a result of overtopping flows associated with smaller floods.

Further differentiating how the FHWA's floodplain interaction function is distinct from a flood control role, the FHWA floodplain regulations require highway project design flows to consider potential effects on any existing flood control channels, levees, and reservoirs. In doing so, the FHWA recognizes the importance of flood control missions performed by other entities, but clearly avoids undertaking and involvement in such a mission. Typically, the Federal Agencies with such a flood control and mitigation mission and authority are the FEMA and the U.S. Army Corps of Engineers.

Risk of Failure

In developing the floodplain regulations, the FHWA did not intend that highway embankments act as a flood control structure. To the contrary, the FHWA believes that assuming such a role poses a significant risk of embankment failure.

An additional concern is that highway engineers cannot quantify the risk of failure of these embankments during a flood event. There are no cost effective means to ascertain the potential of failure associated with any given highway embankment or even relative to similarly designed highway embankments in different areas. Nor does a history of some individual embankment acting in a "flood protection" mode imply that the design is adequate for a flood control role.

Embankments and Permanent Dams

The FHWA floodplain regulations do recognize that there are times when embankments may interact with or function as permanent dams. In these cases, the FHWA has no design standards. Instead the FHWA regulations require the design have the approval of the State or Federal Agency responsible for the safety of dams or like structures within the State. Even in this case, the FHWA floodplain regulations distinguish between permanent structures and those affected during floods.

Guidance on Highway Embankments

Staff from the FHWA's Office of Bridge Technology have carefully studied the points discussed in this memorandum and believe that certifying or otherwise designating highway embankments as levees is not an acceptable practice and should be opposed for the following reasons:

- Most existing highway embankments were not designed and constructed for (and thus are ill-suited to) performing as a levee or other flood control facility;
- In such a role, highway embankments could pose a significant and unacceptable risk to the public; and subject a DOT and FHWA to an untenable position with respect to costs, liability and damages;
- Certification requires conducting a thorough engineering evaluation by groups with experience in analysis and design of flood control structures and applying standards and obtaining approval of agencies responsible for flood control structures; and
- This situation indirectly places the FHWA into a flood control role for its Federal-aid highway program. For nearly all projects, the FHWA does not have the authority to engage in flood control activities.

Therefore, the FHWA discourages DOTs in certifying highway embankments as levees or allowing any such certification by any entity. Additionally, the FHWA discourages any type of retrofit efforts as DOTs and the FHWA are not in a position to assume such a role for statutory, financial, liability, and engineering reasons.

We recommend that you and your corresponding DOT decline any certification request from any entity that may contact you on this subject. Additionally, we recommend informing the FHWA's Office of Bridge Technology, Hydraulics and Geotechnical Team (HIBT-20) of the request. The HIBT-20 staff will be available to serve as the FHWA's lead in providing assistance and guidance to your office in resolving such requests. The HIBT-20 staff has also met with FEMA headquarters staff on this issue and can provide liaison services as needed.

Please share this memorandum with your appropriate staff and with all appropriate DOT and local transportation management officials within your State.

If you have any questions or need additional information, please contact Mr. Joe Krolak at (202) 366-4611 (joe.krolak@dot.gov) or Mr. Jorge Pagán-Ortiz at (202) 366-4604 (jorge.pagan@dot.gov).

STORM WATER MANAGEMENT PLAN

Storm Water Management Plan
For Priority Projects
(Major SWMP)

The Major Stormwater Management Plan (Major SWMP) must be completed in its entirety and accompany applications to the County for a permit or approval associated with certain types of development projects. To determine whether your project is required to submit a Major or Minor SWMP, please reference the County's Stormwater Intake Form for Development Projects.

Project Name:	Campus Park – TM & Preliminary Grading Plan
Permit Number (Land Development Projects):	TM 5338 RPL6
Work Authorization Number (**CIP only**):	
Applicant:	Passerelle, LLC
Applicant's Address:	402 W. Broadway, Suite ~~2175~~ 1320 San Diego, Ca 92101
Plan Prepare By (*Leave blank if same as applicant*):	Landmark Consulting
Date:	10-14-05
Revision Date (If applicable):	~~1-24-08~~3-3-09

The County of San Diego Watershed Protection, Storm Water Management, an

d Discharge Control Ordinance (WPO) (Ordinance No. 9424) requires all applications for a permit or approval associated with a Land Disturbance Activity to be accompanied by a Storm Water Management Plan (SWMP) (section 67.806.b). The purpose of the SWMP is to describe how the project will minimize the short and long-term impacts on receiving water quality. Projects that meet the criteria for a priority development project are required to prepare a Major SWMP.

Since the SWMP is a living document, revisions may be necessary during various stages of approval by the County. Please provide the approval information requested below.

Project Stages	Does the SWMP need revisions?		If YES, Provide Revision Date
	YES	NO	
5	X		1-24-08
6	X		8-26-08
7	X		3-3-09

Instructions for a Major SWMP can be downloaded at http://www.co.sandiego.ca.us/dpw/stormwater/susmp.html.

Completion of the following checklists and attachments will fulfill the requirements of a Major SWMP for the project listed above.

PROJECT DESCRIPTION

The project is located on the northerly side of Pala Road, east of Interstate 15, west of Rice Canyon Road and south of Stewart Canyon Road, in the County of San Diego, State of California. The surrounding land uses around the project are as follows: westerly is Interstate 15, southerly is Pala Road (SR-76)/agricultural, easterly is agricultural/vacant/large parcel SFR, northerly is agricultural/large parcel SFR.

Attachment A is a vicinity map showing the general property location. The site is located on a north to south sloping topography. The terrains along the northerly and easterly boundaries are steep sloping, the mid-portion of the project is moderately sloping and the southerly end of the project is very gently sloping. The project site is located at the downstream end of an approximately 7,500 acre upstream drainage basin. An existing Caltrans channel conveys runoff from this upstream basin southerly along a portion of the westerly boundary of this project. The runoff from this upstream basin creates the Horse Ranch Creek and floodplain which eventually confluence with the San Luis Rey River to the south.

~~The project consists of approximately 415.8 areas of mixed development including 73.6 acres of single family dwelling units, 44.8 acres of multi-family dwelling units, 7.8 acres of town center development, 10.9 acres of professional office development, 0.7 acres of trail staging area, 0.1 acres of pump station area, 10.4 acres of park area, 49.8 acres of streets and 217.7 acres of open space area.~~

The project consists of approximately 416.1 acres of mixed-use development including 113.8 acres of single family dwelling units, 45.4 acres of multi-family dwelling units, 11.5 acres of professional office development, 8.1 acres of town center, 215.4 acres of parks and open space, 0.2 acres of pump station area as well as 21.7 acres of major circulation roads.

Horse Ranch Creek flows from along the westerly boundary of the project site. The upstream of the Horse Ranch Creek watershed consists of commercial and industrial developments, low-density residential developments, and the vast majority of the watershed consists of either natural or agricultural developments and existing roadways. The Horse Ranch Creek is not listed in the latest 303d list, based on the upstream development types, the anticipated pollutants are: sediments, nutrients, heavy metals, organic compounds, trash & debris, oxygen demanding substances, oil & grease, bacteria and viruses and pesticides. With the proposed on-site BMP measures, the project will not contribute additional pollutants to Horse Ranch Creek. The water quality of Horse Ranch Creek will remain the same as the pre-development conditions.

PRIORITY DEVELOPMENT PROJECT DETERMINATION

Please check the box that best describes the project. Does the project meet one of the following criteria?

Table 1

PRIORITY DEVELOPMENT PROJECT	YES	NO
Redevelopment that creates or adds at least 5,000 net square feet of additional impervious surface area	X	
Residential development of more than 10 units	X	
Commercial developments with a land area for development of greater than 1 acre	X	
Heavy industrial development with a land area for development of greater than 1 acre		X
Automotive repair shop(s)		X
Restaurants, where the land area for development is greater than 5,000 square feet	X	
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface	X	
Environmentally Sensitive Areas (ESA): All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.	X	
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff	X	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	X	
Retail Gasoline Outlets (RGO) that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	X	

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered Priority Development Projects. Parking lots, buildings and other structures associated with utility projects are subject to the WPO requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project. If you answered **YES** to any of the questions, please continue.

HYDROMODIFICATION DETERMINATION

The following questions provide a guide to collecting information relevant to hydromodification management issues.

Table 2

	QUESTIONS	YES	NO	Information
1.	Will the proposed project disturb 50 or more acres of land? (Including all phases of development)	X		If YES, continue to 2. If NO, go to 6.
2.	Would the project site discharge directly into channels that are concrete-lined or significantly hardened such as with rip-rap, sackcrete, etc, downstream to their outfall into bays or the ocean?		X	If NO, continue to 3. If YES, go to 6.
3.	Would the project site discharge directly into underground storm drains discharging directly to bays or the ocean?		X	If NO, continue to 4. If YES, go to 6.
4.	Would the project site discharge directly to a channel (lined or un-lined) and the combined impervious surfaces downstream from the project site to discharge at the ocean or bay are 70% or greater?		X	If NO, continue to 5. If YES, go to 6.
5.	Project is required to manage hydromodification impacts.	X		Hydromodification Management Required as described in Section 67.812 b(4) of the WPO.
6.	Project is not required to manage hydromodification impacts.			Hydromodification Exempt. Keep on file.

An exemption is potentially available for projects that are required (No. 5. in Table 2 above) to manage hydromodification impacts: The project proponent may conduct an independent geomorphic study to determine the project's full hydromodification impact. The study must incorporate sediment transport modeling across the range of geomorphically-significant flows and demonstrate to the County's satisfaction that the project flows and sediment reductions will not detrimentally affect the receiving water to qualify for the exemption.

STORMWATER QUALITY DETERMINATION

The following questions provide a guide to collecting information relevant to project stormwater quality issues. Please provide the following information in a printed report accompanying this form.

Table 3

	QUESTIONS	COMPLETED	N/A
1.	Describe the topography of the project area.	The site is located on a north to south sloping topography. The terrains along the northerly and easterly boundaries are steep sloping, the mid-portion of the project is moderately sloping and the southerly end of the project is very gently sloping.	
2.	Describe the local land use within the project area and adjacent areas.	The proposed land use for the site is a mix development, with 73.6 acres of single family dwelling units, 44.8 acres of multi-family dwelling units, 7.8 acres of town center development, 10.9 acres of professional office development, 0.8 acres of trail staging area, 0.1 acres of pump station area, 10.4 acres of park areas, 49.8 acres of streets and 217.7 acres of open space area. The adjacent area is of rural and vacant land.	
3.	Evaluate the presence of dry weather flow.	No dry weather flow is evident.	
4.	Determine the receiving waters that may be affected by the project throughout all phases of development (i.e., construction, maintenance and operation).	Horse Ranch Creek and San Luis Rey River and Pacific Ocean	
5.	For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern.	Pacific Ocean shoreline, San Luis Rey River. Stressor: Bacteria Indicators	
6.	Determine if there are any High Risk Areas (which is defined by the presence of municipal or domestic water supply reservoirs or groundwater percolation facilities) within the project limits.	No	X
7.	Determine the Regional Board special requirements, including TMDLs, effluent limits, etc.		X
8.	Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves.	The project area is located in climate Zone 10. The annual rainfall is 24".	
9.	If considering Treatment BMPs, determine the soil classification, permeability, erodibility, and	Type 'D' soil, low permeability when soil is thoroughly wetted. Moderate to low erodibility. No groundwater was encountered.	

	depth to groundwater.		
10.	Determine contaminated or hazardous soils within the project area.	There are no evidence of contaminated or hazardous soils within the project area.	
11.	Determine if this project is within environmentally sensitive areas as defined on the maps in Appendix A of the *County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects.*	Not Applicable	X
12.	Determine if this is an emergence project.	Not Applicable	X

WATERSHED

Please check the watershed(s) for the project.

San Juan 901	Santa Margarita 902	**San Luis Rey 903**	Carlsbad 904
San Dieguito 905	Penasquitos 906	San Diego 907	Sweetwater 909
Otay 910	Tijuana 911	Whitewater 719	Clark 720
West Salton 721	Anza Borrego 722	Imperial 723	

Please provide the hydrologic sub-area and number(s)

Number	Name
903.12	Bonsall

Please provide the beneficial uses for Inland Surface Waters and Ground Waters. Beneficial Uses can be obtained from the Water Quality Control Plan for the San Diego Basin, which is available at the Regional Board office or at http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

SURFACE WATERS	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Inland Surface Waters	903.12	X	X	X			X	X	X	X		X	X	X	X	
Ground Waters																

*** Excepted from Municipal**

X = Existing Beneficial Use
0 = Potential Beneficial Use

POLLUTANTS OF CONCERN

Using Table 4, identify pollutants that are anticipated to be generated from the proposed priority project categories. Pollutants associated with any hazardous material sites that have been remediated or are not threatened by the proposed project are not considered a pollutant of concern.

Table 4. Anticipated and Potential Pollutants Generated by Land Use Type

	General Pollutant Categories								
PDP Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	**X**	**X**			**X**	**X**	**X**	**X**	**X**
Attached Residential Development	**X**	**X**			**X**	**P(1)**	**P(2)**	**P**	**X**
Commercial Development 1 acre or greater	**P(1)**	**P(1)**		**P(2)**	**X**	**P(5)**	**X**	**P(3)**	**P(5)**
Heavy industry /industrial development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Hillside Development >5,000 ft2	X	X			X	X	X		X
Parking Lots	**P(1)**	**P(1)**	**X**		**X**	**P(1)**	**X**		**P(1)**
Retail Gasoline Outlets			X	X	X	X	X		
Streets, Highways & Freeways	**X**	**P(1)**	**X**	**X(4)**	**X**	**P(5)**	**X**		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

Note: If other monitoring data that is relevant to the project is available, please include as Attachment C.

CONSTRUCTION BMPs

Please check the construction BMPs that may be implemented during construction of the project. The applicant will be responsible for the placement and maintenance of the BMPs incorporated into the final project design.

X	Silt Fence	X	Desilting Basin
X	Fiber Rolls	X	Gravel Bag Berm
X	Street Sweeping and Vacuuming	X	Sandbag Barrier
X	Storm Drain Inlet Protection	X	Material Delivery and Storage
X	Stockpile Management	X	Spill Prevention and Control
X	Solid Waste Management	X	Concrete Waste Management
X	Stabilized Construction Entrance/Exit	X	Water Conservation Practices
X	Dewatering Operations	X	Paving and Grinding Operations
X	Vehicle and Equipment Maintenance	X	Any minor slopes created incidental to construction and not subject to a major or minor grading permit shall be protected by covering with plastic or tarp prior to a rain event, and shall have vegetative cover reestablished within 180 days of completion of the slope and prior to final building approval.

EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

Complete the checklist below to determine if a proposed project will pose an "exceptional threat to water quality," and therefore require Advanced Treatment Best Management Practices.

Table 5

No.	CRITERIA	YES	NO	INFORMATION
1.	Is all or part of the proposed project site within 200 feet of waters named on the Clean Water Act (CWA) Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity? Current 303d list may be obtained from the following site: http://www.swrcb.ca.gov/tmdl/docs/303dlists2006/approved/r9_06_303d_reqtmdls.pdf		X	If YES, continue to 2. If NO, go to 5.
2.	Will the project disturb more than 5 acres, including all phases of the development?	X		If YES, continue to 3. If NO, go to 5.
3.	Will the project disturb slopes that are steeper than 4:1 (horizontal: vertical) with at least 10 feet of relief, and that drain toward the 303(d) listed receiving water for sedimentation and/or turbidity?	X		If YES, continue to 4. If NO, go to 5.
4.	Will the project disturb soils with a predominance of USDA-NRCS Erosion factors k_f greater than or equal to 0.4?		X	If YES, continue to 6. If NO, go to 5.
5.	Project is not required to use Advanced Treatment BMPs.	X		Document for Project Files by referencing this checklist.
6.	Project poses an "exceptional threat to water quality" and is required to use Advanced Treatment BMPs.		X	Advanced Treatment BMPs must be consistent with WPO section 67.811(b)(20)(D) performance criteria

Exemption potentially available for projects that require advanced treatment:
Project proponent may perform a Revised Universal Soil Loss Equation, Version 2 (RUSLE 2), Modified Universal Soil Loss Equation (MUSLE), or similar analysis that shows to the County official's satisfaction that advanced treatment is not required

Now that the need for treatment BMPs has been determined, other information is needed to complete the SWMP.

SITE DESIGN

To minimize stormwater impacts, site design measures must be addressed. The following checklist provides options for avoiding or reducing potential impacts during project planning. If YES is checked, it is assumed that the measure was used for this project.

Table 6

	OPTIONS		YES	NO	N/A
1.	Has the project been located and road improvements aligned to avoid or minimize impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions?		X		
2.	Is the project designed to minimize impervious footprint?		X		
3.	Is the project conserving natural areas where feasible?		X		
4.	Where landscape is proposed, are rooftops, impervious sidewalks, walkways, trails and patios be drained into adjacent landscaping?		X		
5.	For roadway projects, are structures and bridges be designed or located to reduce work in live streams and minimize construction impacts?		X		
6.	Can any of the following methods be utilized to minimize erosion from slopes:				
	6.a.	Disturbing existing slopes only when necessary?	X		
	6.b.	Minimize cut and fill areas to reduce slope lengths?	X		
	6.c.	Incorporating retaining walls to reduce steepness of slopes or to shorten slopes?	X		
	6.d.	Providing benches or terraces on high cut and fill slopes to reduce concentration of flows?			X
	6.e.	Rounding and shaping slopes to reduce concentrated flow?	X		
	6.f.	Collecting concentrated flows in stabilized drains and channels?	X		

LOW IMPACT DEVELOPMENT (LID)

Each numbered item below is a LID requirement of the WPO. Please check the box(s) under each number that best describes the Low Impact Development BMP(s) selected for this project.

Table 7

1.	Conserve natural Areas, Soils, and Vegetation-County LID Handbook 2.2.1
X	Preserve well draining soils (Type A or B)
X	Preserve Significant Trees
	Other. Description:
	1. Not feasible. State Reason:
2.	Minimize Disturbance to Natural Drainages-County LID Handbook 2.2.2
X	Set-back development envelope from drainages
	Restrict heavy construction equipment access to planned green/open space areas
	Other. Description:
	2. Not feasible. State Reason:
3.	Minimize and Disconnect Impervious Surfaces (see 5) -County LID Handbook 2.2.3
X	Clustered Lot Design
	Items checked in 5?
	Other. Description:
	3. Not feasible. State Reason:
4.	Minimize Soil Compaction-County LID Handbook 2.2.4
X	Restrict heavy construction equipment access to planned green/open space areas
X	Re-till soils compacted by construction vehicles/equipment
X	Collect & re-use upper soil layers of development site containing organic materials
	Other. Description:
	4. Not feasible. State Reason:
5.	Drain Runoff from Impervious Surfaces to Pervious Areas-County LID Handbook 2.2.5
	LID Street & Road Design
	Curb-cuts to landscaping
	Rural Swales
	Concave Median
	Cul-de-sac Landscaping Design
	Other. Description:
	LID Parking Lot Design
	Permeable Pavements
X	Curb-cuts to landscaping
	Other. Description:

	LID Driveway, Sidewalk, Bike-path Design
	Permeable Pavements
X	Pitch pavements toward landscaping
	Other. Description:
	LID Building Design
	Cisterns & Rain Barrels
X	Downspout to swale
	Vegetated Roofs
	Other. Description:
	LID Landscaping Design
X	Soil Amendments
X	Reuse of Native Soils
X	Smart Irrigation Systems
X	Street Trees
	Other. Description:
	5. Not feasible. State Reason:

CHANNELS & DRAINAGES

Complete the following checklist to determine if the project includes work in channels.

Table 8

No.	CRITERIA	YES	NO	N/A	COMMENTS
1.	Will the project include work in channels?	X			If YES go to 2 If NO go to 13.
2.	Will the project increase velocity or volume of downstream flow?		X		If YES go to 6.
3.	Will the project discharge to unlined channels?	X			If YES go to. 6.
4.	Will the project increase potential sediment load of downstream flow?	X			If YES go to 6.
5.	Will the project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability?		X		If YES go to 8.
6.	Review channel lining materials and design for stream bank erosion.	X			Continue to 7.
7.	Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity.	X			Continue to 8.
8.	Include, where appropriate, energy dissipation devices at culverts.	X			Continue to 9.
9.	Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour.	X			Continue to 10.
10.	Include, if appropriate, detention facilities to reduce peak discharges.	X			
11.	"Hardening" natural downstream areas to prevent erosion is not an acceptable technique for protecting channel slopes, unless pre-development conditions are determined to be so erosive that hardening would be required even in the absence of the proposed development.		X		Continue to 12.
12.	Provide other design principles that are comparable and equally effective.	X			Continue to 13.
13.	End				

SOURCE CONTROL

Please complete the following checklist for Source Control BMPs. If the BMP is not applicable for this project, then check N/A only at the main category.

Table 9

BMP			YES	NO	N/A
1.	**Provide Storm Drain System Stenciling and Signage**				
	1.a.	All storm drain inlets and catch basins within the project area shall have a stencil or tile placed with prohibitive language (such as: "NO DUMPING – DRAINS TO San Luis Rey River") and/or graphical icons to discourage illegal dumping.	X		
	1.b.	Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.	X		
2.	**Design Outdoors Material Storage Areas to Reduce Pollution Introduction**				
	2.a.	This is a detached single-family residential project. Therefore, personal storage areas are exempt from this requirement.			X
	2.b.	Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.	X		
	2.c.	The storage area shall be paved and sufficiently impervious to contain leaks and spills.	X		
	2.d.	The storage area shall have a roof or awning to minimize direct precipitation within the secondary containment area.	X		
3.	**Design Trash Storage Areas to Reduce Pollution Introduction**				
	3.a.	Paved with an impervious surface, designed not to allow run-on from adjoining areas, screened or walled to prevent off-site transport of trash; or,	X		
	3.b.	Provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation.	X		
4.	**Use Efficient Irrigation Systems & Landscape Design**				
	The following methods to reduce excessive irrigation runoff shall be considered, and incorporated and implemented where determined applicable and feasible.		X		
	4.a.	Employing rain shutoff devices to prevent irrigation after precipitation.	X		
	4.b.	Designing irrigation systems to each landscape area's specific water requirements.	X		
	4.c.	Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.	X		
	4.d.	Employing other comparable, equally effective, methods to reduce irrigation water runoff.	X		
5.	**Private Roads**				

	BMP		YES	NO	N/A
	The design of private roadway drainage shall use at least one of the following				
	5.a.	Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.			X
	5.b.	Urban curb/swale system: street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter.			X
	5.c.	Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to storm water conveyance system.	X		
	5.d.	Other methods that are comparable and equally effective within the project.	X		
6.	**Residential Driveways & Guest Parking**				
	The design of driveways and private residential parking areas shall use one at least of the following features.				
	6.a.	Design driveways with shared access, flared (single lane at street) or wheelstrips (paving only under tires); or, drain into landscaping prior to discharging to the storm water conveyance system.			X
	6.b.	Uncovered temporary or guest parking on private residential lots may be: paved with a permeable surface; or, designed to drain into landscaping prior to discharging to the storm water conveyance system.	X		
	6.c.	Other features which are comparable and equally effective.	X		
7.	**Dock Areas**				
	Loading/unloading dock areas shall include the following.				
	7.a.	Cover loading dock areas, or design drainage to preclude urban run-on and runoff.	X		
	7.b.	Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.	X		
	7.c.	Other features which are comparable and equally effective.	X		
8.	**Maintenance Bays**				
	Maintenance bays shall include the following.		X		
	8.a.	Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff.	X		
	8.b.	Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.	X		
	8.c.	Other features which are comparable and equally effective.	X		
9.	**Vehicle Wash Areas**				
	Priority projects that include areas for washing/steam cleaning of vehicles shall use the following.		X		
	9.a.	Self-contained; or covered with a roof or overhang.	X		
	9.b.	Equipped with a clarifier or other pretreatment facility.	X		
	9.c.	Properly connected to a sanitary sewer.	X		
	9.d.	Other features which are comparable and equally effective.	X		

	BMP		YES	NO	N/A
10.	**Outdoor Processing Areas**				
	Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, waste piles, and wastewater and solid waste treatment and disposal, and other operations determined to be a potential threat to water quality by the County shall adhere to the following requirements.				
	10.a.	Cover or enclose areas that would be the most significant source of pollutants; or, slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment in accordance with conditions established by the applicable sewer agency.	X		
	10.b.	Grade or berm area to prevent run-on from surrounding areas.	X		
	10.c.	Installation of storm drains in areas of equipment repair is prohibited.	X		
	10.d.	Other features which are comparable or equally effective.	X		
11.	**Equipment Wash Areas**				
	Outdoor equipment/accessory washing and steam cleaning activities shall be.				
	11.a.	Be self-contained; or covered with a roof or overhang.	X		
	11.b.	Be equipped with a clarifier, grease trap or other pretreatment facility, as appropriate	X		
	11.c.	Be properly connected to a sanitary sewer.	X		
	11.d.	Other features which are comparable or equally effective.	X		
12.	**Parking Areas**				
	The following design concepts shall be considered, and incorporated and implemented where determined applicable and feasible by the County.				
	12.a.	Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	X		
	12.b.	Overflow parking (parking stalls provided in excess of the County's minimum parking requirements) may be constructed with permeable paving.	X		
	12.c.	Other design concepts that are comparable and equally effective.	X		
13.	**Fueling Area**				
	Non-retail fuel dispensing areas shall contain the following.				
	13.a.	Overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.	X		
	13.b.	Paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.	X		
	13.c.	Have an appropriate slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff.	X		

BMP			YES	NO	N/A
	13.d.	At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.	X		

Please list other project specific Source Control BMPs in the following box. Write **N/A** if there are none.

N/A

TREATMENT CONTROL

To select a structural treatment BMP using Treatment Control BMP Selection Matrix (Table 10), each priority project shall compare the list of pollutants for which the downstream receiving waters are impaired (if any), with the pollutants anticipated to be generated by the project (as identified in Table 4). Any pollutants identified by Table 4, which are also causing a Clean Water Act section 303(d) impairment of the receiving waters of the project, shall be considered primary pollutants of concern. Priority projects that are anticipated to generate a primary pollutant of concern shall select a single or combination of stormwater BMPs from Table 10, which **maximizes pollutant removal** for the particular primary pollutant(s) of concern.

Priority development projects that are **not** anticipated to generate a pollutant for which the receiving water is CWA 303(d) impaired shall select a single or combination of stormwater BMPs from Table 10, which are effective for pollutant removal of the identified secondary pollutants of concern, consistent with the "maximum extent practicable" standard.

Table 10. Treatment Control BMP Selection Matrix

Pollutants of Concern	**Bioretention Facilities (LID)***	**Settling Basins (Dry Ponds)**	Wet Ponds and Wetlands	**Infiltration Facilities or Practices (LID)***	**Media Filters**	High-rate biofilters	High-rate media filters	Trash Racks & Hydro - dynamic Devices
Coarse Sediment and Trash	**High**	**High**	High	**High**	**High**	High	High	High
Pollutants that tend to associate with fine particles during treatment	**High**	**High**	High	**High**	**High**	Medium	Medium	Low
Pollutants that tend to be dissolved following treatment	**Medium**	**Low**	Medium	**High**	**Low**	Low	Low	Low

*Additional information is available in the County of San Diego LID Handbook.

NOTES ON POLLUTANTS OF CONCERN:

In Table 11, Pollutants of Concern are grouped as gross pollutants, pollutants that tend to associate with fine particles, and pollutants that remain dissolved.

Table 11

Pollutant	Coarse Sediment and Trash	Pollutants that tend to associate with fine particles during treatment	Pollutants that tend to be dissolved following treatment
Sediment	X	X	
Nutrients		X	X
Heavy Metals		X	
Organic Compounds		X	
Trash & Debris	X		
Oxygen Demanding		X	
Bacteria		X	
Oil & Grease		X	
Pesticides		X	

A Treatment BMP must address runoff from developed areas. Please provide the post-construction water quality treatment volume or flow values for the selected project Treatment BMP(s). Guidelines for design calculations are located in Chapter 5, Section 4.3, Principle 8 of the County SUSMP. Label outfalls on the BMP map. The Water Quality peak rate of discharge flow (Qwq) and the Water Quality storage volume (Vwq) is dependent on the type of treatment BMP selected for the project.

Outfall	Tributary Area (acres)	Q_{wq} (cfs)	V_{wq} (ft^3)
~~Node 348~~	~~1006.9~~	~~3209.7~~	~~140.5~~
Westerly of Frigate Bird Rd., on the proposed fill slope westerly of the Pool site. BMP: bioswale #1	32.5	3.7	N/A * no volume based permanent BMP proposed.
Northerly of proposed Pankey Place, at approximately the halfway point of the roadway. BMP: bioswale #2	0.8	0.1	N/A * no volume based permanent BMP proposed.
On the northwesterly fill slope of the Staging Area/Pump Station site, westerly of Pala Mesa Drive Pala Mesa Dr., approximately 560'northerly of intersection with ex. Pala Rd./SR76 BMP: bioswale #3	5.1	0.9	N/A * no volume based permanent BMP proposed.
Northerly of proposed Pala Mesa Dr., approximately 690' easterly of intersection with Old Hwy 395. BMP: bioswale #4	0.8	0.1	N/A * no volume based permanent BMP proposed.
At the westerly end of Belted Kingfisher Rd. BMP: bioswale #5	7.4	0.8	N/A * no volume based permanent BMP proposed.
Northerly of proposed Pala Mesa Dr., approximately 1600' northerly of intersection with ex. Pala Rd./SR76. BMP: bioswale #6	2.0	0.3	N/A * no volume based permanent BMP proposed.
Westerly of Horse Ranch Creek Rd. approximately 1700 northerly of intersection with SR76. BMP: bioswale #7	5.9	1.0	N/A * no volume based permanent BMP proposed.
Westerly of Horse Ranch Creek Rd. at the N/w corner of intersection with SR76. BMP: bioswale #8	4.7	0.8	N/A * no volume based permanent BMP proposed.
Entering proposed detention basin outlet	231.2	N/A * no flow based permanent BMP proposed	463,270

Please check the box(s) that best describes the Treatment BMP(s) selected for this project.

	Biofilters
X	Bioretention swale
	Vegetated filter strip
	Stormwater Planter Box (open-bottomed)
	Stormwater Flow-Through Planter (sealed bottom)
	Bioretention Area
	Vegetated Roofs/Modules/Walls
	Detention Basins
X	Extended/dry detention basin with grass/vegetated lining
	Extended/dry detention basin with impervious lining
	Infiltration Basins
	Infiltration basin
X	Infiltration trench
	Dry well
	Permeable Paving
	Gravel
	Permeable asphalt
	Pervious concrete
	Unit pavers, ungrouted, set on sand or gravel
	Subsurface reservoir bed
	Wet Ponds or Wetlands
	Wet pond/basin (permanent pool)
	Constructed wetland
	Filtration
	Media filtration
	Sand Filtration
	Hydrodynamic Separator Systems
	Swirl Concentrator
	Cyclone Separator
	Trash Racks and Screens

Include Treatment Datasheet as Attachment E. The datasheet should include the following:	**COMPLETED**	**NO**
1. Description of how treatment BMP was designed. Provide a description for each type of treatment BMP.	X	
2. Engineering calculations for the BMP(s)	X	

Please describe why the selected treatment BMP(s) was selected for this project. For projects utilizing a low performing BMP, please provide a detailed explanation.

The bio-swale at the most downstream ends of the underground storm drain pipes, will only function as a BMP device – see attached Post-Construction BMP Site Plan. Since the bio-swale is very long and flat, the runoff will settle and infiltrate into the ground, thus it will also function as a filtration trench.

Based on the land use of the tributary areas, the anticipated pollutants are: sediments, nutrients, heavy metals, organic compounds, trash & debris, oxygen demanding substances, oil & grease, bacteria & viruses and pesticides. The bio-swales/filtration trenches have combined adequacy efficiency to remove all the above mentioned pollutants.

Treatment BMP Engineering Calculations:

FLOW BASED BMPs:

BIO-SWALE #1

Westerly of Frigate Bird Rd., on the proposed fill slope westerly of the Pool site. A water quality low flow drop outlet will discharge the first flush water quality runoff into the proposed grass-lined bio-swale located in the proposed fill slope westerly of the Pool site. The disturbed tributary area is 32.5 Ac, the water quality flow is:

Qwq = C x I x A = 0.57 x 0.2in/hr x 32.5 Ac = 3.7 cfs

The bioswale will have a bottom width of 20', a depth of 1', with a 3:1 side slope, the top width is 26'. The design slope of the bio-swale is 0.1% to ensure a slow flow. The flow depth is at 4.2", the grass height should be maintained at 8". The first flush flow velocity is 0.50 fps, a swale length of 300 feet is required to achieve a 10-minute resident time.

BIO-SWALE #2

Northerly of proposed Pankey Place, approximately at the halfway point of the roadway. A water quality low flow drop outlet will located in the northerly curb inlet will discharge the first flush water quality runoff into the proposed grass-lined bio-swale located in the northerly proposed fill slope of Pankey Place. The tributary area is 0.8 acres, and the water quality flow is:

Qwq = C x I x A = 0.85 x 0.2in/hr x 0.8 Ac = 0.1 cfs

The bio-swale will have a bottom width of 5', a depth of 6", with a 3:1 side slope the top width is 8'. The flow depth is at 1.1", the grass height should be maintained at 6". The design slope of the bio-slope is 0.1 % to ensure a slow flow. The first flush flow velocity is 0.21fps, a swale length of 126 feet is required to achieve a 10-minute resident time.

BIO-SWALE #3

On the northwesterly fill slope of the Staging Area/Pump Station site, westerly of Pala Mesa Drive. A water quality low flow channel drain located at the entrance to each of the three curb inlets will discharge the first flush water quality runoff into the proposed grass-lined bio-swale via a low flow pipe. The westerly half of the proposed Pankey Place and the southerly 1600' of the Pala Mesa Drive (north of SR 76) contribute to the runoff entering the three curb inlets located at the intersection of Pala Mesa Drive and Pankey Place. The tributary area is 5.1 acres, and the water quality flow is:

Qwq = C x I x A = 0.85 x 0.2in/hr x 5.1 Ac = 0.9 cfs

The bio-swale will have a bottom width of 5.5', a depth of 6", with a 3:1 side slope the top width is 9'. The flow depth is at 3.8", the grass height should be maintained at 6". The design slope of the bio-slope is 0.1 % to ensure a slow flow. The first flush flow velocity is 0.44fps, a swale length of 264 feet is required to achieve a 10-minute resident time.

BIO-SWALE #4

Northerly side of Pala Mesa Drive, approximately 690' easterly of Old Hwy 395. A water quality low flow drop outlet located in the northerly curb inlet will discharge the first flush water quality runoff into the proposed grass-lined bio-swale located on the northerly fill slope. The tributary area is 0.8 acres, and the water quality flow is:

Qwq = C x I x A = 0.85 x 0.2in/hr x 0.8 Ac = 0.1 cfs

The bio-swale will have a bottom width of 3', a depth of 6", with a 3:1 side slope the top width is 6'. The flow depth is at 1.5", the grass height should be maintained at 6". The design slope of the bio-slope is 0.1 % to ensure a slow flow. The first flush flow velocity is 0.24fps, a swale length of 144 feet is required to achieve a 10-minute resident time.

BIO-SWALE #5

A water quality low flow mini channel drain, located at the opening of the curb inlets at the westerly end of Belted Kingfisher Road, will intercept the first flush flow from the street. A low flow outlet pipe will discharge the first flush flow onto a proposed grass-lined bio-swale located along the property line between Lots 57 and 58, and along the westerly property line of Lot 58. The tributary area is 7.4 acres, and the water quality flow is:

Qwq = C x I x A = 0.57 x 0.2 x 7.4 = 0.8 cfs

The bio-swale will have a bottom width of 5', a depth of 6", with a 3:1 side slope the top width is 8'. The flow depth is at 3.7", the grass height should be maintained at 6". The design slope of the bio-slope is 0.1 % to ensure a slow flow. The first flush flow velocity is 0.43 fps, a swale length of 258 feet is required to achieve a 10-minute resident time.

BIO-SWALE #6

Northerly of proposed Pala Mesa Dr., approximately 1600' northerly of intersection with ex. Pala Rd./SR76. A water quality low flow drop outlet located in the easterly curb inlet will discharge the first flush water quality runoff into the proposed grass-lined bio-swale located on the easterly fill slope. The tributary area is 2.0 acres, and the water quality flow is:

Qwq = C x I x A = 0.85 x 0.2 x 2.0 = 0.3 cfs

The bio-swale will have a bottom width of 1.5', a depth of 6", with a 3:1 side slope the top width is 4.5'. The flow depth is at 3.8", the grass height should be maintained at 6". The design slope of the bio-slope is 0.1 % to ensure a slow flow. The first flush flow velocity is 0.38 fps, a swale length of 228 feet is required to achieve a 10-minute resident time.

BIO-SWALE #7

Westerly of Horse Ranch Creek Rd. approximately 1700' northerly of intersection with SR76. A water quality low flow drop outlet located in the westerly curb inlet will discharge the first flush water quality runoff into the proposed grass-lined bio-swale located on the westerly fill slope. The tributary area is 5.9 acres, and the water quality flow is:

Qwq = C x I x A = 0.85 x 0.2 x 5.9 = 1.0 cfs

The bio-swale will have a bottom width of 5.5', a depth of 6", with a 3:1 side slope the top width is 8.5'. The flow depth is at 4", the grass height should be maintained at 6". The design slope of the bio-slope is 0.1 % to ensure a slow flow. The first flush flow velocity is 0.46 fps, a swale length of 276 feet is required to achieve a 10-minute resident time.

BIO-SWALE #8

Westerly of Horse Ranch Creek Rd. at the northwesterly corner of intersection with SR76. A water quality low flow channel drain located at the entrance of each curb inlet will discharge the first flush water quality runoff into the proposed grass-lined bio-swale via a low flow pipe. The tributary area is 4.7 acres, and the water quality flow is:

Qwq = C x I x A = 0.85 x 0.2 x 4.7 = 0.8 cfs

The bio-swale will have a bottom width of 4.5', a depth of 6", with a 3:1 side slope the top width is 7.5'. The flow depth is at 4", the grass height should be maintained at 6". The design slope of the bio-slope is 0.1 % to ensure a slow flow. The first flush flow velocity is 0.44 fps, a swale length of 264 feet is required to achieve a 10-minute resident time.

FLOW BASED BMPs:

Project Description	
Worksheet	BIO SWALE #1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	20.00	ft
Discharge	3.70	cfs

Results		
Depth	4.2	in
Flow Area	7.4	ft^2
Wetted Perimeter	22.22	ft
Top Width	22.10	ft
Critical Depth	0.10	ft
Critical Slope	6.37	%
Velocity	0.50	ft/s
Velocity Head	0.00	ft
Specific Energy	4.3	in
Froude Number	0.15	
Flow Type	Subcritical	

Project Description	
Worksheet	BIO SWALE #2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	5.00	ft
Discharge	0.10	cfs

Results		
Depth	1.1	in
Flow Area	0.5	ft²
Wetted Perimeter	5.58	ft
Top Width	5.55	ft
Critical Depth	0.02	ft
Critical Slope	10.69	%
Velocity	0.21	ft/s
Velocity Head	0.00	ft
Specific Energy	1.1	in
Froude Number	0.12	
Flow Type	Subcritical	

Project Description	
Worksheet	BIO SWALE #3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	5.50	ft
Discharge	0.90	cfs

Results		
Depth	3.8	in
Flow Area	2.0	ft^2
Wetted Perimeter	7.51	ft
Top Width	7.41	ft
Critical Depth	0.09	ft
Critical Slope	6.67	%
Velocity	0.44	ft/s
Velocity Head	0.00	ft
Specific Energy	3.8	in
Froude Number	0.15	
Flow Type	Subcritical	

Project Description	
Worksheet	BIO SWALE #4
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	3.00	ft
Discharge	0.10	cfs

Results		
Depth	1.5	in
Flow Area	0.4	ft^2
Wetted Perimeter	3.78	ft
Top Width	3.74	ft
Critical Depth	0.03	ft
Critical Slope	9.43	%
Velocity	0.24	ft/s
Velocity Head	0.00	ft
Specific Energy	1.5	in
Froude Number	0.13	
Flow Type	Subcritical	

Project Description	
Worksheet	BIO SWALE #5
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	5.00	ft
Discharge	0.80	cfs

Results		
Depth	3.7	in
Flow Area	1.9	ft²
Wetted Perimeter	6.97	ft
Top Width	6.87	ft
Critical Depth	0.09	ft
Critical Slope	6.71	%
Velocity	0.43	ft/s
Velocity Head	0.00	ft
Specific Energy	3.8	in
Froude Number	0.15	
Flow Type	Subcritical	

Project Description	
Worksheet	BIO SWALE #6
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	1.50	ft
Discharge	0.30	cfs

Results		
Depth	3.8	in
Flow Area	0.8	ft²
Wetted Perimeter	3.51	ft
Top Width	3.41	ft
Critical Depth	0.10	ft
Critical Slope	6.83	%
Velocity	0.38	ft/s
Velocity Head	0.00	ft
Specific Energy	3.8	in
Froude Number	0.14	
Flow Type	Subcritical	

Project Description	
Worksheet	BIO SWALE #7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	5.50	ft
Discharge	1.00	cfs

Results		
Depth	4.0	in
Flow Area	2.2	ft^2
Wetted Perimeter	7.63	ft
Top Width	7.52	ft
Critical Depth	0.10	ft
Critical Slope	6.52	%
Velocity	0.46	ft/s
Velocity Head	0.00	ft
Specific Energy	4.1	in
Froude Number	0.15	
Flow Type	Subcritical	

Project Description	
Worksheet	BIO SWALE #8
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.50	ft
Discharge	0.80	cfs

Results		
Depth	4.0	in
Flow Area	1.8	ft^2
Wetted Perimeter	6.59	ft
Top Width	6.48	ft
Critical Depth	0.10	ft
Critical Slope	6.59	%
Velocity	0.44	ft/s
Velocity Head	0.00	ft
Specific Energy	4.0	in
Froude Number	0.15	
Flow Type	Subcritical	

VOLUME BASED BMPs:

Sediment traps are proposed for each multi-family, professional office, town center, sports complex and pump station sites. These sites will be mass graded and specific site plans and BMPs will be designed per another document. Once each site plan is developed according to their approved "B" Designator Site Plans, these interim sediment traps will be removed and permanent BMPs will be built with the site development. See Section II of this report for the permanent BMP of each "B" Designator Site Plan. Per the County of San Diego Hydrology Manual, the 85th percentile storm for this area is 0.8 in.

The first flush water quality flood volume is:

Vwq = 0.8 in / 12 x C x A

Where C = runoff Coefficient = 0.71 (urban newly graded areas).

DETENTION BASIN AT LOT U:

The tributary area that drains into this detention basin is 231.2 acres, the weighted runoff coefficient C is 0.69**, thus, the water quality runoff volume entering the detention basin is:

Vwq = 0.8in/12 x 0.69 x 231.2 Acre x 43,560 sf/acre = **463,270 cf or 10.64 acre-ft.**

The required sediment traps volumes are tabulated for each of the sites:

LOT NO.	FUTURE DEV.	TRIBUTARY AREA	C	Vwq
-	-	(SF)	-	(CF)
537*	MULTI-FAMILY 3	811,653	0.71	**38,418**
551*	MULTI-FAMILY 2	208,006	0.71	**9,846**
567*	TOWN CENTER	344,959	0.71	**16,328**
569*	POOL SITE	54,830	0.71	**2,595**
574 (N)*	SPORTS COMPLEX (North)	150,650	0.71	**7,131**
574 (S)*	SPORTS COMPLEX (South)	201,685	0.71	**9,546**
566*	PROFESSIONAL OFFICE 2	366,176	0.71	**17,332**
563*	PROFESSIONAL OFFICE 1	98,829	0.71	**4,678**
527*	MULTI-FAMILY 1	449,099	0.71	**21,257**
559*	MULTI-FAMILY 4	413,361	0.71	**19,566**
576*	STAGING AREA/PUMP STATION	21,265	0.71	**1,007**
U**	DETENTION BASIN	231.2AC	0.69**	**463,270**

* The volume-based BMPs for these lots are not permanent BMPs for these site plans. See Section II of this report for permanent BMP of each "B" Designator Site Plan.
** The detention basin will be a permanent treatment facility. C value per weighted coefficient presented in the hydrology report titled "A CEQA Level Preliminary Hydrology & Hydraulics Study for Campus Park".

MAINTENANCE

Please check the box that best describes the maintenance mechanism(s) for this project. Guidelines for each category are located in Chapter 5, Section 5.2 of the County SUSMP.

CATEGORY	SELECTED	
	YES	NO
First	X	
Second	X	
Third	X	
Fourth		

(Note: Projects in Category 2 or 3 may choose to establish or be included in a Stormwater Maintenance Assessment District for the long-term maintenance of treatment BMPs).

The proposed long-term treatment BMP consists of bio-filtration swales around each individual single-family homes(first category) to be maintained by individual homeowners, the bio-filtration swales located in manufactured slopes along roads and streets will be maintained by the master HOA. The curb inlet low flow drop out boxes, the low flow channel drain inlets in front of some of the curb inlets and the low flow pipes leading to the bio-filtration swales will be maintained by the master HOA and are considered second category facilities. ~~de-silting basins and detention basin.~~ The master Homeowners' Association is primarily responsible for the BMPs located in the residential and park common areas. The Property Management Companies of the Town Center and Professional Office areas will be responsible for the BMPs on these properties. ~~The Homeowners' Association is primarily responsible for the BMPs located in the residential and park areas.~~ The sediment traps located on each multi-family, commercial, town center and recreation pads are second category and will be maintained by the developer until the sites are developed and maintenance responsibility is turned over to the site HOA's or Property Management Companies .The third category is selected for the detention basin where the master HOA (or and established landscape maintenance district) will have primary maintenance responsibility. However, due to the natural and size of this project, the County needs to assure ongoing maintenance. The County needs to be in a backup role to perform the BMP maintenance if the property owners, HOAs or Property Management Companies fail. The developer would provide the County with security to substantiate the maintenance agreement, which will remain in place for an interim period of 5 years. The amount of the security would equal to the cost of two years of maintenance activities. Security for "backup" maintenance after the interim period (5-years) would not be provided.

ATTACHMENTS

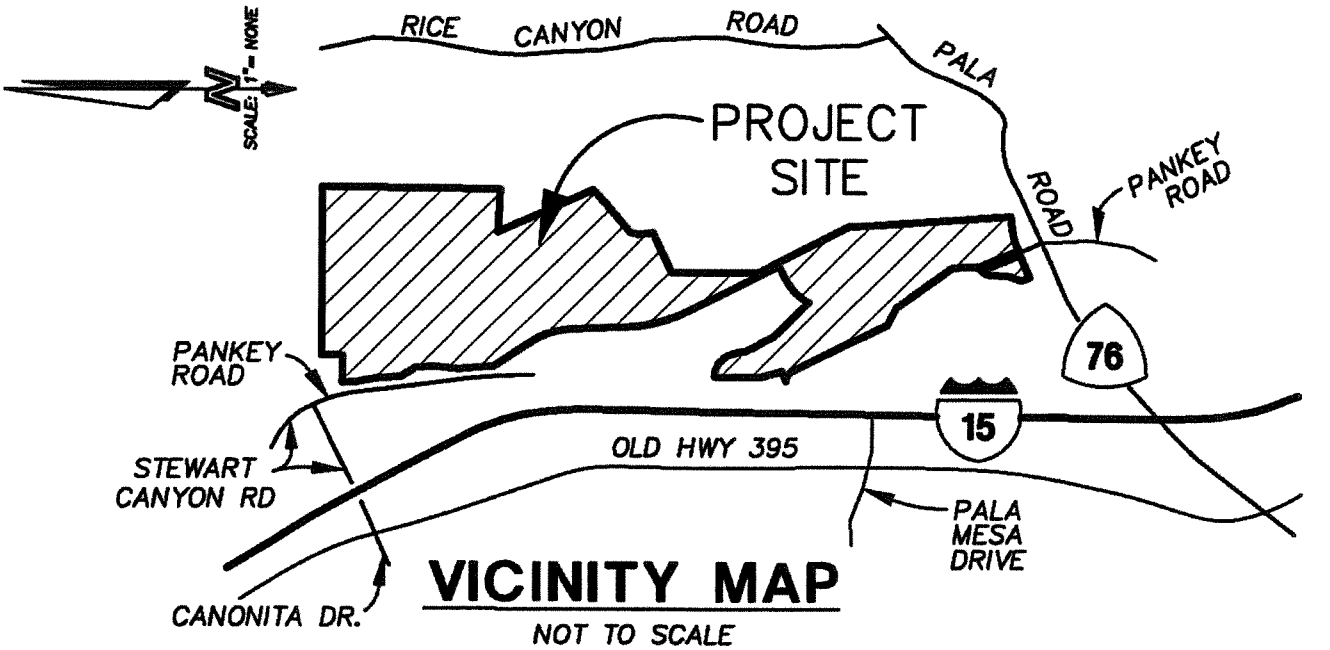
Please include the following attachments.

ATTACHMENT		COMPLETED	N/A
A	Project Location Map	X	
B	Site Map	X	
C	Relevant Monitoring Data		X
D	LID and Treatment BMP Location Map	X	
E	Treatment BMP Datasheets	X	
F	Operation and Maintenance Program for Treatment BMPs	X	
G	Fiscal Resources	X	
H	Engineer's Certification Sheet	X	
I	Addendum		X

Note: Attachments A and B may be combined.

ATTACHMENT A

PROJECT LOCATION MAP



ATTACHMENT B

SITE MAP

ATTACHMENT C

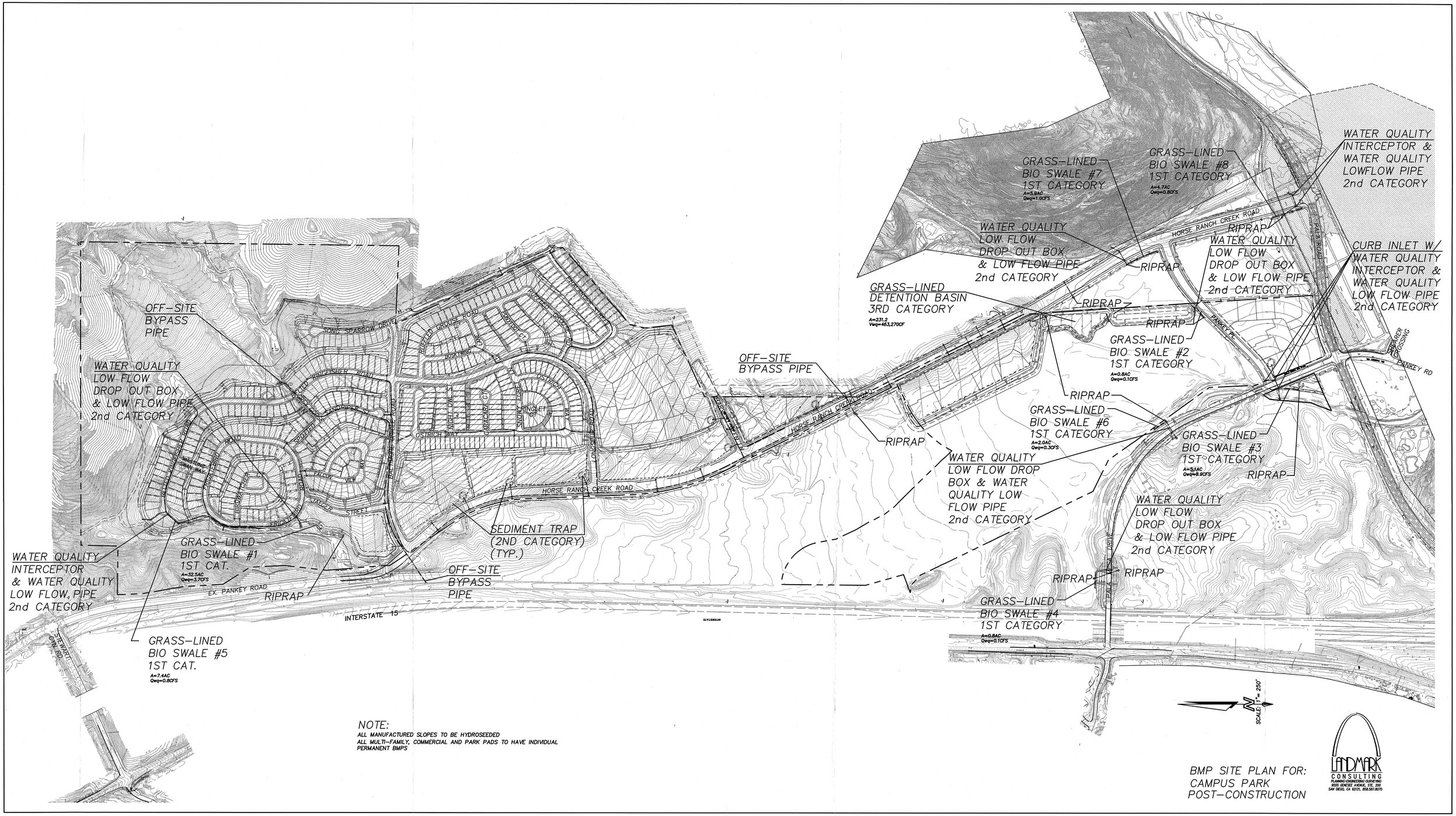
RELEVANT MONITORING DATA

(NOTE: PROVIDE RELEVANT WATER QUALITY MONITORING DATA IF AVAILABLE.)

N/A

ATTACHMENT D

LID AND TREATMENT BMP LOCATION MAP



NOTE:
ALL MANUFACTURED SLOPES TO BE HYDROSEEDED
ALL MULTI-FAMILY, COMMERCIAL AND PARK PADS TO HAVE INDIVIDUAL PERMANENT BMPS

BMP SITE PLAN FOR:
CAMPUS PARK
POST-CONSTRUCTION

LANDMARK CONSULTING
PLANNING-ENGINEERING-SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

ATTACHMENT E

TREATMENT BMP DATASHEET

*(**NOTE:** POSSIBLE SOURCE FOR DATASHEETS CAN BE FOUND AT WWW.CABMPHANDBOOKS.COM. INCLUDE ENGINEERING CALCULATIONS FOR SIZING THE TREATMENT BMP.)*

FOSSIL FILTER INSERTS

E-Mail Suntree
Order Catalog
Home Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

Suntree Technologies Inc.

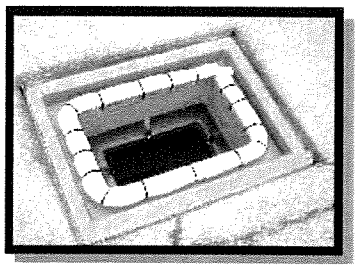
Grate Inlet Skimmer Box

Grated Inlet Stormwater Treatment System

Since 1993

Built Strong To Last!

Engineered To Be Permanent Infrasturcture



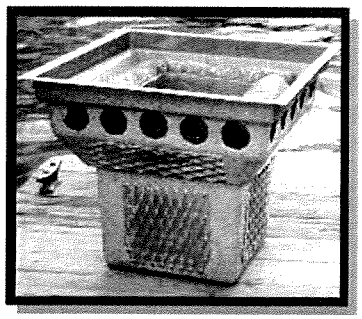
Installs Quickly

Step 1: **Remove the grate.**

Step 2: **Drop in the filter.**

Step 3: **Replace the grate.**

Custom Sizes... No Problem



Great For Retrofits...
Will Not Impede The Original Designed Flow Of The Inlet

E-Mail Suntree | Order Catalog | Home Page | Next Page

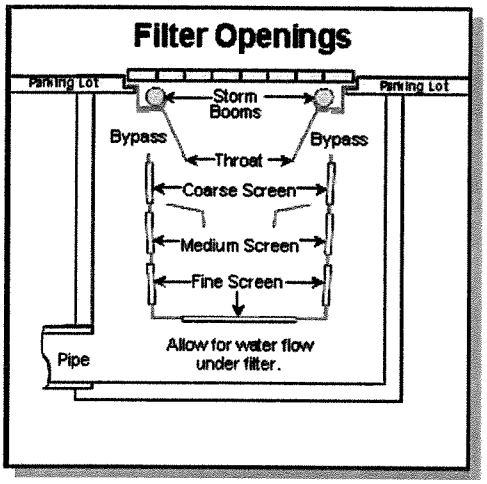
Grate Inlet Skimmer Box

Sizing and Flow Rates

Although certain sizes are recommended, The *Grate Inlet Skimmer Box* can be sized to fit any size inlet.

Custom Sizes No Problem

The **maximum flow rate** of a *Grate Inlet Skimmer Box* is determined by the amount of flow that can pass through the throat, the exception is found only in very large units



To determine the **minimum flow rate** of a *Grate Inlet Skimmer Box*, consider only the potential flow through the throat and bypass. If the potential flow through the throat is less than the potential flow through the bypass, then the then the throat determines the minimum flow. If the potential water flow through the bypass is less than that of the throat, then the bypass determines the minimum flow.

The table below represents the flow rates of 8 different sizes of Grate Inlet Skimmer Box.

Filtered Flow represents the potential flow rate through all screens, and does not include the potential flow through the bypass. Water flow through the bypass happens only when the flow rate through the grate exceeds the flow rate through all the screens.

Flow Rate Table						
	Dimensions of the flange around the top of the Grate Inlet Skimmer Box			Flow Rate (cubic feet per second)		
Model Number	Width (inches)	Length (inches)	Depth (inches)	Throat	Filtered Flow	Bypass Flow
GISB-I-24-24-25	24	24	25	4.4	14.9	6.7
GISB-A-24-37-25	24	37	25	10.2	21.1	8.7
GISB-C-28-37-25	28	37	25	12.2	19.4	7.4
GISB-J-24-41-25	24	41	25	12	24.6	10
GISB-NK-32-32-25	32	32	25	12.5	19.1	10.3
GISB-36-36-25	36	36	25	18.8	23.4	13.4
GISB-D-36-48-18	36	48	18	33.2	26.3	13.3
GISB-G-52-58-18	52	58	18	89.3	40.1	25
◆ The yellow blocks represent the minimum flow rates. ◆ Filtered flow is based on unobstructed screens.						

Drawings and flow specifications for any size Grate Inlet Skimmer Box is available upon request.

E-Mail Suntree | Order Catalog | Home Page | Next Page

E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

Grate Inlet Skimmer Box

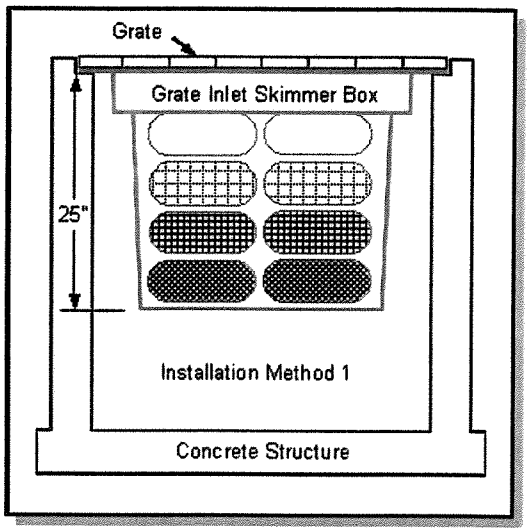
Installation

Although certain sizes are recommended, The *Grate Inlet Skimmer Box* can be sized to fit any size inlet.

Can Be Sized To Fit Any Inlet

Installation Method 1

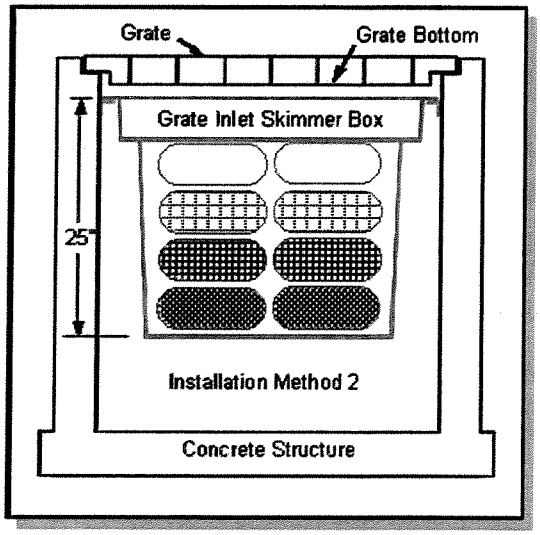
- Remove the grate.
- Place the *Grate Inlet Skimmer Box* into the catchbasin so that it rests on the same landing as the grate.
- Replace the grate so that the flange around the top of the *Grate Inlet Skimmer Box* is sandwiched between the grate and the landing.



A second method of installing a *Grate Inlet Skimmer Box* involves the use of an aluminum landing kit which is supplied separately. This method is used for installing larger units, and in catchbasins fitted with extra thick grates.

Installation Method 2

- Remove the grate.
- Attach the aluminum landing kit



to the catchbasin wall 2" below the grate bottom.

- Place the *Grate Inlet Skimmer Box* into the catchbasin so that it rests on the aluminum landing kit.
- Replace the grate.

E-Mail Suntree | Order Catalog | Home Page | Next Page

E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

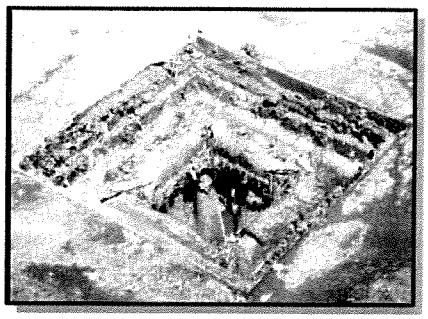
Grate Inlet Skimmer Box

Captured Debris

The Challenge...

Take On The Toughest Inlets...
Capture & Keep The Debris...
Keep The Inlet Flowing!

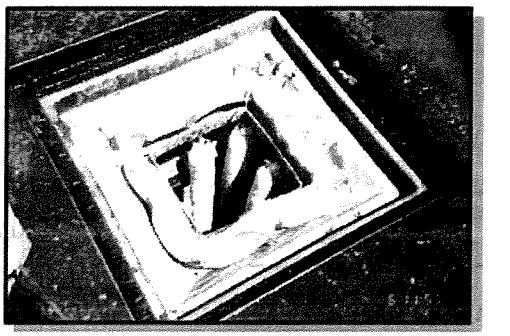
The picture to the right shows an inlet with a ***Grate Inlet Skimmer Box*** immediately after the grate was removed, just 45 days after it was installed. Because this inlet is adjacent to a wash down area, it experiences a simulated storm event everyday. The filter is full to capacity and has been operating in bypass mode for some time.



The picture to the left shows the ***Grate Inlet Skimmer Box*** immediately after the removal of booms and skimmer tray. Notice the bypass openings around the top are completely unobstructed. The filter is full to capacity and is operating bypass mode. Because this inlet experiences an extra heavy hydrocarbon pollutant load it is fitted with extra ***Storm Booms***.

Stainless Steel Screens are easily cleaned to restore the original unobstructed flow rates to the Grate Inlet Skimmer Box

Although the inlet is relatively small with a grate that measures 24" x 24", debris weighing 232 pounds with a volume of 78 quarts was removed during this servicing. To the right is a photo of the same *Grate Inlet Skimmer Box* after being serviced.



Ready For The Next Storm Event!

E-Mail Suntree | Order Catalog | Home Page | Next Page

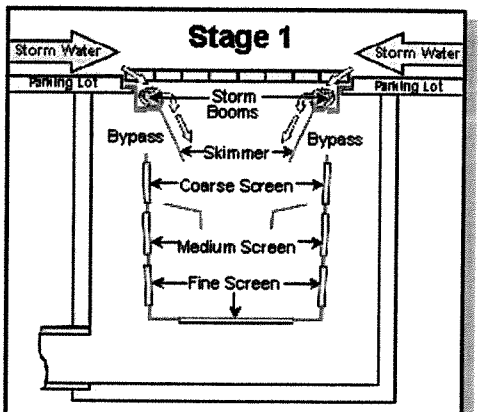
E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

Grate Inlet Skimmer Box

Functional Description

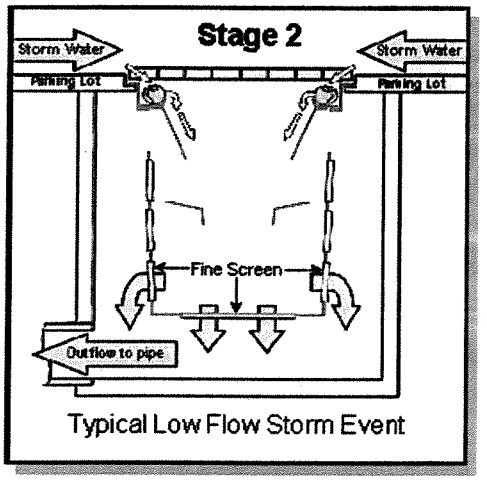
Multi-Stage Filtration Utilizes Screens Of Different Sieve Sizes Optimize Filtration And Water Flow

Stage 1: As stormwater enters the inlet through the grate it comes in contact with and passes through a ***Storm Boom*** located around the top perimeter of the ***Grate Inlet Skimmer Box***. After making contact with the ***Storm Boom***, the stormwater flows down into the lower filtration chamber which is equipped with 3 different sieve size filtration screens and bypass openings.



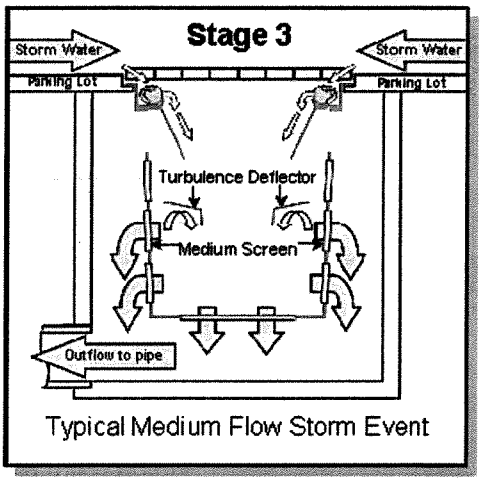
As Stormwater Enters The Inlet

Stage 2: Throughout the entire storm event, stormwater continues to come in contact with the ***Storm Boom*** and then flow into the lower filtration chamber, adjacent to the fine sieve size screens. The fines sieve size screens are sized to be able to capture sediment such as sand, clay, phosphates, etc. A sand filter quickly forms across the bottom which has the potential to capture the finest of particles.



Typical Low Flow Storm Event

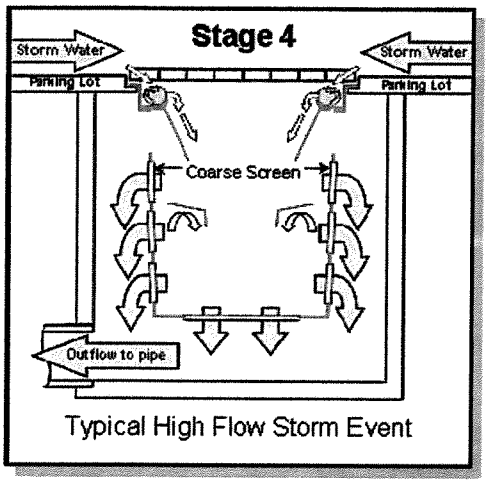
Stage 3: As the storm event increases in intensity the water level in the ***Grate Inlet Skimmer box*** rises to a level adjacent to the medium sieve size screens and the ***turbulence deflector***. The medium screen provides additional flow with less chance of obstruction than the fine screen. The ***turbulence deflector*** dramatically reduces the turbulence in the lower filtration chamber, which allows sediment to continue to settle, without re-suspending sediment that has previously been captured.



Typical Medium Flow Storm Event

Stage 4: As the storm event increases in intensity to that of high flow storm event, the water level in the ***Grate Inlet Skimmer box*** rises to a level adjacent to the coarse sieve size screens above ***turbulence deflector***.

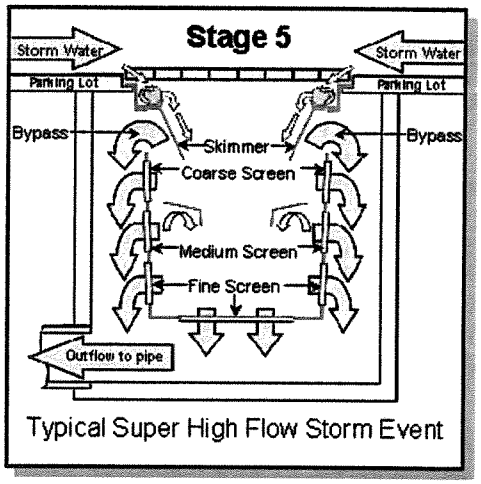
The coarse screen provides yet more additional filtered flow with less chance for obstruction than either the medium or fine screen. The coarse screen is sized to capture floatables like foliage and litter. At this stage water is flowing through all the different sieve size screens, the ***turbulence deflector***



Typical High Flow Storm Event

continues to dramatically reduce the turbulence in the lower filtration chamber, and sediment continues to settle and collect toward the bottom.

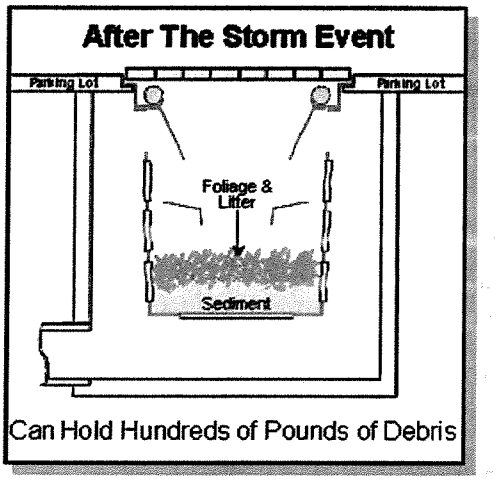
Stage 5: If the storm event creates an extremely high flow rate into the inlet which exceeds the flow through all the screens, the water flow can bypass the filtration screens through skimmer protected bypass openings near the top of the ***Grate Inlet Skimmer Box***. As water flows through the bypass openings, it also continues to flow through all the other screens. Storm events that produce such high flow rates are rare and typically don't last very long.



Typical Super High Flow Storm Event

Drains Dry After Storm

After The Storm Event: The stormwater drains completely out of the ***Grate Inlet Skimmer Box*** after the storm event. The debris collected in the unit is stored in a dry state which helps to contain the nutrient pollutant load, prevents the filter from going septic, and prevents mosquitoes from breeding in the unit. After each storm event more debris is collected, which can ultimately weigh many hundreds of



pounds.

E-Mail Suntree | Order Catalog | Home Page | Next Page

E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

Suntree Technologies Inc.

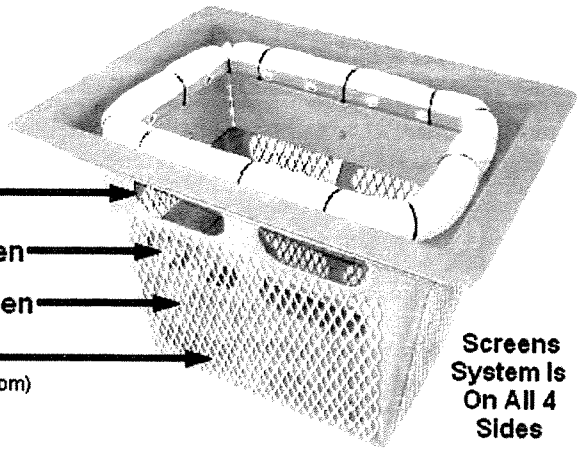
Grate Inlet Skimmer Box

Unique Features

Multi-Stage Filtration

Screens of Different Sieve Sizes Optimize Filtration And Water Flow

All Screens Are Stainless Steel



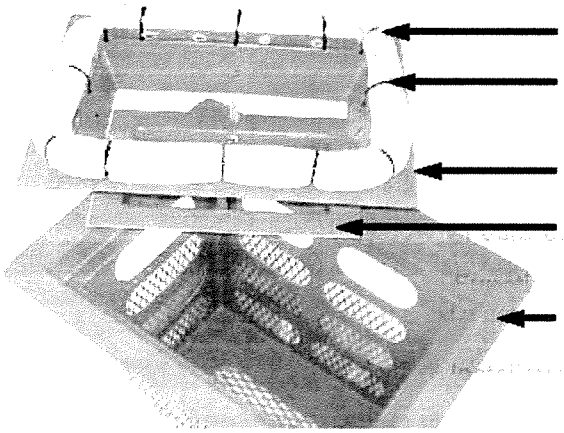
- Bypass Openings
- Coarse Sieve Size Screen
- Medium Sieve Size Screen
- Fine Sieve Size Screen
  (Fine Sieve Size Screen Also On Bottom)

Screens System Is On All 4 Sides

Interior components are easily removed to allow easy access to lower filtration chamber.

Fiberglass components have gelcoated finish with UV filter.

- Storm Boom *Absorbs Hydrocarbons*
- Zip Tie
- Skimmer Tray
- Deflection Shield



- Flange is reinforced With knitted 1808 ± 45° Biaxial fiberglass

E-Mail Suntree | Order Catalog | Home Page | Next Page

Pages: 1, 2, 3, 4, 5, 6

E-Mail Suntree | Order Catalog | Suntree Technologies Inc. | Home Page | First Page

Features
Functional Description
Installation
Flow Rate
Drawings

For More Information
on our Grate Inlet Skimmer Box
Please contact us directly:

Since 1993

Suntree Technologies, Inc.
798 Clearlake RD
Cocoa, FL 32922

Ph: (321) 637-7552
FAX: (321) 637-7554

Infrastructure
Stormwater Filtration Systems

Page 1

Pages: 1, 2, 3, 4, 5, 6, 7

E-Mail Suntree | Home Page | Order Catalog | Next Page

Suntree Technologies Inc.

Curb Inlet Basket

Patented

A stormwater filtration system for Curb Inlets where access to the catchbasin is through a manhole.

Captures Everything From Litter, Foliage, Sediment, To Hydrocarbons...Everything!

- ***Fits any catchbasin***
- ***No need to enter the catchbasin to service.***
- ***No need to enter or lay in the street to service.***
- ***Filtration screens of different sieve sizes can be utilized to optimize filtration and water flow.***

Will Not Impede The Water Flow Into The Inlet

Order Catalog

E-Mail Suntree | Home Page

For more information on Curb Inlet Baskets, click on the **Next Page** button or the specific page links below.

Next Page

Curb Inlet Basket Pages:
1, 2, 3, 4, 5, 6, 7

Page 2

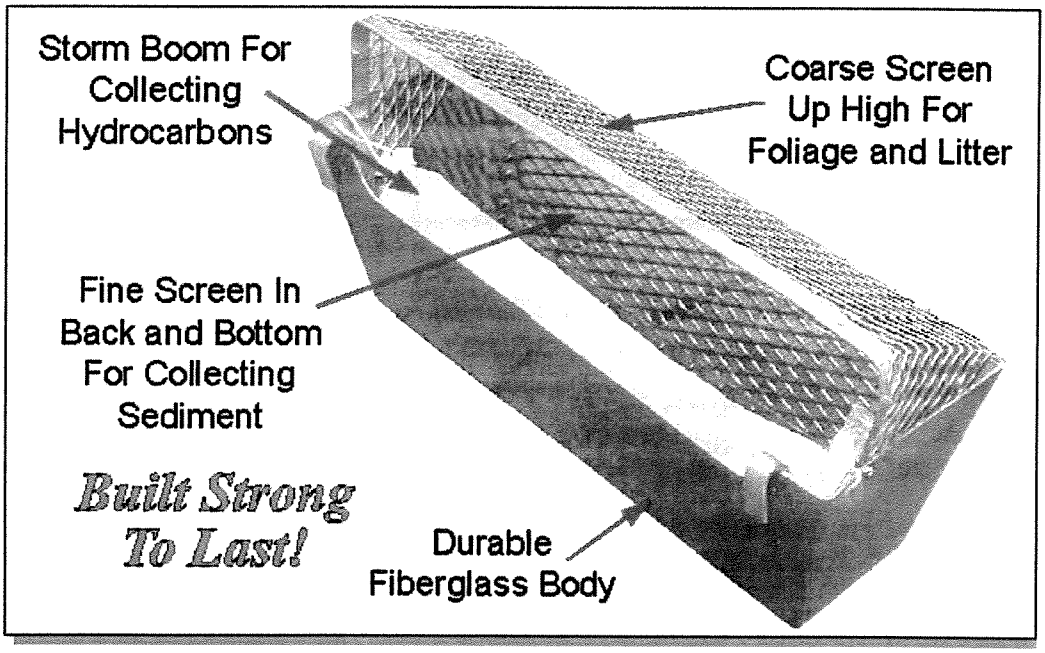
Pages: 1, 2, 3, 4, 5, 6, 7

E-Mail Suntree | Home Page | Previous Page | Next Page

Suntree Technologies Inc.

Curb Inlet Basket

Patented



Order Catalog

E-Mail Suntree | Home Page

For more information on Curb Inlet Baskets, click on the Next Page button or the specific page links below.

First Page

Previous Page | Next Page

Curb Inlet Basket Pages:
1, 2, 3, 4, 5, 6, 7

Page 3

Pages: 1, 2, 3, 4, 5, 6, 7

E-Mail Suntree | Home Page | Suntree Technologies Inc. | Previous Page | Next Page

Curb Inlet Basket

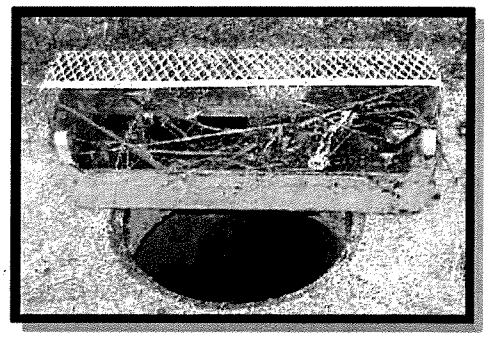
No Need To Enter The Confined Space Of The Catchbasin To Service

To Service:

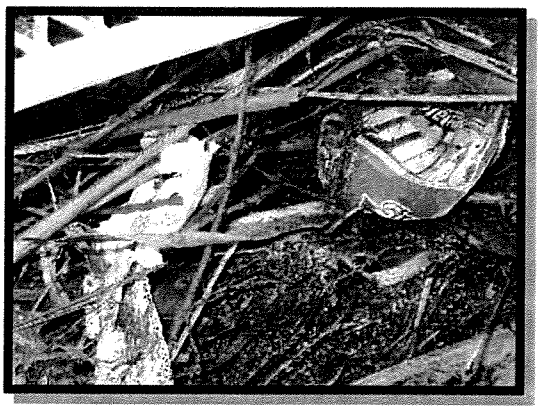
- Remove the manhole lid
- Reach in with by hand or with a manhole hook and remove the basket
- Empty the contents of the basket and replace the Storm Boom
- Replace the basket and manhole lid

Heavy and Expensive Equipment Is Not Required To Do Service Work

Multi-stage Filtration Captures Everything From Hydrocarbons, To Sediment, To Grass Clippings, To Litter...Everything!



Once The Basket Is Removed From The Catchbasin It Can Be Easily Emptied.



Order Catalog

E-Mail Suntree

Home Page

For more information on Curb Inlet Baskets, click on the Next Page button or the specific page links below.

First Page

Previous Page

Next Page

Curb Inlet Basket Pages:

1, 2, **3**, 4, 5, 6, 7

Curb Inlet Basket (CIB)

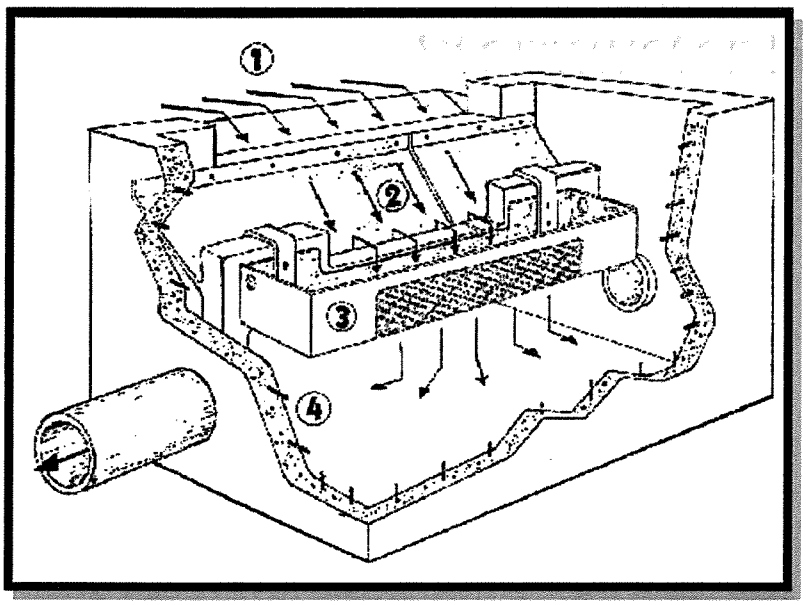
Functional Description

① Stormwater runoff carrying debris and pollutants enters curb inlet.

② Adjustable throat width funnels water to weir. The immediate drop in the throat elevation prevents head losses through the inlet. Sediment will collect along the incoming side of the weir.

③ Water flows over weir and into removable basket, filtering trash, leaves, yard clippings, sediment, etc.. If desired, a hydrocarbon absorption boom can be fitted along the incoming edge of the basket.

④ Cleaner water leaves basket and enters catchbasin, then flows down stream. The position of the CIB, high in the catch basin, avoids any restriction of up-stream pipes flowing through the catchbasin.

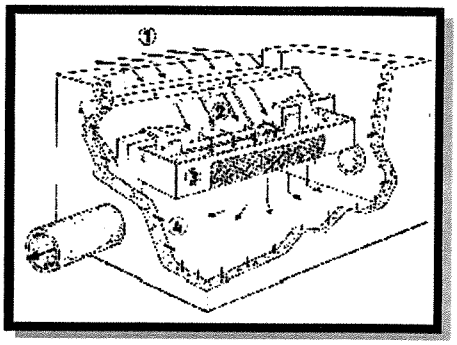


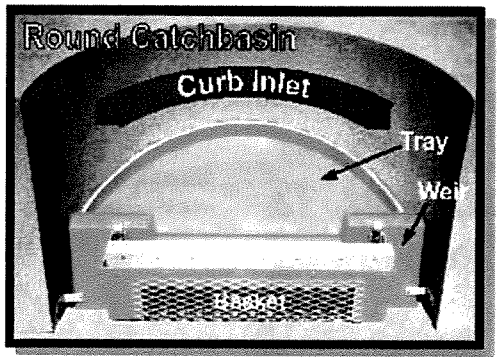
The CIB telescopes to change size so that it can fit almost any catchbasin. In addition, CIBs that fit a round catchbasin are also available.

Curb Inlet Basket (CIB)

Installation

Square Catchbasin:
For installation into a square catchbasin, there is a left half and a right half that telescope together to adjust for size, which make up the main body of the CIB and mounts solid to the catchbasin wall with either drive pins or *Tap-Cons*. The non-removable portion consists of a tray area that directs the flow toward the weir, and a weir that channels the flow into the removable basket. The basket is placed on last, and is simply dropped in place and hangs from the top of the weir.





Round Catchbasin:
To install the CIB into a round catchbasin there are 3 main pieces; the weir, which attaches to the catch basin wall, the tray which attaches to the catchbasin wall and weir, and the removable basket. The weir and tray attach to the catchbasin wall with either *Tap-Cons* or drive pins. The basket is placed on last, and is just dropped in place and hangs from the top of the weir.

For more information on Curb Inlet Baskets, click on the Next Page button or the specific page links below.

Page 6

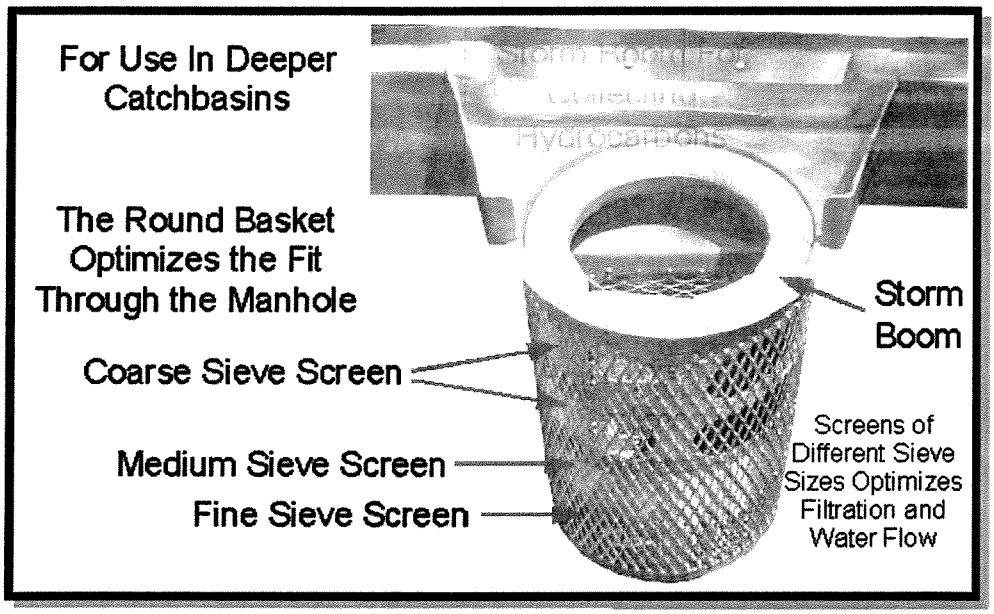
Pages: 1, 2, 3, 4, 5, **6**, 7

E-Mail Suntree | Home Page | Previous Page | Next Page

Suntree Technologies Inc.

High Capacity Curb Inlet Basket

Patented



Captures Everything From Litter, Foliage, Sediment, To Hydrocarbons...Everything!

Installation and servicing is similar to the standard Curb Inlet Basket

Built Strong To Last!

Order Catalog
E-Mail Suntree
Home Page

For more information on Curb Inlet Baskets, click on the Next Page button or the specific page links below.

First Page
Previous Page
Next Page

Curb Inlet Basket Pages:
1, 2, 3, 4, 5, 6, 7

Suntree Technologies Inc.

High Capacity Curb Inlet Basket
In The Field

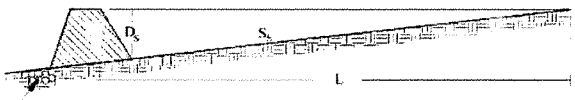
View of Debris In High Capacity Curb Inlet Basket Before Removal From Catchbasin

This unit did not utilize a Storm Boom.

Once Removed From The Catch Basin, The Collected Debris Was Emptied And The Basket Put Back.

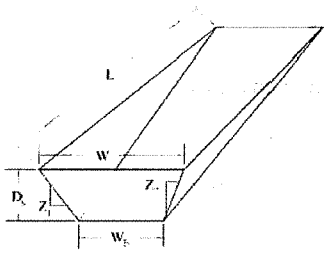
200 Pounds of Debris Was Emptied From This Curb Inlet Basket.

BIOFILTER/GRASS-LINED SWALE



Provide for scour protection.

(a) Cross section of swale with check dam.

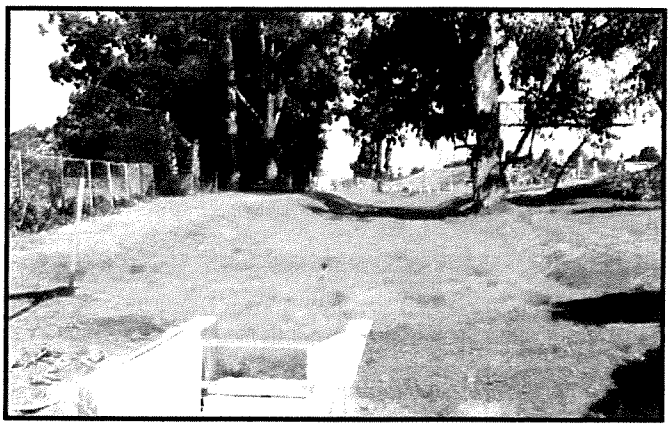


(b) Dimensional view of swale impoundment area.

Notation:

L = Length of swale impoundment area per check dam (ft)
D_s = Depth of check dam (ft)
S_S = Bottom slope of swale (ft/ft)
W = Top width of check dam (ft)
W_B = Bottom width of check dam (ft)
$Z_{H:V}$ = Ratio of horizontal to vertical change in swale side slope (ft/ft)

Vegetated Swale TC-30



Design Considerations

- Tributary Area
- Area Required
- Slope
- Water Availability

Description

Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems.

Targeted Constituents

☑ Sediment	▲
☑ Nutrients	●
☑ Trash	●
☑ Metals	▲
☑ Bacteria	●
☑ Oil and Grease	▲
☑ Organics	▲

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

Caltrans constructed and monitored six vegetated swales in southern California. These swales were generally effective in reducing the volume and mass of pollutants in runoff. Even in the areas where the annual rainfall was only about 10 inches/yr, the vegetation did not require additional irrigation. One factor that strongly affected performance was the presence of large numbers of gophers at most of the sites. The gophers created earthen mounds, destroyed vegetation, and generally reduced the effectiveness of the controls for TSS reduction.

Advantages

- If properly designed, vegetated, and operated, swales can serve as an aesthetic, potentially inexpensive urban development or roadway drainage conveyance measure with significant collateral water quality benefits.

- Roadside ditches should be regarded as significant potential swale/buffer strip sites and should be utilized for this purpose whenever possible.

Limitations

- Can be difficult to avoid channelization.
- May not be appropriate for industrial sites or locations where spills may occur
- Grassed swales cannot treat a very large drainage area. Large areas may be divided and treated using multiple swales.
- A thick vegetative cover is needed for these practices to function properly.
- They are impractical in areas with steep topography.
- They are not effective and may even erode when flow velocities are high, if the grass cover is not properly maintained.
- In some places, their use is restricted by law: many local municipalities require curb and gutter systems in residential areas.
- Swales are mores susceptible to failure if not properly maintained than other treatment BMPs.

Design and Sizing Guidelines

- Flow rate based design determined by local requirements or sized so that 85% of the annual runoff volume is discharged at less than the design rainfall intensity.
- Swale should be designed so that the water level does not exceed 2/3rds the height of the grass or 4 inches, which ever is less, at the design treatment rate.
- Longitudinal slopes should not exceed 2.5%
- Trapezoidal channels are normally recommended but other configurations, such as parabolic, can also provide substantial water quality improvement and may be easier to mow than designs with sharp breaks in slope.
- Swales constructed in cut are preferred, or in fill areas that are far enough from an adjacent slope to minimize the potential for gopher damage. Do not use side slopes constructed of fill, which are prone to structural damage by gophers and other burrowing animals.
- A diverse selection of low growing, plants that thrive under the specific site, climatic, and watering conditions should be specified. Vegetation whose growing season corresponds to the wet season are preferred. Drought tolerant vegetation should be considered especially for swales that are not part of a regularly irrigated landscaped area.
- The width of the swale should be determined using Manning's Equation using a value of 0.25 for Manning's n.

Construction/Inspection Considerations

- Include directions in the specifications for use of appropriate fertilizer and soil amendments based on soil properties determined through testing and compared to the needs of the vegetation requirements.
- Install swales at the time of the year when there is a reasonable chance of successful establishment without irrigation; however, it is recognized that rainfall in a given year may not be sufficient and temporary irrigation may be used.
- If sod tiles must be used, they should be placed so that there are no gaps between the tiles; stagger the ends of the tiles to prevent the formation of channels along the swale or strip.
- Use a roller on the sod to ensure that no air pockets form between the sod and the soil.
- Where seeds are used, erosion controls will be necessary to protect seeds for at least 75 days after the first rainfall of the season.

Performance

The literature suggests that vegetated swales represent a practical and potentially effective technique for controlling urban runoff quality. While limited quantitative performance data exists for vegetated swales, it is known that check dams, slight slopes, permeable soils, dense grass cover, increased contact time, and small storm events all contribute to successful pollutant removal by the swale system. Factors decreasing the effectiveness of swales include compacted soils, short runoff contact time, large storm events, frozen ground, short grass heights, steep slopes, and high runoff velocities and discharge rates.

Conventional vegetated swale designs have achieved mixed results in removing particulate pollutants. A study performed by the Nationwide Urban Runoff Program (NURP) monitored three grass swales in the Washington, D.C., area and found no significant improvement in urban runoff quality for the pollutants analyzed. However, the weak performance of these swales was attributed to the high flow velocities in the swales, soil compaction, steep slopes, and short grass height.

Another project in Durham, NC, monitored the performance of a carefully designed artificial swale that received runoff from a commercial parking lot. The project tracked 11 storms and concluded that particulate concentrations of heavy metals (Cu, Pb, Zn, and Cd) were reduced by approximately 50 percent. However, the swale proved largely ineffective for removing soluble nutrients.

The effectiveness of vegetated swales can be enhanced by adding check dams at approximately 17 meter (50 foot) increments along their length (See Figure 1). These dams maximize the retention time within the swale, decrease flow velocities, and promote particulate settling. Finally, the incorporation of vegetated filter strips parallel to the top of the channel banks can help to treat sheet flows entering the swale.

Only 9 studies have been conducted on all grassed channels designed for water quality (Table 1). The data suggest relatively high removal rates for some pollutants, but negative removals for some bacteria, and fair performance for phosphorus.

Table 1 Grassed swale pollutant removal efficiency data

	Removal Efficiencies (% Removal)						
Study	TSS	TP	TN	NO_3	Metals	Bacteria	Type
Caltrans 2002	77	8	67	66	83-90	-33	dry swales
Goldberg 1993	67.8	4.5	-	31.4	42–62	-100	grassed channel
Seattle Metro and Washington Department of Ecology 1992	60	45	-	-25	2–16	-25	grassed channel
Seattle Metro and Washington Department of Ecology, 1992	83	29	-	-25	46–73	-25	grassed channel
Wang et al., 1981	80	-	-	-	70–80	-	dry swale
Dorman et al., 1989	98	18	-	45	37–81	-	dry swale
Harper, 1988	87	83	84	80	88–90	-	dry swale
Kercher et al., 1983	99	99	99	99	99	-	dry swale
Harper, 1988.	81	17	40	52	37–69	-	wet swale
Koon, 1995	67	39	-	9	-35 to 6	-	wet swale

While it is difficult to distinguish between different designs based on the small amount of available data, grassed channels generally have poorer removal rates than wet and dry swales, although some swales appear to export soluble phosphorus (Harper, 1988; Koon, 1995). It is not clear why swales export bacteria. One explanation is that bacteria thrive in the warm swale soils.

Siting Criteria

The suitability of a swale at a site will depend on land use, size of the area serviced, soil type, slope, imperviousness of the contributing watershed, and dimensions and slope of the swale system (Schueler et al., 1992). In general, swales can be used to serve areas of less than 10 acres, with slopes no greater than 5 %. Use of natural topographic lows is encouraged and natural drainage courses should be regarded as significant local resources to be kept in use (Young et al., 1996).

Selection Criteria (NCTCOG, 1993)

- Comparable performance to wet basins
- Limited to treating a few acres
- Availability of water during dry periods to maintain vegetation
- Sufficient available land area

Research in the Austin area indicates that vegetated controls are effective at removing pollutants even when dormant. Therefore, irrigation is not required to maintain growth during dry periods, but may be necessary only to prevent the vegetation from dying.

The topography of the site should permit the design of a channel with appropriate slope and cross-sectional area. Site topography may also dictate a need for additional structural controls. Recommendations for longitudinal slopes range between 2 and 6 percent. Flatter slopes can be used, if sufficient to provide adequate conveyance. Steep slopes increase flow velocity, decrease detention time, and may require energy dissipating and grade check. Steep slopes also can be managed using a series of check dams to terrace the swale and reduce the slope to within acceptable limits. The use of check dams with swales also promotes infiltration.

Additional Design Guidelines

Most of the design guidelines adopted for swale design specify a minimum hydraulic residence time of 9 minutes. This criterion is based on the results of a single study conducted in Seattle, Washington (Seattle Metro and Washington Department of Ecology, 1992), and is not well supported. Analysis of the data collected in that study indicates that pollutant removal at a residence time of 5 minutes was not significantly different, although there is more variability in that data. Therefore, additional research in the design criteria for swales is needed. Substantial pollutant removal has also been observed for vegetated controls designed solely for conveyance (Barrett et al, 1998); consequently, some flexibility in the design is warranted.

Many design guidelines recommend that grass be frequently mowed to maintain dense coverage near the ground surface. Recent research (Colwell et al., 2000) has shown mowing frequency or grass height has little or no effect on pollutant removal.

Summary of Design Recommendations

1) The swale should have a length that provides a minimum hydraulic residence time of at least 10 minutes. The maximum bottom width should not exceed 10 feet unless a dividing berm is provided. The depth of flow should not exceed 2/3rds the height of the grass at the peak of the water quality design storm intensity. The channel slope should not exceed 2.5%.

2) A design grass height of 6 inches is recommended.

3) Regardless of the recommended detention time, the swale should be not less than 100 feet in length.

4) The width of the swale should be determined using Manning's Equation, at the peak of the design storm, using a Manning's n of 0.25.

5) The swale can be sized as both a treatment facility for the design storm and as a conveyance system to pass the peak hydraulic flows of the 100-year storm if it is located "on-line." The side slopes should be no steeper than 3:1 (H:V).

6) Roadside ditches should be regarded as significant potential swale/buffer strip sites and should be utilized for this purpose whenever possible. If flow is to be introduced through curb cuts, place pavement slightly above the elevation of the vegetated areas. Curb cuts should be at least 12 inches wide to prevent clogging.

7) Swales must be vegetated in order to provide adequate treatment of runoff. It is important to maximize water contact with vegetation and the soil surface. For general purposes, select fine, close-growing, water-resistant grasses. If possible, divert runoff (other than necessary irrigation) during the period of vegetation

establishment. Where runoff diversion is not possible, cover graded and seeded areas with suitable erosion control materials.

Maintenance

The useful life of a vegetated swale system is directly proportional to its maintenance frequency. If properly designed and regularly maintained, vegetated swales can last indefinitely. The maintenance objectives for vegetated swale systems include keeping up the hydraulic and removal efficiency of the channel and maintaining a dense, healthy grass cover.

Maintenance activities should include periodic mowing (with grass never cut shorter than the design flow depth), weed control, watering during drought conditions, reseeding of bare areas, and clearing of debris and blockages. Cuttings should be removed from the channel and disposed in a local composting facility. Accumulated sediment should also be removed manually to avoid concentrated flows in the swale. The application of fertilizers and pesticides should be minimal.

Another aspect of a good maintenance plan is repairing damaged areas within a channel. For example, if the channel develops ruts or holes, it should be repaired utilizing a suitable soil that is properly tamped and seeded. The grass cover should be thick; if it is not, reseed as necessary. Any standing water removed during the maintenance operation must be disposed to a sanitary sewer at an approved discharge location. Residuals (e.g., silt, grass cuttings) must be disposed in accordance with local or State requirements. Maintenance of grassed swales mostly involves maintenance of the grass or wetland plant cover. Typical maintenance activities are summarized below:

- Inspect swales at least twice annually for erosion, damage to vegetation, and sediment and debris accumulation preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the swale is ready for winter. However, additional inspection after periods of heavy runoff is desirable. The swale should be checked for debris and litter, and areas of sediment accumulation.
- Grass height and mowing frequency may not have a large impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.
- Trash tends to accumulate in swale areas, particularly along highways. The need for litter removal is determined through periodic inspection, but litter should always be removed prior to mowing.
- Sediment accumulating near culverts and in channels should be removed when it builds up to 75 mm (3 in.) at any spot, or covers vegetation.
- Regularly inspect swales for pools of standing water. Swales can become a nuisance due to mosquito breeding in standing water if obstructions develop (e.g. debris accumulation, invasive vegetation) and/or if proper drainage slopes are not implemented and maintained.

Cost

Construction Cost

Little data is available to estimate the difference in cost between various swale designs. One study (SWRPC, 1991) estimated the construction cost of grassed channels at approximately $0.25 per ft^2. This price does not include design costs or contingencies. Brown and Schueler (1997) estimate these costs at approximately 32 percent of construction costs for most stormwater management practices. For swales, however, these costs would probably be significantly higher since the construction costs are so low compared with other practices. A more realistic estimate would be a total cost of approximately $0.50 per ft^2, which compares favorably with other stormwater management practices.

Table 3 Estimated Maintenance Costs (SEWRPC, 1991)

Component	Unit Cost	Swale Size (Depth and Top Width)		Comment
		1.5 Foot Depth, One-Foot Bottom Width, 10-Foot Top Width	3-Foot Depth, 3-Foot Bottom Width, 21-Foot Top Width	
Lawn Mowing	$0.85 / 1,000 ft²/ mowing	$0.14 / linear foot	$0.21 / linear foot	Lawn maintenance area=(top width + 10 feet) x length. Mow eight times per year
General Lawn Care	$9.00 / 1,000 ft²/ year	$0.16 / linear foot	$0.26 / linear foot	Lawn maintenance area = (top width + 10 feet) x length
Swale Debris and Litter Removal	$0.10 / linear foot / year	$0.10 / linear foot	$0.10 / linear foot	--
Grass Reseeding with Mulch and Fertilizer	$0.30 / yd²	$0.01 / linear foot	$0.01 / linear foot	Area revegetated equals 1% of lawn maintenance area per year
Program Administration and Swale Inspection	$0.15 / linear foot / year, plus $25 / inspection	$0.15 / linear foot	$0.15 / linear foot	Inspect four times per year
Total	--	$0.58 / linear foot	$ 0.75 / linear foot	--

Maintenance Cost

Caltrans (2002) estimated the expected annual maintenance cost for a swale with a tributary area of approximately 2 ha at approximately $2,700. Since almost all maintenance consists of mowing, the cost is fundamentally a function of the mowing frequency. Unit costs developed by SEWRPC are shown in Table 3. In many cases vegetated channels would be used to convey runoff and would require periodic mowing as well, so there may be little additional cost for the water quality component. Since essentially all the activities are related to vegetation management, no special training is required for maintenance personnel.

References and Sources of Additional Information

Barrett, Michael E., Walsh, Patrick M., Malina, Joseph F., Jr., Charbeneau, Randall J, 1998, "Performance of vegetative controls for treating highway runoff," *ASCE Journal of Environmental Engineering*, Vol. 124, No. 11, pp. 1121-1128.

Brown, W., and T. Schueler. 1997. *The Economics of Stormwater BMPs in the Mid-Atlantic Region*. Prepared for the Chesapeake Research Consortium, Edgewater, MD, by the Center for Watershed Protection, Ellicott City, MD.

Center for Watershed Protection (CWP). 1996. *Design of Stormwater Filtering Systems*. Prepared for the Chesapeake Research Consortium, Solomons, MD, and USEPA Region V, Chicago, IL, by the Center for Watershed Protection, Ellicott City, MD.

Colwell, Shanti R., Horner, Richard R., and Booth, Derek B., 2000. *Characterization of Performance Predictors and Evaluation of Mowing Practices in Biofiltration Swales*. Report to King County Land And Water Resources Division and others by Center for Urban Water Resources Management, Department of Civil and Environmental Engineering, University of Washington, Seattle, WA

Dorman, M.E., J. Hartigan, R.F. Steg, and T. Quasebarth. 1989. *Retention, Detention and Overland Flow for Pollutant Removal From Highway Stormwater Runoff. Vol. 1*. FHWA/RD 89/202. Federal Highway Administration, Washington, DC.

Goldberg. 1993. *Dayton Avenue Swale Biofiltration Study*. Seattle Engineering Department, Seattle, WA.

Harper, H. 1988. *Effects of Stormwater Management Systems on Groundwater Quality*. Prepared for Florida Department of Environmental Regulation, Tallahassee, FL, by Environmental Research and Design, Inc., Orlando, FL.

Kercher, W.C., J.C. Landon, and R. Massarelli. 1983. Grassy swales prove cost-effective for water pollution control. *Public Works*, 16: 53–55.

Koon, J. 1995. *Evaluation of Water Quality Ponds and Swales in the Issaquah/East Lake Sammamish Basins*. King County Surface Water Management, Seattle, WA, and Washington Department of Ecology, Olympia, WA.

Metzger, M. E., D. F. Messer, C. L. Beitia, C. M. Myers, and V. L. Kramer. 2002. The Dark Side Of Stormwater Runoff Management: Disease Vectors Associated With Structural BMPs. Stormwater 3(2): 24-39.Oakland, P.H. 1983. An evaluation of stormwater pollutant removal

through grassed swale treatment. In *Proceedings of the International Symposium of Urban Hydrology, Hydraulics and Sediment Control, Lexington, KY*. pp. 173–182.

Occoquan Watershed Monitoring Laboratory. 1983. Final Report: *Metropolitan Washington Urban Runoff Project*. Prepared for the Metropolitan Washington Council of Governments, Washington, DC, by the Occoquan Watershed Monitoring Laboratory, Manassas, VA.

Pitt, R., and J. McLean. 1986. *Toronto Area Watershed Management Strategy Study: Humber River Pilot Watershed Project*. Ontario Ministry of Environment, Toronto, ON.

Schueler, T. 1997. Comparative Pollutant Removal Capability of Urban BMPs: A reanalysis. *Watershed Protection Techniques* 2(2):379–383.

Seattle Metro and Washington Department of Ecology. 1992. *Biofiltration Swale Performance: Recommendations and Design Considerations*. Publication No. 657. Water Pollution Control Department, Seattle, WA.

Southeastern Wisconsin Regional Planning Commission (SWRPC). 1991. *Costs of Urban Nonpoint Source Water Pollution Control Measures*. Technical report no. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI.

U.S. EPA, 1999, Stormwater Fact Sheet: Vegetated Swales, Report # 832-F-99-006 http://www.epa.gov/owm/mtb/vegswale.pdf, Office of Water, Washington DC.

Wang, T., D. Spyridakis, B. Mar, and R. Horner. 1981. *Transport, Deposition and Control of Heavy Metals in Highway Runoff*. FHWA-WA-RD-39-10. University of Washington, Department of Civil Engineering, Seattle, WA.

Washington State Department of Transportation, 1995, *Highway Runoff Manual*, Washington State Department of Transportation, Olympia, Washington.

Welborn, C., and J. Veenhuis. 1987. *Effects of Runoff Controls on the Quantity and Quality of Urban Runoff in Two Locations in Austin, TX*. USGS Water Resources Investigations Report No. 87-4004. U.S. Geological Survey, Reston, VA.

Yousef, Y., M. Wanielista, H. Harper, D. Pearce, and R. Tolbert. 1985. *Best Management Practices: Removal of Highway Contaminants By Roadside Swales*. University of Central Florida and Florida Department of Transportation, Orlando, FL.

Yu, S., S. Barnes, and V. Gerde. 1993. *Testing of Best Management Practices for Controlling Highway Runoff*. FHWA/VA-93-R16. Virginia Transportation Research Council, Charlottesville, VA.

Information Resources

Maryland Department of the Environment (MDE). 2000. *Maryland Stormwater Design Manual*. www.mde.state.md.us/environment/wma/stormwatermanual. Accessed May 22, 2001.

Reeves, E. 1994. Performance and Condition of Biofilters in the Pacific Northwest. *Watershed Protection Techniques* 1(3):117–119.

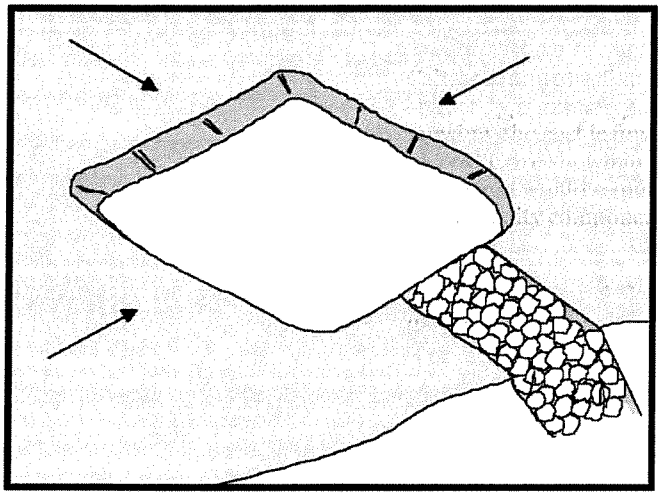
Seattle Metro and Washington Department of Ecology. 1992. *Biofiltration Swale Performance.* Recommendations and Design Considerations. Publication No. 657. Seattle Metro and Washington Department of Ecology, Olympia, WA.

USEPA 1993. *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.* EPA-840-B-92-002. U.S. Environmental Protection Agency, Office of Water. Washington, DC.

Watershed Management Institute (WMI). 1997. *Operation, Maintenance, and Management of Stormwater Management Systems.* Prepared for U.S. Environmental Protection Agency, Office of Water. Washington, DC, by the Watershed Management Institute, Ingleside, MD.

SEDIMENT TRAP

Sediment Trap SE-3



Objectives

EC	Erosion Control	
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.
- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.
- Conducive to vector production.
- Should not be located in live streams.

Implementation

Design

A sediment trap is a small temporary ponding area, usually with a gravel outlet, formed by excavation or by construction of an earthen embankment. Its purpose is to collect and store sediment from sites cleared or graded during construction. It is intended for use on small drainage areas with no unusual drainage features and projected for a quick build-out time. It should help in removing coarse sediment from runoff. The trap is a temporary measure with a design life of approximately six months to one year and is to be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, refer to SE-2, Sediment Basins, or subdivide the catchment area into smaller drainage basins.

Sediment usually must be removed from the trap after each rainfall event. The SWPPP should detail how this sediment is to be disposed of, such as in fill areas onsite, or removal to an approved offsite dump. Sediment traps used as perimeter controls should be installed before any land disturbance takes place in the drainage area.

Sediment traps are usually small enough that a failure of the structure would not result in a loss of life, damage to home or buildings, or interruption in the use of public roads or utilities. However, sediment traps are attractive to children and can be dangerous. The following recommendations should be implemented to reduce risks:

- Install continuous fencing around the sediment trap or pond. Consult local ordinances regarding requirements for maintaining health and safety.
- Restrict basin side slopes to 3:1 or flatter.

Sediment trap size depends on the type of soil, size of the drainage area, and desired sediment removal efficiency (see SE-2, Sediment Basin). As a rule of thumb, the larger the basin volume the greater the sediment removal efficiency. Sizing criteria are typically established under the local grading ordinance or equivalent. The runoff volume from a 2-year storm is a common design criteria for a sediment trap. The sizing criteria below assume that this runoff volume is 0.042 acre-ft/acre (0.5 in. of runoff). While the climatic, topographic, and soil type extremes make it difficult to establish a statewide standard, the following criteria should trap moderate to high amounts of sediment in most areas of California:

- Locate sediment traps as near as practical to areas producing the sediment.
- Trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd^3/acre and 33 yd^3/acre of contributing drainage area, respectively, based on 0.5 in. of runoff volume over a 24-hour period. In many cases, the size of an individual trap is limited by available space. Multiple traps or additional volume may be required to accommodate specific rainfall, soil, and site conditions.
- Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- The outlet pipe or open spillway must be designed to convey anticipated peak flows.
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing should be provided to prevent unauthorized entry.

Installation

Sediment traps can be constructed by excavating a depression in the ground or creating an impoundment with a small embankment. Sediment traps should be installed outside the area being graded and should be built prior to the start of the grading activities or removal of vegetation. To minimize the area disturbed by them, sediment traps should be installed in natural depressions or in small swales or drainage ways. The following steps must be followed during installation:

- The area under the embankment must be cleared, grubbed, and stripped of any vegetation and root mat. The pool area should be cleared.
- The fill material for the embankment must be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment may be compacted by traversing with equipment while it is being constructed.
- All cut-and-fill slopes should be 3:1 or flatter.
- When a riser is used, all pipe joints must be watertight.
- When a riser is used, at least the top two-thirds of the riser should be perforated with 0.5 in. diameter holes spaced 8 in. vertically and 10 to 12 in. horizontally. See SE-2, Sediment Basin.
- When an earth or stone outlet is used, the outlet crest elevation should be at least 1 ft below the top of the embankment.

- When crushed stone outlet is used, the crushed stone used in the outlet should meet AASHTO M43, size No. 2 or 24, or its equivalent such as MSHA No. 2. Gravel meeting the above gradation may be used if crushed stone is not available.

Costs

Average annual cost per installation and maintenance (18 month useful life) is $0.73 per ft^3 ($1,300 per drainage acre). Maintenance costs are approximately 20% of installation costs.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect outlet area for erosion and stabilize if required.
- Inspect trap banks for seepage and structural soundness, repair as needed.
- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect fencing for damage and repair as needed.
- Inspect the sediment trap for area of standing water during every visit. Corrective measures should be taken if the BMP does not dewater completely in 72 hours or less to prevent vector production.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the trap capacity. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.
- Remove vegetation from the sediment trap when first detected to prevent pools of standing water and subsequent vector production.
- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs shall be implemented at all times during dewatering activities.

References

Brown, W., and T. Schueler. The Economics of Stormwater BMPs in the Mid-Atlantic Region. Prepared for Chesapeake Research Consortium, Edgewater, MD, by the Center for Watershed Protection, Ellicott City, MD, 1997.

Draft – Sedimentation and Erosion Control, an Inventory of Current Practices, USEPA, April 1990.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Metzger, M.E., D.F. Messer, C.L. Beitia, C.M. Myers, and V.L. Kramer, The Dark Side of Stormwater Runoff Management: Disease Vectors Associated with Structural BMPs, 2002.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

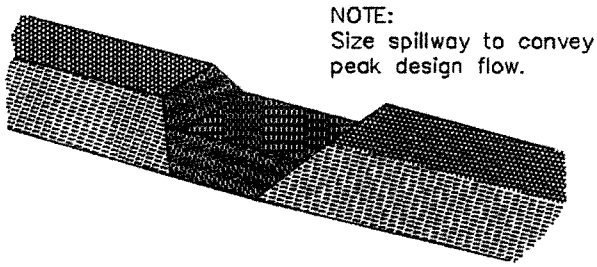
Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

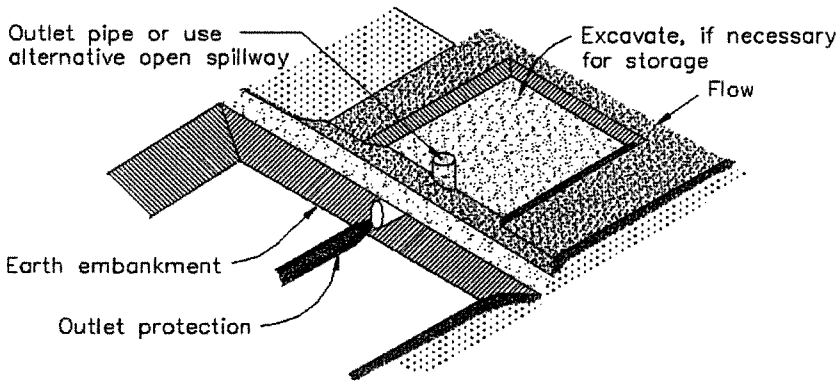
Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

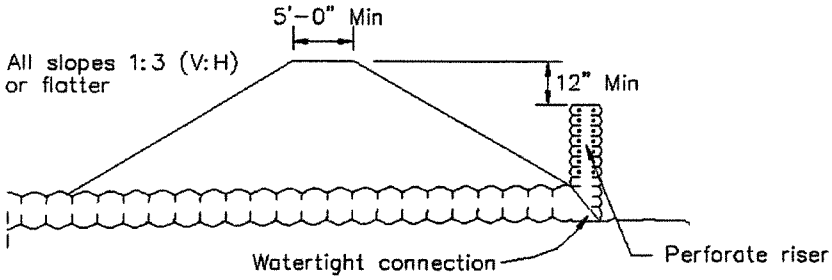
U.S. Environmental Protection Agency (USEPA). Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters. EPA 840-B-9-002. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



TYPICAL OPEN SPILLWAY





EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP
NOT TO SCALE

SLOPETAME 2

Product Data Sheet - Slopetame^2

Slopetame^2 (ST^2) is a unique solution to age old problems - soil erosion and stabilization of soil on slopes and vegetated drainage channels.

The difficulty with most erosion control products are their lack of ability to keep soils in place until root systems are mature, and their potential to be undercut by rapid flow of storm water. These products are usually thin sheets of various materials, or open web-like matrices.

Other existing products act to "contain" various depths of fill materials by cellular constructions of fabrics or plastic sheets, but offer little resistance to water undercutting, or ability to interconnect cells of vegetation.

ST^2 System Description-
Each ST^2 unit is a 3-dimensional structure designed to isolate and contain small zones of soil over the entire slope surface, while at the same time preventing water from under cutting the unit and dislodging soil and roots.

ST^2 units consist of rigid upstanding rings connected with a flexible diagonal geogrid injection molded onto a geotextile fabric. The fabric acts to contain soil or gravel fill, while rows of bars and rings act to prevent erosion channels developing between rows of rings.

ST^2 Benefits-

- True 3-dimensional containment of fill.
- Rings and bars offer small scale confinement.
- Shallow depth of fill material needed.
- Strong diagonal grid to disperse loads across slopes.
- All units can be interlocked for continuous structure across slopes.
- Geotextile fabrics to strengthen root matrix.
- Fabrics act to slow speed of water infiltration and reduce chance of undercutting.
- Fabrics under gravel fill can prevent plant penetration from below and resist root penetration from above.
- Product is lightweight and easy to assemble.
- Recycled plastics are used.
- Plastics are treated for UV resistance.
- These plastics are inert from damage from normal chemicals used in horticulture.

ST^2 Units & System-
The ST^2 system includes the unit, and duckbill anchors - 3 ft (1 meter) lengths of 1/2" (1.25 cm) rebar not included. Soil preparation, product placement, anchors, soil or gravel fill, and irrigation (if required), are provided by the contractor, and considered an essential part of the installation of the system.

ST^2 Installation Guidelines-
If undisturbed slope continues above the area designated for ST^2, cut-off drains should be installed at the top of

the new slope to intercept surface water generated from above. The new slope will need only to contend with water actually falling on the ST^2 surfaced area, minimizing storm water volume build-up.

At the toe of long slopes, or at terrace levels, additional cut-off drains may be installed for the similar purposes downstream.

The units should extend from the top to toe of a slope in one continuous piece. 1 - 2.5 meter wide rolls are sold in standard lengths but can be preassembled in custom lengths.

Generally spunbonded non-woven fabrics made of either polyester or polypropylene are used, to enhance root system strength.

Units are anchored securely from the top of the slope, and periodically along the face of the slope. Types of anchors used may vary with substrata conditions.

ST^2 units are then filled with small gravel, or a lightweight soil mix, preferably, which includes Hydrogrow soil conditioner to retain adequate moisture in the primary root zone.

Gravel Fill -
For slopes that do not require vegetation cover, the ST^2 units can be filled with small gravel - which should be 3/8's inch minus in size, and sharp (crushed) rather than rounded to best lock into place.

Vegetation -
ST^2 system can be very effective in assisting new vegetative cover to establish and remain in place for years by protecting the root zone from soil removal due to water runoff.
Compatible forms of vegetation include:

- Grasses
- Groundcovers
- Vines
- Shrubs
- Trees

The selected form(s) should be matched with slope, soil types, moisture, maintenance and aesthetic requirements of the site.

Shrubs and trees, with their larger roots, will most likely be restricted to slopes with permeable soils below the units and openings cut into the unit (remove rings with pruning shears) to allow proper root development.

Groundcovers other than grasses will usually be planted from pots ranging in size from 2" to 1 gallon. Small plants may have the root system split to grow over and between rings, while larger plants may require ring removal.

Grasses and most wildflowers will be best installed by seeding, or hydroseeding techniques.

As the root systems develop, roots will penetrate and integrate with the fabric layer to establish a very strong surface.

Normal Installation Steps-
Installation of the system begins with soil preparation.

1. The soil should be tilled to a depth of 10 cm to 15 cm.
2. Pre-assemble on flat ground 1, 1.5, 2, or 2.5 meter widths, for the continuous length of the slope, deforming the top of connection pins with heat (propane torch and screwdriver) to prevent separation.

3. Start at the highest elevation and place the ST^2 mat with rings up, fabric down, and the double hole corner at the upper right position, and unroll down the slope. Make connections to adjacent units and deform pins to keep interlocked.

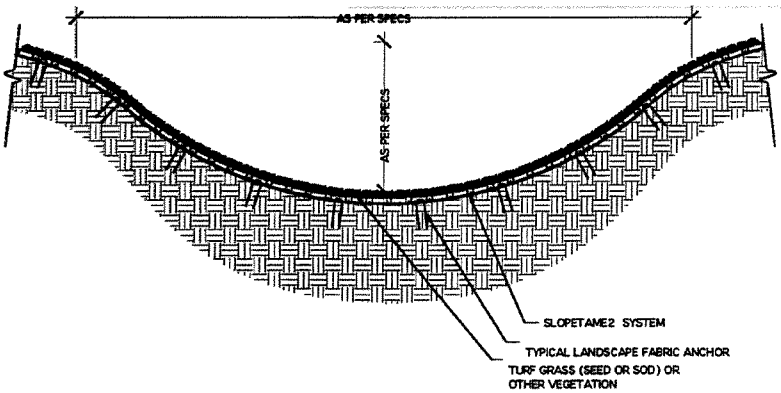
4. Anchor the mat with 1 pin (15 cm long x 25 mm wide x 2 mm ga. wire) placed just inside the double hole corner, every 40" on center, or closer as may be needed by local conditions.

5. Shrubs and trees may be placed by cutting away rings/grid/fabric to accommodate root ball. Place crown of plant just below the top of rings.

6. Fill the Slopetame^2 units with proper topsoil type materials in preparation for seeding.

7. Hydroseed and mulch the area for grasses and groundcovers. Mulch materials (paper, cellulose, or light fabric) will protect delicate seedlings until germination, and roots have reached the ST^2 fabric layer.

8. Provide supplemental irrigation as needed to assure germination and plant root establishment.



NOTE: GRASS/VEGETATION AND SAND/SOIL TYPES SHALL BE SPECIFIED BY A LANDSCAPE ARCHITECT OR ENGINEER

SLOPETAME2 SWALE REINFORCEMENT

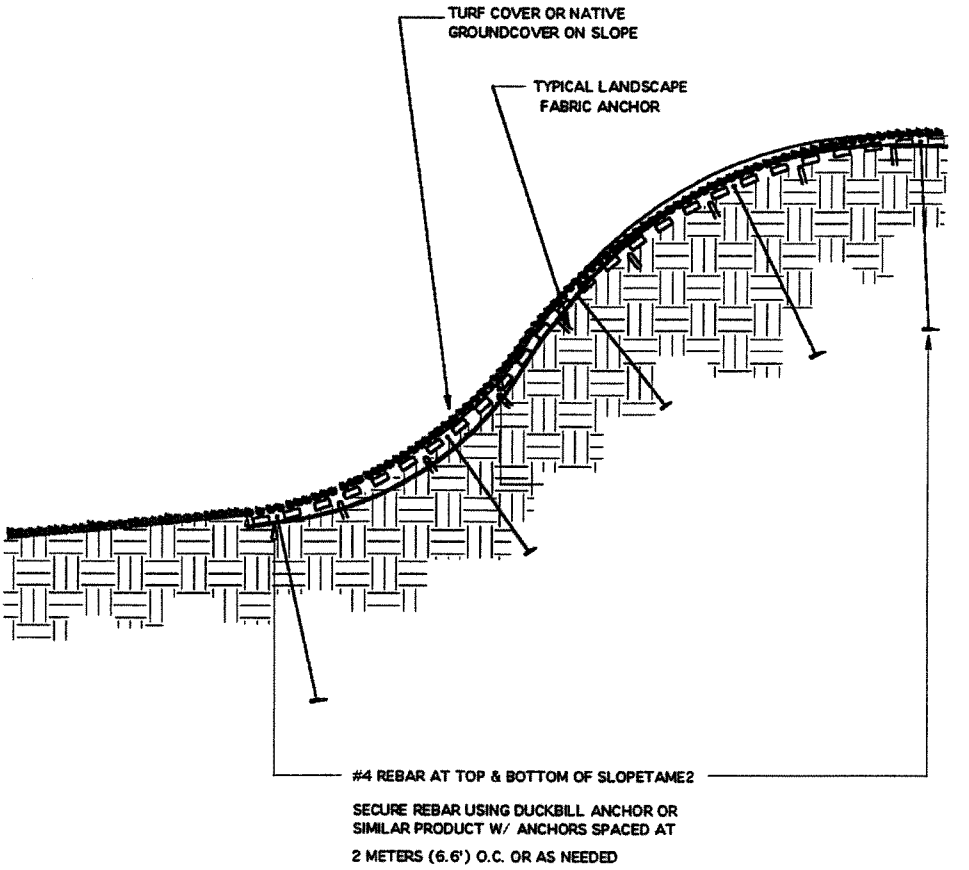
1
1OF1

NOT TO SCALE

CHOOSE THIS PRODUCT FOR EROSION AND SEDIMENT CONTROL

Invisible Structures, Inc.
ST2Swale.dwg

1600 Jackson St., SUITE 310
GOLDEN, COLORADO 80401
800-233-1510 or 303-233-8989
Fax 303-233-6262
www.invisiblestructures.com
Rev. 08/04



SLOPETAME2 CHANNEL REINFORCEMENT

1

1 OF 1

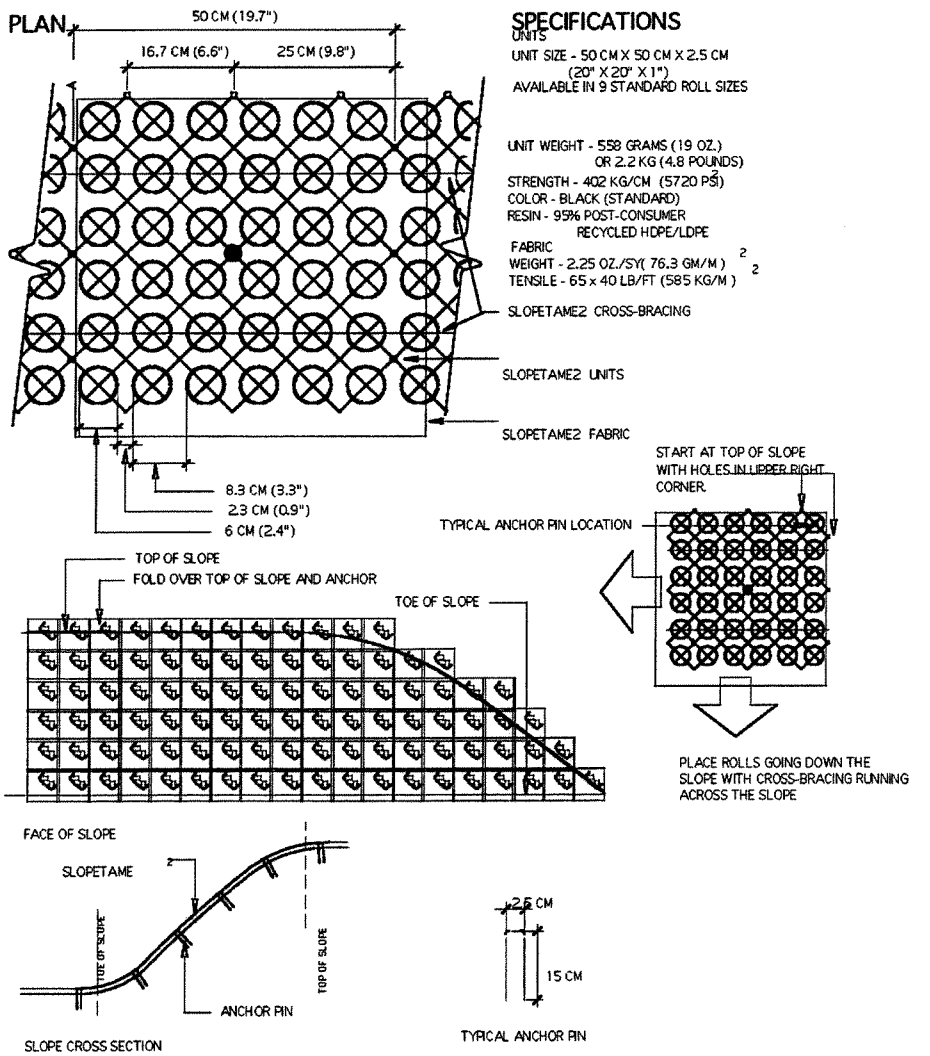
NOT TO SCALE

CHOOSE THIS PRODUCT FOR CHANNEL EROSION AND SEDIMENT CONTROL

Invisible Structures, Inc.

St2-channel.dwg

1600 Jackson St., Suite 310
Golden, CO 80401
800-233-1510 OR 303-233-8983
FAX: 303-233-8282
www.invisiblestructures.com
Rev. 08/04



TYPICAL SLOPETAME2 ASSEMBLY AND ANCHORAGE

1
1 OF 1

CHOOSE THIS PRODUCT FOR STABALIZING SLOPE CONDITIONS

NOT TO SCALE

Invisible
Structures, Inc.

1600 Jackson St., Suite 310
Golden, Colorado 80401
800-239-1610 OR 303-233-6363
FAX: 303-233-6282
rev. 08/04

St2.dwg

ATTACHMENT F
OPERATION AND MAINTENANCE PROGRAM FOR TREATMENT BMPs

BMP CATEGORY (FIRST)	MAINTENANCE ACTIVITIES	ANNUAL COST
BIO-FILTERATION SWALES (along the roadways only) (12,850 sf total)	- CUT VEGETATION IN CHANNEL TO 8" or 6" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM CHANNEL AS NECESSARY - BACKFILL BURROW HOLES AS NECESSARY	$38,500
	TOTAL	**$ 38,500**
MAINTENANCE RESPONSIBILITY	The County should have only minimal concern for ongoing maintenance. The property owners and HOA can naturally be expected to do so as a requirement of taking care of their property.	
BMP CATEGORY (SECOND)	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
SEDIMENT TRAPS (9 total)	- INSPECT STRUCTURAL INTEGRITY - REMOVE SEDIMENT FROM BASIN AS NECESSARY	$18,000
CURB INLET W/ WATER QUALITY INTERCEPTOR/DROP OUTLET BOX (11 total)	- INSPECT STRUCTURAL INTEGRITY - REMOVE TRASH AND DEBRIS FROM GRATE	$11,000
	- **TOTAL**	**$29,000**
MAINTENANCE RESPONSIBILITY	The County needs to assure ongoing maintenance. It is appropriate for the HOA to be given primary responsibility for maintenance. The County needs to be able to step in and perform the maintenance if HOA fails, and needs to have security to provide funding for such maintenance.	
BMP CATEGORY (THIRD)	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
DETENTION BASIN (1 total)	- CUT VEGETATION IN BASIN TO 8" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM BASIN AS NECESSARY - INSPECT STRUCTURAL INTEGRITY - BACKFILL BURROW HOLES AS NECESSARY	$10,000
MAINTENANCE RESPONSIBILITY	The County needs to assure ongoing maintenance is heightened, to the point that the County is willing to take on this responsibility. The master HOA will be primarily responsible for maintenance. A permanent funding mechanism needs to be established. A special assessment district will be established for this project, the assessment will be collected with property tax.	
	TOTAL	**$10,000**
	GRAND TOTAL	**$ 77,500**

Note: There are no storm drain inserts with this project. However, see Section II of this report for the number of storm drain inserts proposed with the "B" Designator site plans.

ATTACHMENT G

FISCAL RESOURCES

The individual home owners will be responsible for the BMP devices on their individual residential lots. The master Home Owners' Associations (HOA) will be responsible for the BMP devices in the public right of way and adjoining slopes, the Sports Complex, the Pool Site, the detention basin and the Staging Area/Pump Station lot. The developer will be responsible for the maintenance of interim BMP devices (i.e. sediment traps) on the mass-graded multi-family and commercial lots before they are developed into their ultimate use. Ultimately, after the "B" Designator site plan areas are developed, the individual site HOAs will be responsible for the permanent BMP devices in the multi-family neighborhoods and neighbor recreation facilities and the Tenants' Association will be responsible for the maintenance of permanent BMP devices on the commercial lots.

ATTACHMENT H

CERTIFICATION SHEET

This Stormwater Management Plan has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

The combination of proposed construction and post-construction BMPs will reduce, to the maximum extent practicable, the expected pollutants and will not adversely impact the beneficial uses or water quality of the receiving waters.

Date:

ATTACHMENT I

ADDENDUM

Section II

Storm Water Management Plan
For Priority Projects
(Major SWMP)

The Major Stormwater Management Plan (Major SWMP) must be completed in its entirety and accompany applications to the County for a permit or approval associated with certain types of development projects. To determine whether your project is required to submit a Major or Minor SWMP, please reference the County's Stormwater Intake Form for Development Projects.

Project Name:	Campus Park, "B" Designator Site Plans
Permit Number (Land Development Projects):	TM 5338 RPL6
Work Authorization Number (CIP):	
Applicant:	Passerelle, LLC
Applicant's Address:	402 W. Broadway, Suite 1320 San Diego, Ca 92101
Plan Prepare By (*Leave blank if same as applicant*):	Landmark Consulting
Date:	6-27-07
Revision Date (If applicable):	~~9-1-08~~ 3-3-09

The County of San Diego Watershed Protection, Storm Water Management, and Discharge Control Ordinance (WPO) (Ordinance No. 9424) requires all applications for a permit or approval associated with a Land Disturbance Activity must be accompanied by a Storm Water Management Plan (SWMP) (section 67.804.f). The purpose of the SWMP is to describe how the project will minimize the short and long-term impacts on receiving water quality. Projects that meet the criteria for a priority project are required to prepare a Major SWMP.

Since the SWMP is a living document, revisions may be necessary during various stages of approval by the County. Please provide the approval information requested below.

Project Stages	Does the SWMP need revisions?		If YES, Provide Revision Date
	YES	NO	
1		X	
2	X		9-1-08
3	X		3-3-09

Instructions for a Major SWMP can be downloaded at http://www.co.sandiego.ca.us/dpw/stormwater/susmp.html.

Completion of the following checklists and attachments will fulfill the requirements of a Major SWMP for the project listed above.

PROJECT DESCRIPTION

The project is located on the northerly side of Pala Road, east of Interstate 15, west of Rice Canyon Road and south of Stewart Canyon Road, in the County of San Diego, State of California. The surrounding land uses around the project are as follows: westerly is Interstate 15, southerly is Pala Road (SR-76)/agricultural, easterly is agricultural/vacant/large parcel SFR, northerly is agricultural/large parcel SFR. The main entrance to the project is from SR-76 (Pala Road) to the south of the project site.

Attachment A is a vicinity map showing the general property location. In its pre-development condition, the site is located on a north to south sloping topography. The terrain along the northerly and easterly boundaries are steep sloping, the mid-portion of the project is moderately sloping and the southerly end of the project is very gently sloping. The project site is located at the downstream end of an approximately 7,500 acre upstream drainage basin. An existing Caltrans channel conveys runoff from this upstream basin southerly along a portion of the westerly boundary of this project. The runoff from this upstream basin creates the Horse Ranch Creek and floodplain which eventually confluence with the San Luis Rey River to the south.

~~The project consists of approximately 415.8 areas of mixed development including 73.6 acres of single family dwelling units, 44.8 acres of multi-family dwelling units, 7.8 acres of town center development, 10.9 acres of professional office development, 0.7 acres of trail staging area, 0.1 acres of pump station area, 10.4 acres of park area, 49.8 acres of streets and 217.7 acres of open space area.~~

The project consists of approximately 416.1 acres of mixed-use development including 113.8 acres of single family dwelling units, 45.4 acres of multi-family dwelling units, 11.5 acres of professional office development, 8.1 acres of town center, 215.4 acres of parks and open space, 0.2 acres of pump station area as well as 21.7 acres of major circulation roads.

This SWMP will address the water quality issues of the recreational areas, the multi-family sites, professional office sites and commercial sites of this planned development. These sites will be built upon mass-graded pads. Section I of this report addresses the water quality issues of the tentative map and mass grading of the site. Runoff coefficents used throughout this report were taken from the hydrology report titled "A CEQA Level Preliminary Hydrology & Hydraulics Study for Campus Park".

The following pages will describe in detail each of the "B" Designator Site Plans proposed with this project.

Multi-Family 1, MF-1, is located on ~~the southwesterly corner of the intersection of Pala Mesa Drive and~~ Horse Ranch Creek Road just south of the proposed Palomar College site.. The site is located on a super pad at a 1% north to south sloping terrain. Nine multi-family building clusters will be built along a north-south main driveway through the middle of the site. The runoff from clusters 1 -4 flows into the landscaped areas surrounding each building and then onto the main driveway via a series of concrete ribbon gutters. The runoff flows southerly along a concrete ribbon gutter on the easterly side of the main driveway and into a proposed curb inlet equipped with fossil filter insert. The discharge then is carried to a fossil filter insert equipped grated drain inlet at the southerly end of the concrete ribbon gutter in cluster 9. Clusters 5-9 also drain into the landscaped areas surrounding the buildings and then into this inlet via a series of concrete ribbon gutters, the confluence flow from this inlet is discharged onto the southerly natural terrain via a down drain.

The runoff from the buildings is treated when it is discharged into the landscaped areas surrounding each building. The buildings will contribute very limited amount of pollutants, such as sediments, to the overall discharge from the site. Even though the runoff from the building intermingles with the untreated runoff from the street, it is anticipated that the buildings will not contribute additional pollutants to the runoff.

The grated inlet will be equipped with a water quality drop outlet that will divert the low flow, first flush runoff from the main outlet pipe to a low-flow water quality pipe that will discharge the first flush flow into a grass-lined bio-swale cut into the southerly fill slope and discharge onto the existing natural terrain. The low flow outlet pipe will have a flow line elevation 8 inches below the main storm drain flow line elevation such that pollutant laden first flush flow will flow into the outlet trap and out the low flow 8" outlet pipe without reaching the downstream main storm drain pipe. The 8" water quality low flow outlet pipe will convey the first flush runoff into a turf reinforced grass-lined water quality low flow bio-filtration swales cut into the manufactured slopes.

The bio-swales will have a 0.2% slope where the first flush runoff will slow and filter through the vegetation before reaching the down stream terrain. Since the bio-swales are cut into the slopes, the slope at the downstream end is relatively steep, thus, turf reinforcement such as Slope Tame 2 by Invisible Structures will be installed at the downstream end of the swale to prevent erosion. During normal peak runoff events following the first flush flow, the peak runoff will simply fill the outlet trap to reach the normal flow lines of the 100-year storm drain pipe and continue on downstream.

The tributary area of the site is 10.8 acres, the water quality flow based on 0.2 in/hr is 1.5 cfs (Qwq = C x I x A = 0.71 x 0.2in/hr x 10.8 Ac = 1.5 cfs).

Multi-Family 2, MF-2, is located on the southeasterly corner of the intersection of Harvest Glen Lane and Horse Ranch Creek Road. This site consists of 4 building clusters of town home type development. The site will be mass graded to a gentle northeast to southwest sloping terrain (at approximately 1% grade). A driveway cuts across the northwesterly corner of the site to provide access from both Harvest Glen Lane and Horse Ranch Creek Road. ~~The runoff from clusters 7 and 8 sheet flows onto the driveway and flow to a low point just south of cluster 3 that will confluence with the flows from clusters 1-3. The combined runoff will flow southerly along a concrete ribbon gutter through clusters 4-6 and into a curb inlet, and from there the runoff will be discharged into a storm trunk system located in Horse Ranch Creek Road via an under ground pipe along the westerly property line. During first flush rain event, the low flow runoff will be diverted from the curb inlet by a baffle such that it will enter a grass-lined swale long the westerly property line and into a grated inlet. The low flow runoff will then be conveyed into the main outlet pipe via an 8" pvc pipe.~~

The runoff from each of the building clusters will drain into the surrounding landscaped areas then onto the street and ribbon gutters. The discharge from the building clusters and streets will flow along the ribbon gutters and to a proposed curb inlet equipped with fossil filter insert at the southerly end of the driveway. Prior to entering the curb inlet, an low flow interceptor channel drain, installed in front of the curb inlet opening, will divert the low flow water quality runoff into bio-filtration swale located in the landscaped area at the southerly tip of the site. The 100-year storm runoff volumes will simply bypass the low flow interceptor channel drain in front of the curb inlet and will flow directly into the storm drain lateral from the Horse Ranch Creek Road storm drain system.

The tributary area of the site is 5.4 acres, the 85th percentile storm is 0.8 in. The water quality first flush runoff volume is:

The tributary area of the site is 5.4 acres, the water quality flow based on 0.2 in/hr is 0.8 cfs (Qwq = C x I x A = 0.71 x 0.2in/hr x 5.4 Ac = 0.8 cfs).

Multi-Family 3, MF-3, is located between Longspur Road and Harvest Glen Lane, easterly of the proposed Town Center sites. The site is on a gentle northeast to southwest sloping mass-graded pad (at approximately 1% grade). The runoff form the northeasterly corner of the site – building cluster 1, flows onto the circle drive's northerly gutter and into a curb inlet located at the northeaster end of the driveway approach form Longspur Road. This curb inlet will be connected to another curb inlet located on the northwesterly corner of the driveway. The northwesterly curb inlet outlets to the storm drain main located in Longspur Road. A water quality low flow drop structure will be built into this northwesterly curb inlet such that the first flush flow will not reach the main outlet pipe but instead into low flow outlet pipe. The low flow outlet pipe will discharge the first flush flow onto a grass-lined bio-filtration swale located along Longspur Road. A grated drain inlet will collect the first flush flow from the swale at the westerly end of the swale and discharge the runoff into the same storm drain main pipe in Longspur Road. The runoff form the easterly and southerly portions of the site, building clusters 2-5, as well as the driveway approach off Harvest Glen Lane, flows onto the circle drive and into two curb inlets located at the southerly end of the driveway approach. The westerly curb inlet is equipped with a water quality low flow drop outlet such that the first flush will by pass the main outlet pipe and into a low flow outlet pipe. The low flow outlet pipe will discharge the first flush runoff into a grass-line bio-filtration swale along Harvest Glen Lane and into storm drain main pipe in Harvest Glen Lane. The main outlet pipe is connected to an underground system located at the southwesterly corner of the site. This underground system will convey the runoff from rest of the site to the storm drain main pipe in Harvest Glen Lane. This system is also equipped with a water quality low flow outlet structure that will discharge the first flush flow into the same bio-filtration swale along Harvest Glen Lane.

The tributary area to the northeasterly system is 1.7 acres, the water quality flow based on 0.2in/hr is 0.2 cfs (Qwq = C x I x A = 0.71 x 0.2in/hr x 1.7 Ac = 0.2 cfs).

The tributary area to the southerly system is 16.8 acres, the water quality flow is 2.4 cfs (Qwq = C x I x A = 0.71 x 0.2in/hr x 16.8 Ac = 2.4 cfs).

Multi-Family 4, MF-4, is located on the on the northeasterly corner of Pala Mesa Drive and Pala Road. The northeasterly corner of the site drains into Street "A" where the street gutter will convey the runoff northerly (towards Pankey Place) into a curb inlet located at the easterly intersection into the site from Pankey Place. A water quality low flow drop structure will be built into this curb inlet such that the first flush flow will not reach the main outlet pipe but instead into a low flow outlet pipe. The low flow outlet pipe will discharge the first flush flow into a grass-lined bio-filtration swale located along Pankey Place, south of this intersection. The 100-year runoff will bypass the water quality low flow drop structure and continue flowing into a proposed storm drain main located south of and parallel to Pankey Place. The water quality low flow runoff in the bio-swale will get picked up in a grated inlet located at the southeasterly corner of the westerly intersection into the site from Pankey Place.

The middle section of the site drains to two grated inlets looked in the middle of the site, just south of Pankey Place. The grated inlets will have water quality low flow interceptor channel drains in front of the grated inlets so that the first flush flow will be diverted into a low flow outlet pipe. The low flow outlet pipe will discharge into the same grass-lined bio-filtration swale located south of and parallel to Pankey Place. This low flow runoff will be picked up in the same grated inlet located at the southeasterly corner of the westerly intersection into the site from Pankey Place.

The rest of the site drains onto Street "A" and into a water quality low flow drop structure built into a curb inlet located at the westerly intersection into the site such that the first flush flow will not reach the main outlet pipe but instead into a low flow outlet pipe . The low flow outlet pipe will discharge the first flush flow into a grass-lined bio-filtration swale located along Pankey Place, south of this intersection. The 100-year runoff will bypass the water quality low flow drop structure and continue flowing into a proposed storm drain main located south of and parallel to Pankey Place. The water quality low flow runoff in the bio-swale will get picked up in a grated inlet located at the southeasterly corner of the intersection of Pankey Place and Pala Mesa Drive.

The tributary area of the northeasterly corner is 2.2 acres, the water quality flow is:

$Qwq = C \times I \times A = 0.71 \times 0.2 \times 2.2 = 0.3$ cfs

The tributary area for the middle section of the site is 1.1 acres, the water quality flow is:

$Qwq = C \times I \times A = 0.71 \times 0.2 \times 1.1 = 0.2$ cfs

The tributary area of the rest of the site is 6.1 acres, the water quality flow is:

$Qwq = C \times I \times A = 0.71 \times 0.2 \times 6.1 = 0.9$ cfs

Professional Office 1, PO1, is located across the Baltimore Oriole Road from the above site, between Jaeger Street and Horse Ranch Creek Road. This site consists of one professional office building that is surrounded by a driveway isle and parking spaces. The runoff from the site sheet flows southerly and westerly and into a curb and gutter system along the northwesterly, westerly and southerly sides of the site. The curb will have small opening at regular intervals to allow the first flush runoff to enter a grass-lined bio swale located just behind the northwesterly, westerly and southerly curbs. The bio swale will convey the first flush runoff to a filtration basin located at the southwesterly corner of the site and discharge the runoff into the storm drain system in Baltimore Oriole Road. The 100-year runoff gets picked up in a curb inlet located at the southwesterly corner of the site and then discharges into the same storm drain system in Baltimore Oriole Road.

The westerly site (PO2) has a tributary area of 2.7 acres, the water quality runoff is:

Qwq = C x I x A = 0.85 x 0.2 x 2.7 = 0.5 cfs.

Professional Office 2, PO2, is located on the southeasterly corner of Baltimore Oriole Road and Horse Ranch Creek Road. The site consists of three office building and a parking lot. The northwesterly portion (around Building D) of the site drains into an underground system via grated inlet at concentration points in the parking areas. Under normal rainfall, the runoff will be conveyed through this system and discharged into the storm drain main pipe in Horse Ranch Creek Road. For first flush rain fall events, the first flush flow will bypass the main outlet pipe located at the last grated inlet of this system and into a built-in water quality low flow drop outlet which discharges the first flush flow into a grass-lined bio swale located along Horse Ranch Creek Road and into a grated inlet located northerly of the Horse Ranch Creek Road site entry driveway which is then discharged into the Horse Ranch Creek Road storm drain system. The easterly portion of the site (east of Buildings B & C) also drains to concentration points in the parking areas which carries the 100-year runoff to the storm drain system in Horse Ranch Creek Road. The first flush flows will bypass the main outlet pipe located in the grated inlet just southeasterly of Building C and into a built-in water quality low flow drop outlet which discharges the first flush flow into a grass-lined bio swale located along southerly property line and into a grated inlet located at the southwesterly corner of the site which is then discharged into the Horse Ranch Creek Road storm drain system The rest of site (around Buildings B & C) drains into another underground system that outlets into the same Horse Ranch Creek Road storm drain system. During first flush storm events, the flow will bypass the main outlet pipe located at the last grated inlet of this system, near the southwesterly corner of the site and into a water quality low flow drop structure in the last grated inlet and into a low flow pipe. The low flow pipe will discharge the first flush runoff into the another grass-lined bio swale located along Horse Ranch Creek Road and into a grated inlet located at the southwesterly corner of the site and into the Horse Ranch Creek Road storm drain system. Lastly, there are two curb inlets located at the site entry off of Horse Ranch Creek Road. These two inlets pick up the 100-year runoff and flow to the Horse Ranch Creek Road storm drain system. Prior to entering these curb inlets, an low flow interceptor channel drain, installed in front of the curb inlet openings, will divert the low flow water quality runoff into the same grass-lined bio swale that runs along Horse Ranch Creek Road at the southwesterly corner of the site.

The northwesterly side of PO1 (around Building D) has a tributary area of 1.9 acres, the water quality runoff is:

Qwq = C x I x A = 0.85 x 0.2 x 1.9 = 0.3 cfs.

The easterly side of PO1 (north of Buildings B & C) has a tributary area of 1.9 acres, the water quality runoff is:

Qwq = C x I x A = 0.85 x 0.2 x 1.9 = 0.3 cfs.

The middle area of PO1 (west of Buildings B & C) has a tributary area of 4.5 acres, the water quality runoff is:

Qwq = C x I x A = 0.85 x 0.2 x 4.5 = 0.8 cfs.

Sports Complex. The Sports Complex (Lot 574) is located on the northeasterly corner of Longspur Road and Horse Ranch Creek Road. The Sports Complex consists of two large ball fields locate on the northerly 90% of the site and a parking lot on the southerly end. The runoff from the northerly ball field sheet flows southwesterly into a grated drain inlet that discharges the runoff into the storm drain main pipe in Horse Ranch Creek Road. The runoff from the ball field does not require treatment control BMPs since the vegetation of the field will function as bio filtration BMPs to treat the runoff before it reaches downstream storm drains.

The southerly ball field sheet flows southwesterly into a grated inlet and storm drain system. The storm drain will also convey the runoff into the storm drain main pipe in Horse Ranch Creek Road. Likewise, the runoff from this ball field does not require treatment control BMPs since the vegetation of the field will function as bio filtration BMPs to treat the runoff before it reaches downstream storm drains.

The parking lot sheet flows southwesterly into a drain inlet located at the southwesterly corner of the parking lot. The main flow will be conveyed into the storm drain main pipe in Horse Ranch Creek Road. The first flush flow will be diverted by the water quality low flow drop outlet in the drain inlet, into a grass-lined bio swale along the westerly site boundary and into a bio swale cut into the fill slope along Horse Ranch Creek Road. The low flow will flow southerly in the bio swale and into a grated inlet at the southerly end of the swale. The inlet will discharge the low flow into the storm drain main pipe in Horse Ranch Creek Road.

The tributary area of the ball field parking lot is 0.7 acres, the water quality flow is:

Qwq = C x I x A = 0.85 x 0.2 x 0.7 = 0.1 cfs

HOA Parks. The pool site (Lot 569 – P3) is located on the southwesterly corner of Frigatebird Road and Jaeger Street. The site consists of a pool and pool house on the northerly half of the site and a parking lot on the southerly half. The pool deck will drain into a series of deck drains that discharge into the sanitary sewer system due to the potential of chlorine and other chemicals used in pool waters. The runoff from the pool house and the parking lot sheet flow southerly and to a curb inlet at the southwesterly corner of the parking lot. Prior to entering the curb inlet, an low flow interceptor channel drain, installed in front of the curb inlet openings, will divert the low flow water quality runoff into a grass-lined bio-swale along the westerly side of the parking lot. The bio swale discharges into a grated inlet and outlets the runoff onto the riprap pad westerly of the fill slope and onto the natural terrain.

The tributary area of the pool parking lot is 0.35 acres, the water quality flow is:

Qwq = C x I x A = 0.85 x 0.2 x 0.35 = 0.1 cfs

The park sites on Lot 568 (P-1), Lot 572 (P-2), Lot 570 (P-5), Lot 571 (P-6), Lot 575 (P-7), Lot 573 (P-8) are scattered throughout the single-family residential neighborhoods. All of these park sites will be landscaped and the vegetation cover will function as treatment BMP for the runoff. Therefore, no BMP is necessary for these park sites.

Staging Area (Lot 576) and Sewer Pump Station (Lot 577), are located on the on the northeasterly corner of Pala Mesa Drive and Pala Road.

The runoff from this site sheet flows northerly into a water quality low flow pipe equipped curb inlet. The low flow pipe will convey the first flush runoff into a grass-lined bio swale located on the northerly fill slope that discharges the runoff onto the existing terrain. The 100-year runoff will bypass the low flow pipe and discharge directly into riprap to dissipate the runoff before flowing into the existing terrain.

The tributary area of the site is 0.8 acres, the water quality flow is:

Qwq = C x I x A = 0.79 x 0.2 x 0.8 = 0.1 cfs.

Town Center, TC, is located on the easterly side of Horse Ranch Creek Road, between Longspur Road and Harvest Glen Lane. It consists of 7 commercial and retail buildings and a surrounding parking lot on a gentle northeast to southwesterly sloping terrain.

The Town Center is divided into northerly, central and southerly portions by the two driveway approaches from Horse Ranch Creek Road. The northerly portion consists of two buildings, Buildings A and B and driveways and parking lots. The runoff from this portion of the site sheet flows southwesterly and into a fossil filter equipped curb inlet located at the southwesterly corner of the drive-thru lane around Building B and two fossil filter equipped curb inlets located on each side of the center driveway entrance into the site. These curb inlets will discharge the runoff into an underground oil-water separator before it is discharged into the storm drain main pipe in Horse Ranch Creek Road.

The central portion of the site consists of three buildings, Buildings C, D & E and a parking lot. This portion of the site sheet flows southwesterly and into a fossil filter equipped curb inlets located: 1. at the southwesterly corner of this portion of the site (northerly of Building F); 2. on each side of the southerly driveway entrance from Horse Ranch Creek Road; and 3. on the westerly side of the entry driveway on Harvest Glen Lane. The runoff from these curb inlets flows into an underground storm drain system that conveys the runoff to an oil/water separator located at the northeasterly corner of Harvest Glen Lane and Horse Ranch Creek Road. The oil/water separator discharges the runoff into the storm drain main pipe in Harvest Glen Lane.

The northerly tributary area of the site is 3.4 acres. The water quality flow is:

$Qwq = C \times I \times A = 0.79 \times 0.2 \times 3.4 = 0.5$ cfs.

The central and southerly tributary area of the site is 4.4 acres, the water quality flow is:

$Qwq = C \times I \times A = 0.79 \times 0.2 \times 4.4 = 0.7$ cfs

PRIORITY DEVELOPMENT PROJECT DETERMINATION

Please check the box that best describes the project. Does the project meet one of the following criteria? Please note that a Priority Development Project Determination Table was completed for each land use type proposed with the "B" Designator Site Plans due to the unique water quality issues associated with each of the proposed uses.

Table 1

PRIORITY DEVELOPMENT PROJECT (MF1 through MF4)	**YES**	**NO**
Redevelopment that creates or adds at least 5,000 net square feet of additional impervious surface area		X
Residential development of more than 10 units	X	
Commercial developments with a land area for development of greater than 1 acre		X
Heavy industrial development with a land area for development of greater than 1 acre		X
Automotive repair shop(s)		X
Restaurants, where the land area for development is greater than 5,000 square feet		X
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface	X	
Environmentally Sensitive Areas (ESA): All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.	X	
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff	X	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	X	
Retail Gasoline Outlets (RGO) that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	X	

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered Priority Development Projects. Parking lots, buildings and other structures associated with utility projects are subject to the WPO requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project. If you answered **YES** to any of the questions, please continue.

Table 1 (continued)

PRIORITY DEVELOPMENT PROJECT (PROFESSIONAL OFFICE)	YES	NO
Redevelopment that creates or adds at least 5,000 net square feet of additional impervious surface area	X	
Residential development of more than 10 units		X
Commercial developments with a land area for development of greater than 1 acre	X	
Heavy industrial development with a land area for development of greater than 1 acre		X
Automotive repair shop(s)		X
Restaurants, where the land area for development is greater than 5,000 square feet		X
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface		X
Environmentally Sensitive Areas (ESA): All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.	X	
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff	X	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	X	
Retail Gasoline Outlets (RGO) that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.		X

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered Priority Development Projects. Parking lots, buildings and other structures associated with utility projects are subject to the WPO requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project. If you answered **YES** to any of the questions, please continue.

Table 1 (continued)

PRIORITY DEVELOPMENT PROJECT (SPORTS COMPLEX AND PARKS)	YES	NO
Redevelopment that creates or adds at least 5,000 net square feet of additional impervious surface area	X	
Residential development of more than 10 units		X
Commercial developments with a land area for development of greater than 1 acre	X	
Heavy industrial development with a land area for development of greater than 1 acre		X
Automotive repair shop(s)		X
Restaurants, where the land area for development is greater than 5,000 square feet		X
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface		X
Environmentally Sensitive Areas (ESA): All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.	X	
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff	X	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	X	
Retail Gasoline Outlets (RGO) that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.		X

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered Priority Development Projects. Parking lots, buildings and other structures associated with utility projects are subject to the WPO requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project. If you answered **YES** to any of the questions, please continue.

Table 1 (continued)

PRIORITY DEVELOPMENT PROJECT (TOWN CENTER)	YES	NO
Redevelopment that creates or adds at least 5,000 net square feet of additional impervious surface area	X	
Residential development of more than 10 units		X
Commercial developments with a land area for development of greater than 1 acre	X	
Heavy industrial development with a land area for development of greater than 1 acre		X
Automotive repair shop(s)		X
Restaurants, where the land area for development is greater than 5,000 square feet	X	
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface		X
Environmentally Sensitive Areas (ESA): All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.	X	
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff	X	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	X	
Retail Gasoline Outlets (RGO) that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.		X

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered Priority Development Projects. Parking lots, buildings and other structures associated with utility projects are subject to the WPO requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project. If you answered **YES** to any of the questions, please continue.

Table 1 (continued)

PRIORITY DEVELOPMENT PROJECT (PUMP STATION AND STAGING AREA)	YES	NO
Redevelopment that creates or adds at least 5,000 net square feet of additional impervious surface area	X	
Residential development of more than 10 units		X
Commercial developments with a land area for development of greater than 1 acre	X	
Heavy industrial development with a land area for development of greater than 1 acre		X
Automotive repair shop(s)		X
Restaurants, where the land area for development is greater than 5,000 square feet		X
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface		X
Environmentally Sensitive Areas (ESA): All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.	X	
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff	X	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater		X
Retail Gasoline Outlets (RGO) that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.		X

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered Priority Development Projects. Parking lots, buildings and other structures associated with utility projects are subject to the WPO requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project. If you answered **YES** to any of the questions, please continue.

HYDROMODIFICATION DETERMINATION

The following questions provide a guide to collecting information relevant to hydromodification management issues.

Table 2: This table applies to each site plan individually.

	QUESTIONS	YES	NO	Information
1.	Will the proposed project disturb 50 or more acres of land? (Including all phases of development)		X	If YES, continue to 2. If NO, go to 6.
2.	Would the project site discharge directly into channels that are concrete-lined or significantly hardened such as with rip-rap, sackcrete, etc, downstream to their outfall into bays or the ocean?		X	If NO, continue to 3. If YES, go to 6.
3.	Would the project site discharge directly into underground storm drains discharging directly to bays or the ocean?		X	If NO, continue to 4. If YES, go to 6.
4.	Would the project site discharge directly to a channel (lined or un-lined) and the combined impervious surfaces downstream from the project site to discharge at the ocean or bay are 70% or greater?		X	If NO, continue to 5. If YES, go to 6.
5.	Project is required to manage hydromodification impacts.		X	Hydromodification Management Required as described in Section 67.812 b(4) of the WPO.
6.	Project is not required to manage hydromodification impacts.	X		Hydromodification Exempt. Keep on file.

An exemption is potentially available for projects that are required (No. 5. in Table 2 above) to manage hydromodification impacts: The project proponent may conduct an independent geomorphic study to determine the project's full hydromodification impact. The study must incorporate sediment transport modeling across the range of geomorphically-significant flows and demonstrate to the County's satisfaction that the project flows and sediment reductions will not detrimentally affect the receiving water to qualify for the exemption.

STORMWATER QUALITY DETERMINATION

The following questions provide a guide to collecting information relevant to project stormwater quality issues. Please provide the following information in a printed report accompanying this form.

Table 3

	QUESTIONS	COMPLETED	NA
1.	Describe the topography of the project area.	**MF-1**is located on the southwesterly corner of the intersection of Pala Mesa Drive and Horse Ranch Creek Road. The site is located on a super pad at a 1% north to south sloping terrain. **MF-2** is located on the southeasterly corner of the intersection of Harvest Glen Lane and Horse Ranch Creek Road. The site is located on a super pad at a 1% gentle northeast to southwest sloping terrain. **MF-3** is located between Longspur Road and Harvest Glen Lane, easterly of the proposed Town Center sites. The site is located on a super pad at a 1% gentle northeast to southwest sloping pad. **MF-4** is located is at the northeasterly intersection of Pala Mesa Drive and Pala Road. The site is located on a super pad at a 1% northwest sloping terrain. **Professional Office** is located on the southeasterly corner of Baltimore Oriole Road and Horse Ranch Creek Road. The northerly site is on a gentle north to south sloping terrain. The southerly site is on a gentle northeast to southwest sloping terrain. **Sports Complex** is located on the northeasterly corner of Longspur Road and Horse Ranch Creek Road. The site is located on a gentle northeast to southwest sloping terrain. **The pool site (Lot 569)** is located on the southwesterly corner of Frigatebird Road and Jaeger Street. The site is located on a gentle north to south sloping terrain. **The park sites on Lot 568 (P-1), Lot 572 (P-2), Lot 570 (P-5), Lot 571 (P-6), Lot 575 (P-7) and Lot 573 (P-8)** are located on Birdwatcher Court in the R-4 neighborhood, and on the easterly end of Caracara Court in the R-1 neighborhood, respectively. Both sites are on gently sloping terrain. **Town Center** is located on the easterly side of Horse Ranch Creek Road, between Longspur Road and Harvest Glen Lane. It consists of 7 commercial and retail buildings and parking lots on a gentle northeast to southwesterly sloping terrain. **Staging Area/Pump Station** are located at the northeasterly intersection of Pala Mesa Drive and Pala Road. The site is on a gentle westerly sloping terrain.	
2.	Describe the local land use within the project area and adjacent areas.	**MF-1:** N-College site S-Open space E-Prop. Meadowood TM 5354 W-Open Space **MF-2:** N-MF-1 & Town Center S-College Site E-Prop. Meadowood TM 5354 W- College Site	

		MF-3: N-Single Family Residences S- Prop. Meadowood TM 5354 E- Single Family Residences W- Town Center **MF-4:** N- Open space S-Pala Road Highway 76 E-Prop. Meadowood TM 5354 W-Pala Mesa Drive **PO:** N-HOA Lot 535 and Open Space S-Sports Complex E- Single Family Residences W- College site **Sports complex:** N-Professional Office S-Town Center E- Single Family Residences W-College Site **Pool Site (Lot 569):** N- Single Family Residences S- Professional Office E- Single Family Residences W- Open Space **The park sites on Lot 568 (P-1), Lot 572 (P-2), Lot 570 (P-5), Lot 571 (P-6), Lot 575 (P-7) and Lot 573 (P-8):** N- Single Family Residences S- Single Family Residences E- Single Family Residences W- Single Family Residences **Town Center:** N-Sports Complex S-Multi-family residential E- Multi-family residential W-College Site **Staging Area/Pump Station:** N- Open Space S- Pala Road Highway 76 E- Multi-family residential W- Open Space	
3.	Evaluate the presence of dry weather flow.	No dry weather flow is evident.	
4.	Determine the receiving waters that may be affected by the project throughout the project life cycle (i.e., construction, maintenance and operation).	Horse Ranch Creek and San Luis Rey River and Pacific Ocean	
5.	For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern.	Pacific Ocean shoreline by **Bacteria Indicators** San Luis Rey River by **Chloride and TDS.**	
6.	Determine if there are any High Risk Areas (municipal or domestic water supply reservoirs or groundwater	Not Applicable	X

	percolation facilities) within the project limits.		
7.	Determine the Regional Board special requirements, including TMDLs, effluent limits, etc.	Not Applicable	X
8.	Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves.	The project area is located in climate Zone 10. The annual rainfall is 24".	
9.	If considering Treatment BMPs, determine the soil classification, permeability, erodibility, and depth to groundwater.	Type 'D' soil, low permeability when soil is thoroughly wetted. Moderate to low erodibility. No groundwater was encountered.	
10.	Determine contaminated or hazardous soils within the project area.	There are no evidence of contaminated or hazardous soils within the project area.	
11.	Determine if this project is within environmentally sensitive areas as defined on the maps in Appendix A of the *County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects.*	Not Applicable	X
12.	Determine if this is an emergence project.	Not Applicable	X

WATERSHED

Please check the watershed(s) for the project.

San Juan 901	Santa Margarita 902	**San Luis Rey 903**	Carlsbad 904
San Dieguito 905	Penasquitos 906	San Diego 907	Sweetwater 909
Otay 910	Tijuana 911	Whitewater 719	Clark 720
West Salton 721	Anza Borrego 722	Imperial 723	

Please provide the hydrologic sub-area and number(s)

Number	Name
903.12	Bonsall

Please provide the beneficial uses for Inland Surface Waters and Ground Waters. Beneficial Uses can be obtained from the Water Quality Control Plan for the San Diego Basin, which is available at the Regional Board office or at http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

SURFACE WATERS	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Inland Surface Waters	903.12	X	X	X			X	X	X	X		X	X	X	X	
Ground Waters																

*** Excepted from Municipal**

X = Existing Beneficial Use
0 = Potential Beneficial Use

POLLUTANTS OF CONCERN

Using Table 4, identify pollutants that are anticipated to be generated from the proposed priority project categories. Pollutants associated with any hazardous material sites that have been remediated or are not threatened by the proposed project are not considered a pollutant of concern.

Table 4. Anticipated and Potential Pollutants Generated by Land Use Type

	General Pollutant Categories								
PDP Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	**X**	**X**			**X**	**X**	**X**	**X**	**X**
Attached Residential Development	**X**	**X**			**X**	**P(1)**	**P(2)**	**P**	**X**
Commercial Development 1 acre or greater	**P(1)**	**P(1)**		**P(2)**	**X**	**P(5)**	**X**	**P(3)**	**P(5)**
Heavy industry /industrial development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					**X**	**X**	**X**	**X**	
Hillside Development >5,000 ft_2	X	X			X	X	X		X
Parking Lots	**P(1)**	**P(1)**	**X**		**X**	**P(1)**	**X**		**P(1)**
Retail Gasoline Outlets			X	X	X	X	X		
Streets, Highways & Freeways	**X**	**P(1)**	**X**	**X(4)**	**X**	**P(5)**	**X**		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

Note: If other monitoring data that is relevant to the project is available, please include as Attachment C.

CONSTRUCTION BMPs

Please check the construction BMPs that may be implemented during construction of the project. The applicant will be responsible for the placement and maintenance of the BMPs incorporated into the final project design.

X	Silt Fence	X	Desilting Basin
X	Fiber Rolls	X	Gravel Bag Berm
X	Street Sweeping and Vacuuming	X	Sandbag Barrier
X	Storm Drain Inlet Protection	X	Material Delivery and Storage
X	Stockpile Management	X	Spill Prevention and Control
X	Solid Waste Management	X	Concrete Waste Management
X	Stabilized Construction Entrance/Exit	X	Water Conservation Practices
X	Dewatering Operations	X	Paving and Grinding Operations
X	Vehicle and Equipment Maintenance	X	Any minor slopes created incidental to construction and not subject to a major or minor grading permit shall be protected by covering with plastic or tarp prior to a rain event, and shall have vegetative cover reestablished within 180 days of completion of the slope and prior to final building approval.

EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

Complete the checklist below to determine if a proposed project will pose an "exceptional threat to water quality," and therefore require Advanced Treatment Best Management Practices.

Table 5

No.	CRITERIA	YES	NO	INFORMATION
1.	Is all or part of the proposed project site within 200 feet of waters named on the Clean Water Act (CWA) Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity? Current 303d list may be obtained from the following site: http://www.swrcb.ca.gov/tmdl/docs/303dlists2006/approved/r9_06_303d_reqt mdls.pdf		X	If YES, continue to 2. If NO, go to 5.
2.	Will the project disturb more than 5 acres, including all phases of the development?	X		If YES, continue to 3. If NO, go to 5.
3.	Will the project disturb slopes that are steeper than 4:1 (horizontal: vertical) with at least 10 feet of relief, and that drain toward the 303(d) listed receiving water for sedimentation and/or turbidity?	X		If YES, continue to 4. If NO, go to 5.
4.	Will the project disturb soils with a predominance of USDA-NRCS Erosion factors k_f greater than or equal to 0.4?		X	If YES, continue to 6. If NO, go to 5.
5.	Project is not required to use Advanced Treatment BMPs.	X		Document for Project Files by referencing this checklist.
6.	Project poses an "exceptional threat to water quality" and is required to use Advanced Treatment BMPs.		X	Advanced Treatment BMPs must be consistent with WPO section 67.811(b)(20)(D) performance criteria

Exemption potentially available for projects that require advanced treatment:
Project proponent may perform a Revised Universal Soil Loss Equation, Version 2 (RUSLE 2), Modified Universal Soil Loss Equation (MUSLE), or similar analysis that shows to the County official's satisfaction that advanced treatment is not required

Now that the need for treatment BMPs has been determined, other information is needed to complete the SWMP.

SITE DESIGN

To minimize stormwater impacts, site design measures must be addressed. The following checklist provides options for avoiding or reducing potential impacts during project planning. If YES is checked, it is assumed that the measure was used for this project.

Table 6: This table applies to each site plan individually.

	OPTIONS		YES	NO	N/A
1.	Has the project been located and road improvements aligned to avoid or minimize impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions?		X		
2.	Is the project designed to minimize impervious footprint?		X		
3.	Is the project conserving natural areas where feasible?		X		
4.	Where landscape is proposed, are rooftops, impervious sidewalks, walkways, trails and patios be drained into adjacent landscaping?		X		
5.	For roadway projects, are structures and bridges be designed or located to reduce work in live streams and minimize construction impacts?		X		
6.	Can any of the following methods be utilized to minimize erosion from slopes:				
	6.a.	Disturbing existing slopes only when necessary?	X		
	6.b.	Minimize cut and fill areas to reduce slope lengths?	X		
	6.c.	Incorporating retaining walls to reduce steepness of slopes or to shorten slopes?	X		
	6.d.	Providing benches or terraces on high cut and fill slopes to reduce concentration of flows?			X
	6.e.	Rounding and shaping slopes to reduce concentrated flow?	X		
	6.f.	Collecting concentrated flows in stabilized drains and channels?	X		

LOW IMPACT DEVELOPMENT (LID)

Each numbered item below is a LID requirement of the WPO. Please check the box(s) under each number that best describes the Low Impact Development BMP(s) selected for this project.

Table 7

1.	Conserve natural Areas, Soils, and Vegetation-County LID Handbook 2.2.1
X	Preserve well draining soils (Type A or B)
X	Preserve Significant Trees
	Other. Description:
	1. Not feasible. State Reason:
2.	Minimize Disturbance to Natural Drainages-County LID Handbook 2.2.2
X	Set-back development envelope from drainages
	Restrict heavy construction equipment access to planned green/open space areas
	Other. Description:
	2. Not feasible. State Reason:
3.	Minimize and Disconnect Impervious Surfaces (see 5) -County LID Handbook 2.2.3
X	Clustered Lot Design
	Items checked in 5?
	Other. Description:
	3. Not feasible. State Reason:
4.	Minimize Soil Compaction-County LID Handbook 2.2.4
X	Restrict heavy construction equipment access to planned green/open space areas
X	Re-till soils compacted by construction vehicles/equipment
X	Collect & re-use upper soil layers of development site containing organic materials
	Other. Description:
	4. Not feasible. State Reason:
5.	Drain Runoff from Impervious Surfaces to Pervious Areas-County LID Handbook 2.2.5
	LID Street & Road Design
	Curb-cuts to landscaping
	Rural Swales
	Concave Median
	Cul-de-sac Landscaping Design
	Other. Description:
	LID Parking Lot Design
	Permeable Pavements
X	Curb-cuts to landscaping
	Other. Description:
	LID Driveway, Sidewalk, Bike-path Design

	Permeable Pavements
X	Pitch pavements toward landscaping
	Other. Description:
	LID Building Design
	Cisterns & Rain Barrels
X	Downspout to swale
	Vegetated Roofs
	Other. Description:
	LID Landscaping Design
X	Soil Amendments
X	Reuse of Native Soils
X	Smart Irrigation Systems
X	Street Trees
	Other. Description:
	5. Not feasible. State Reason:

CHANNELS & DRAINAGES

Complete the following checklist to determine if the project includes work in channels.

Table 8

No.	CRITERIA	YES	NO	N/A	COMMENTS
1.	Will the project include work in channels?		X		If YES go to 2 If NO go to 13.
2.	Will the project increase velocity or volume of downstream flow?		X		If YES go to 6.
3.	Will the project discharge to unlined channels?	X			If YES go to. 6.
4.	Will the project increase potential sediment load of downstream flow?		X		If YES go to 6.
5.	Will the project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability?		X		If YES go to 8.
6.	Review channel lining materials and design for stream bank erosion.	X			Continue to 7.
7.	Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity.	X			Continue to 8.
8.	Include, where appropriate, energy dissipation devices at culverts.	X			Continue to 9.
9.	Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour.	X			Continue to 10.
10.	Include, if appropriate, detention facilities to reduce peak discharges.	X			Continue to 11.
11.	"Hardening" natural downstream areas to prevent erosion is not an acceptable technique for protecting channel slopes, unless pre-development conditions are determined to be so erosive that hardening would be required even in the absence of the proposed development.		X		Continue to 12.
12.	Provide other design principles that are comparable and equally effective.	X			Continue to 13.
13.	End				

SOURCE CONTROL

Please complete the following checklist for Source Control BMPs. If the BMP is not applicable for this project, then check N/A only at the main category.

Table 9

		BMP	YES	NO	N/A
1.	**Provide Storm Drain System Stenciling and Signage**				
	1.a.	All storm drain inlets and catch basins within the project area shall have a stencil or tile placed with prohibitive language (such as: "NO DUMPING – DRAINS TO San Luis Rey River") and/or graphical icons to discourage illegal dumping.	X		
	1.b.	Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.	X		
2.	**Design Outdoors Material Storage Areas to Reduce Pollution Introduction**				
	2.a.	This is a detached single-family residential project. Therefore, personal storage areas are exempt from this requirement.			X
	2.b.	Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.	All hazardous material will be stored indoors or in enclosed storage.		
	2.c.	The storage area shall be paved and sufficiently impervious to contain leaks and spills.	X		
	2.d.	The storage area shall have a roof or awning to minimize direct precipitation within the secondary containment area.	X		
3.	**Design Trash Storage Areas to Reduce Pollution Introduction**				
	3.a.	Paved with an impervious surface, designed not to allow run-on from adjoining areas, screened or walled to prevent off-site transport of trash; or,	X		
	3.b.	Provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation.	X		
4.	**Use Efficient Irrigation Systems & Landscape Design**				
	The following methods to reduce excessive irrigation runoff shall be considered, and incorporated and implemented where determined applicable and feasible.				
	4.a.	Employing rain shutoff devices to prevent irrigation after precipitation.	X		
	4.b.	Designing irrigation systems to each landscape area's specific water requirements.	X		
	4.c.	Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.	X		
	4.d.	Employing other comparable, equally effective, methods to reduce irrigation water runoff.	X		
5.	**Private Roads**				
	The design of private roadway drainage shall use at least one of the following				
	5.a.	Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.			X

	5.b.	Urban curb/swale system: street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter.			X
	5.c.	Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to storm water conveyance system.	X		
	5.d.	Other methods that are comparable and equally effective within the project.	X		
6.	**Residential Driveways & Guest Parking**				
	The design of driveways and private residential parking areas shall use one at least of the following features.				
	6.a.	Design driveways with shared access, flared (single lane at street) or wheelstrips (paving only under tires); or, drain into landscaping prior to discharging to the storm water conveyance system.			X
	6.b.	Uncovered temporary or guest parking on private residential lots may be: paved with a permeable surface; or, designed to drain into landscaping prior to discharging to the storm water conveyance system.	X		
	6.c.	Other features which are comparable and equally effective.	X		
7.	**Dock Areas**				
	Loading/unloading dock areas shall include the following.				
	7.a.	Cover loading dock areas, or design drainage to preclude urban run-on and runoff.	X		
	7.b.	Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.	X		
	7.c.	Other features which are comparable and equally effective.	X		
8.	**Maintenance Bays**				
	Maintenance bays shall include the following.				
	8.a.	Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff.	X		
	8.b.	Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.	X		
	8.c.	Other features which are comparable and equally effective.	X		
9.	**Vehicle Wash Areas**				
	Priority projects that include areas for washing/steam cleaning of vehicles shall use the following.				
	9.a.	Self-contained; or covered with a roof or overhang.	X		
	9.b.	Equipped with a clarifier or other pretreatment facility.	X		
	9.c.	Properly connected to a sanitary sewer.	X		
	9.d.	Other features which are comparable and equally effective.	X		
10.	**Outdoor Processing Areas**				
	Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, waste piles, and wastewater and solid waste treatment and disposal, and other operations determined to be a potential threat to water quality by the County shall adhere to the following requirements.				

	10.a.	Cover or enclose areas that would be the most significant source of pollutants; or, slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment in accordance with conditions established by the applicable sewer agency.	X		
	10.b.	Grade or berm area to prevent run-on from surrounding areas.	X		
	10.c.	Installation of storm drains in areas of equipment repair is prohibited.	X		
	10.d.	Other features which are comparable or equally effective.	X		
11.	**Equipment Wash Areas**				
	Outdoor equipment/accessory washing and steam cleaning activities shall be.				
	11.a.	Be self-contained; or covered with a roof or overhang.	X		
	11.b.	Be equipped with a clarifier, grease trap or other pretreatment facility, as appropriate	X		
	11.c.	Be properly connected to a sanitary sewer.	X		
	11.d.	Other features which are comparable or equally effective.	X		
12.	**Parking Areas**				
	The following design concepts shall be considered, and incorporated and implemented where determined applicable and feasible by the County.				
	12.a.	Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	X		
	12.b.	Overflow parking (parking stalls provided in excess of the County's minimum parking requirements) may be constructed with permeable paving.	X		
	12.c.	Other design concepts that are comparable and equally effective.	X		
13.	**Fueling Area**				
	Non-retail fuel dispensing areas shall contain the following.				
	13.a.	Overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.	X		
	13.b.	Paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.	X		
	13.c.	Have an appropriate slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff.	X		
	13.d.	At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.	X		

Please list other project specific Source Control BMPs in the following box. Write **N/A** if there are none and briefly explain.

N/A

TREATMENT CONTROL

To select a structural treatment BMP using Treatment Control BMP Selection Matrix (Table 10), each priority project shall compare the list of pollutants for which the downstream receiving waters are impaired (if any), with the pollutants anticipated to be generated by the project (as identified in Table 4). Any pollutants identified by Table 4, which are also causing a Clean Water Act section 303(d) impairment of the receiving waters of the project, shall be considered primary pollutants of concern. Priority projects that are anticipated to generate a primary pollutant of concern shall select a single or combination of stormwater BMPs from Table 10, which **maximizes pollutant removal** for the particular primary pollutant(s) of concern.

Priority development projects that are **not** anticipated to generate a pollutant for which the receiving water is CWA 303(d) impaired shall select a single or combination of stormwater BMPs from Table 10, which are effective for pollutant removal of the identified secondary pollutants of concern, consistent with the "maximum extent practicable" standard.

Table 10. Treatment Control BMP Selection Matrix

Pollutants of Concern	**Bioretention Facilities (LID)***	**Settling Basins (Dry Ponds)**	Wet Ponds and Wetlands	**Infiltration Facilities or Practices (LID)***	**Media Filters**	High-rate biofilters	High-rate media filters	**Trash Racks & Hydro - dynamic Devices**
Coarse Sediment and Trash	**High**	**High**	High	**High**	**High**	High	High	**High**
Pollutants that tend to associate with fine particles during treatment	**High**	**High**	High	**High**	**High**	Medium	Medium	**Low**
Pollutants that tend to be dissolved following treatment	**Medium**	**Low**	Medium	**High**	**Low**	Low	Low	**Low**

*Additional information is available in the County of San Diego LID Handbook.

NOTES ON POLLUTANTS OF CONCERN:

In Table 11, Pollutants of Concern are grouped as gross pollutants, pollutants that tend to associate with fine particles, and pollutants that remain dissolved.

Table 11

Pollutant	Coarse Sediment and Trash	Pollutants that tend to associate with fine particles during treatment	Pollutants that tend to be dissolved following treatment
Sediment	X	X	
Nutrients		X	X
Heavy Metals		X	
Organic Compounds		X	
Trash & Debris	X		
Oxygen Demanding		X	
Bacteria		X	
Oil & Grease		X	
Pesticides		X	

A Treatment BMP must address runoff from developed areas. Please provide the post-construction water quality treatment volume or flow values for the selected project Treatment BMP(s). Guidelines for design calculations are located in Chapter 5, Section 4.3, Principle 8 of the County SUSMP. Label outfalls on the BMP map. The Water Quality peak rate of discharge flow (QWQ) and the Water Quality storage volume (VWQ) is dependent on the type of treatment BMP selected for the project.

Outfall	**Tributary Area (acres)**	**Q_{WQ} (cfs)**	**V_{WQ} (cf)**
MF-1 Southerly tip of site	10.8	1.5	N/A * no volume based permanent BMP proposed.
MF-2 Southerly tip of site	5.4	0.8	N/A * no volume based permanent BMP proposed.
MF-3 Northerly of site, adjacent to Longspur Rd. Southerly of site, adjacent to Harvest Glen Ln.	1.7 16.8	0.2 2.4	N/A * no volume based permanent BMP proposed.
MF-4 Westerly of easterly D/W entry along Pankey Place Middle area of site at about the midway point on Pankey Place Westerly of westerly D/W entry along Pankey Place	2.2 1.1 6.1	0.3 0.2 0.9	N/A * no volume based permanent BMP proposed.
Professional Office 1, PO1 At northwesterly side of site Along southerly property line At southwesterly corner of site	1.9 1.9 4.5	0.3 0.3 0.8	N/A * no volume based permanent BMP proposed.
Professional Office 2, PO2 At southwesterly corner of site	2.7	0.5	N/A * no volume based permanent BMP proposed.
Sports Complex (parking lot only) At southwesterly corner of site	0.7	0.1	N/A * no volume based permanent BMP proposed.
Pool site (Lot 569)(parking lot only) At southwesterly corner of site	0.35	0.1	N/A * no volume based permanent BMP proposed.
Pump Station & Staging Area At northerly tip of site	0.8	0.1	N/A * no volume based permanent BMP proposed.
Town Center Northerly of center D/W off Horse Ranch Creek Rd At northeasterly corner of intersection of Horse Ranch Creek Rd and Harvest Glen Ln	3.4 4.1	0.5 0.7	N/A * no volume based permanent BMP proposed.

Please check the box(s) that best describes the Treatment BMP(s) selected for this project.

	Biofilters
X	Bioretention swale
	Vegetated filter strip
	Stormwater Planter Box (open-bottomed)
	Stormwater Flow-Through Planter (sealed bottom)
	Bioretention Area
	Vegetated Roofs/Modules/Walls
	Detention Basins
X	Extended/dry detention basin with grass/vegetated lining
	Extended/dry detention basin with impervious lining
	Infiltration Basins
	Infiltration basin
X	Infiltration trench
	Dry well
	Permeable paving
	Gravel
	Permeable asphalt
	Pervious concrete
	Unit pavers, ungrouted, set on sand or gravel
	Subsurface reservoir bed
	Wet Ponds or Wetlands
	Wet pond/basin (permanent pool)
	Constructed wetland
	Filtration
	Media filtration
	Sand filtration
X	**Hydrodynamic Separator Systems**
	Swirl Concentrator
	Cyclone Separator
	Trash Racks and Screens

Include Treatment Datasheet as Attachment E. The datasheet should include the following:	**COMPLETED**	**NO**
1. Description of how treatment BMP was designed. Provide a description for each type of treatment BMP.	X	
2. Engineering calculations for the BMP(s)	X	

Please describe why the selected treatment BMP(s) was selected for this project. For projects utilizing a low performing BMP, please provide a detailed explanation:

In general, bio-filtration swales were chosen as the main treatment BMP in each of the site plan areas. They were chosen due to their effectiveness, ease in maintaining and inspecting. Bio-swales, at the most downstream ends of the underground storm drain pipes, will only function as a BMP device – see attached Post-Construction BMP Site Plan. Since the bio-swales are very long and flat, the runoff will settle and infiltrate into the ground, thus it will also function as a filtration trench.

An oil-water separator was chosen for the Town Center due to the high traffic volumes expected at this site and due to the difficulty of finding sufficient room to construct bio-swales.

Based on the land use of the tributary areas, the anticipated pollutants are: sediments, nutrients, heavy metals, organic compounds, trash & debris, oxygen demanding substances, oil & grease, bacteria & viruses and pesticides. The bio-swales/filtration trenches have combined adequacy efficiency to remove all the abovementioned pollutants.

Treatment BMP engineering calculations:

MF-1: (flow based BMP).
Qwq=1.5 cfs. The grass-lined swale located at the southerly tip of the site has a bottom width of 5.5' and a design depth of 6", with a 3:1 side slope the top width is 8.5 feet. The Qwq will require a 4" flow depth, and the flow velocity is 0.70 fps. The design length is 420 feet to provide a minimum10 minute resident time.

Project Description		
Worksheet	BIO SWALE MF1	
Flow Element	Trapezoidal Channel	
Method	Manning's Formula	
Solve For	Discharge	
Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.24	%
Depth	4.0	in
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	5.50	ft
Results		
Discharge	1.52	cfs
Flow Area	2.2	ft²
Wetted Perimeter	7.61	ft
Top Width	7.50	ft
Critical Depth	0.13	ft
Critical Slope	6.00	%
Velocity	0.70	ft/s
Velocity Head	0.01	ft
Specific Energy	4.1	in
Froude Number	0.23	
Flow Type	Subcritical	

MF-2: (flow based BMP).

Qwq=0.8 cfs. ~~Vwq = 9,148 cf.~~ The grass-lined swale located at the southerly tip of the site has a bottom width of 4.5 feet, a design depth of 6" with a 3:1 side slope the top width is 6.5 feet. The Qwq will require a 4" flow depth, and the flow velocity is 0.44 fps. The design length is 264 feet to provide a minimum10 minute resident time.

~~The proposed detention basin has a bottom area of 706sf and a top area of 3,421sf, the side slope is at 3:1 and the design depth is 6', the total volume of the basin is 12,380 cf, greater than the anticipated first flush runoff volume (of 11,130 cf).~~

Project Description	
Worksheet	BIO SWALE MF2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.50	ft
Discharge	0.80	cfs

Results		
Depth	4.0	in
Flow Area	1.8	ft²
Wetted Perimeter	6.59	ft
Top Width	6.48	ft
Critical Depth	0.10	ft
Critical Slope	6.59	%
Velocity	0.44	ft/s
Velocity Head	0.00	ft
Specific Energy	4.0	in
Froude Number	0.15	
Flow Type	Subcritical	

MF-3: (all flow based BMPs):

NE'ly system: Qwq = 0.2 cfs, the grass-lined swale has a bottom width of 1' and a design depth of 6", with a 3:1 side slope the top width is 4.0 feet and 0.1% longitudinal slope. The Qwq will require a 4" flow depth, and the flow velocity is 0.37 fps. The design length is 222 feet which provides a minimum of 10-minute resident time.

Project Description	
Worksheet	BIO SWALE MF3 NE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coefficient	0.045
Channel Slope	0.10 %
Depth	**4.0 in**
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V
Bottom Width	1.00 ft

Results	
Discharge	**0.25 cfs**
Flow Area	0.7 ft²
Wetted Perimeter	3.11 ft
Top Width	3.00 ft
Critical Depth	0.11 ft
Critical Slope	6.80 %
Velocity	**0.37 ft/s**
Velocity Head	0.00 ft
Specific Energy	4.0 in
Froude Number	0.14
Flow Type	Subcritical

S'ly system: Qwq = 2.4 cfs, the grass-lined swale has a bottom width of 13' and a design depth of 6", with a 3:1 side slope the top width is 4.0 feet and 0.12% longitudinal slope. The Qwq will require a 4" flow depth, and the flow velocity is 0.52 fps. The design length is 312 feet which provides a minimum of 10-minute resident time.

Project Description	
Worksheet	BIO SWALE MF3 S
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.045	
Channel Slope	**0.12**	**%**
Depth	**4.0**	**in**
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	13.00	ft

Results		
Discharge	**2.44**	**cfs**
Flow Area	4.7	ft^2
Wetted Perimeter	15.11	ft
Top Width	15.00	ft
Critical Depth	0.10	ft
Critical Slope	6.39	%
Velocity	**0.52**	**ft/s**
Velocity Head	0.00	ft
Specific Energy	4.1	in
Froude Number	0.17	
Flow Type	Subcritical	

MF-4: (all flow based BMPs).

NW'ly corner: Qwq = 0.3 cfs. The grass-lined bio-swale has a bottom width of 9' and a design depth of 6", with a 3:1 side slope and 0.1% longitudinal slope, the flow has a velocity of 0.25 fps, the design length of the bio-swale is 150 feet that will provide a minimum of 10-minutes resident time.

Project Description	
Worksheet	BIO SWALE MF4NW
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.045	
Channel Slope	**0.10**	**%**
Depth	1.5	in
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	9.00	ft

Results

Results		
Discharge	**0.30**	**cfs**
Flow Area	1.2	ft²
Wetted Perimeter	9.79	ft
Top Width	9.75	ft
Critical Depth	0.03	ft
Critical Slope	9.34	%
Velocity	**0.25**	**ft/s**
Velocity Head	0.00	ft
Specific Energy	1.5	in
Froude Number	0.13	
Flow Type	Subcritical	

Middle Section of the site: Qwq=0.2 cfs. And a combined flow of 0.5 cfs. The grass-lined bio-swale has a bottom width of 9' and a design depth of 6", with a 3:1 side slope and 0.1% longitudinal slope, the flow has a velocity of 0.31 fps, the design length of the bio-swale is 186 feet that will provide a minimum of 10-minutes resident time.

Project Description		
Worksheet	BIO SWALE MF4MID	
Flow Element	Trapezoidal Channel	
Method	Manning's Formula	
Solve For	Discharge	

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Depth	2.1	in
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	**9.00**	**ft**

Results		
Discharge	**0.52**	**cfs**
Flow Area	1.7	ft²
Wetted Perimeter	10.11	ft
Top Width	10.05	ft
Critical Depth	0.05	ft
Critical Slope	8.25	%
Velocity	**0.31**	**ft/s**
Velocity Head	0.00	ft
Specific Energy	2.1	in
Froude Number	0.14	
Flow Type	Subcritical	

The south and west portions of site: Qwq=0.9 cfs. The grass-lined bio-swale has a bottom width of 3.5' and a design depth of 6", with a 3:1 side slope and 0.20% longitudinal slope, the flow has a velocity of 0.61 fps, the design length of the bio-swale is 366 feet that will provide a minimum of 10-minutes resident time.

Project Description	
Worksheet	BIO SWALE MF4 S
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.045	
Channel Slope	**0.20**	**%**
Depth	4.0	in
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	3.50	ft

Results		
Discharge	**0.92**	**cfs**
Flow Area	1.5	ft^2
Wetted Perimeter	5.61	ft
Top Width	5.50	ft
Critical Depth	0.12	ft
Critical Slope	6.17	%
Velocity	**0.61**	**ft/s**
Velocity Head	0.01	ft
Specific Energy	4.1	in
Froude Number	0.21	
Flow Type	Subcritical	

Professional Office 1: (flow based BMP).

Qwq=0.5 cfs. The grass-lined swale located along the north, west and south sides of the site has a bottom width of 3 feet, a design depth of 6" with a side slope of 3:1. The velocity of the water quality flow is 0.43 fps, the proposed 258 feet long bio swale will offer a minimum of 10 minutes of resident time. In addition to the bio-swale, a sediment trap is also proposed at the southerly corner of the site that also offers approximately 940 cubic feet of storage space and acts as an additional BMP treatment on this site.

Project Description	
Worksheet	BIO SWALE OP1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coefficient	0.045
Channel Slope	0.10 %
Depth	**4.0 in**
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V
Bottom Width	3.00 ft

Results	
Discharge	**0.51 cfs**
Flow Area	1.3 ft²
Wetted Perimeter	5.11 ft
Top Width	5.00 ft
Critical Depth	0.10 ft
Critical Slope	6.59 %
Velocity	**0.43 ft/s**
Velocity Head	0.00 ft
Specific Energy	4.0 in
Froude Number	0.15
Flow Type	Subcritical

Professional Office 2: (flow based BMP).

NW'ly system: Qwq=0.3 cfs. The grass-lined swale located at the northwesterly corner of the site has a bottom width of 1.5 feet, a design depth of 6" with a side slope of 3:1. The velocity of the water quality flow is 0.39 fps, the proposed 234 feet long bio swale will offer a minimum of 10 minutes of resident time.

Project Description	
Worksheet	BIO SWALE OP2 NW
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coefficient	0.045
Channel Slope	0.10 %
Depth	**4.0 in**

Input Data		
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	1.50	ft

Results		
Discharge	**0.33**	**cfs**
Flow Area	0.8	ft²
Wetted Perimeter	3.61	ft
Top Width	3.50	ft
Critical Depth	0.11	ft
Critical Slope	6.73	%
Velocity	**0.39**	**ft/s**
Velocity Head	0.00	ft
Specific Energy	4.0	in
Froude Number	0.14	
Flow Type	Subcritical	

S'ly system: Qwq=0.3 cfs. The grass-lined swale located along the southerly property line of the site has a bottom width of 1.5 feet, a design depth of 6" with a side slope of 3:1. The velocity of the water quality flow is 0.39 fps, the proposed 234 feet long bio swale will offer a minimum of 10 minutes of resident time.

Project Description	
Worksheet	BIO SWALE OP2 S
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Depth	**4.0**	**in**
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	1.50	ft

Results		
Discharge	**0.33**	**cfs**
Flow Area	0.8	ft²
Wetted Perimeter	3.61	ft
Top Width	3.50	ft
Critical Depth	0.11	ft
Critical Slope	6.73	%
Velocity	**0.39**	**ft/s**
Velocity Head	0.00	ft
Specific Energy	4.0	in
Froude Number	0.14	
Flow Type	Subcritical	

SW'ly system: Qwq=0.8 cfs. The grass-lined swale located at the southwesterly corner of the site adjacent to Horse Ranch Creek Road has a bottom width of 4.5 feet, a design depth of 6" with a side slope of 3:1. The velocity of the water quality flow is 0.44 fps, the proposed 264 feet long bio swale will offer a minimum of 10 minutes of resident time.

Project Description	
Worksheet	BIO SWALE OP2 SE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Depth	**4.0**	**in**
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.50	ft

Results		
Discharge	**0.81**	**cfs**
Flow Area	1.8	ft^2
Wetted Perimeter	6.61	ft
Top Width	6.50	ft
Critical Depth	0.10	ft
Critical Slope	6.56	%
Velocity	**0.44**	**ft/s**
Velocity Head	0.00	ft
Specific Energy	4.0	in
Froude Number	0.15	
Flow Type	Subcritical	

Sports Complex (parking lot only): (flow based BMP).

Qwq=0.1 cfs. The grass-lined swale located at the southwesterly corner of the site has a bottom width of 1 feet, a design depth of 6" with a side slope of 3:1. The water quality flow velocity is 0.3 fps, the proposed 180 feet long bio swale will provide a minimum of 10 minutes of resident time.

Project Description	
Worksheet	BIO SWALE SC
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Depth	2.7	in
Left Side Slope	3.00	H : V
Right Side Slope	4.00	H : V

Input Data		
Bottom Width	1.00	ft

Results		
Discharge	0.12	cfs
Flow Area	0.4	ft²
Wetted Perimeter	2.64	ft
Top Width	2.58	ft
Critical Depth	0.07	ft
Critical Slope	7.74	%
Velocity	0.30	ft/s
Velocity Head	0.00	ft
Specific Energy	2.7	in
Froude Number	0.13	
Flow Type	Subcritical	

Pool Site (Lot 569): (flow based BMP).

Qwq= 0.1 cfs The grass-lined swale located along the west side of the site has a bottom width of 1 feet, a design depth of 4" with a side slope of 3:1. The water quality flow velocity is 0.29 fps, the proposed 174 feet long bio swale will provide a minimum of 10 minutes of resident time.

Project Description		
Worksheet	BIO SWALE POOL	
Flow Element	Trapezoidal Channel	
Method	Manning's Formula	
Solve For	Discharge	

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Depth	**2.5**	**in**
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	1.00	ft

Results		
Discharge	**0.10**	**cfs**
Flow Area	0.3	ft²
Wetted Perimeter	2.32	ft
Top Width	2.25	ft
Critical Depth	0.06	ft
Critical Slope	7.93	%
Velocity	**0.29**	**ft/s**
Velocity Head	0.00	ft
Specific Energy	2.5	in
Froude Number	0.13	
Flow Type	Subcritical	

Pump Station & Staging Area: (flow based BMP).

Qwq=0.1 cfs. The grass-lined swale located at the northwesterly area of the site has a bottom width of 1 feet and a design depth of 6", with a 3:1 side slope the top width is 4 feet. The Qwq will require a 4" flow depth, and the flow velocity is 0.29 fps. The design length is 174 feet to provide a minimum10

minute resident time.

Project Description	
Worksheet	BIO SWALE PUMP STA/STAGING
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.10	%
Depth	**2.5**	**in**
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	1.00	ft

Results		
Discharge	**0.10**	**cfs**
Flow Area	0.3	ft²
Wetted Perimeter	2.32	ft
Top Width	2.25	ft
Critical Depth	0.06	ft
Critical Slope	7.93	%
Velocity	**0.29**	**ft/s**
Velocity Head	0.00	ft
Specific Energy	2.5	in
Froude Number	0.13	
Flow Type	Subcritical	

Town Center: (all flow based BMPs).

N'ly of center D/W off Horse Ranch Creek Road: Qwq=0.5 cfs. CDS Technologies model number PMIU20-15 has a treatment capacity of **0.7 cfs**, and the 100-year runoff will be diverted into the bypass chamber and continue on to the downstream storm drain system.

SW'ly system: Qwq=0.7 cfs. CDS Technologies model number PMIU20-15 has a treatment capacity of **0.7 cfs**, and the 100-year runoff will be diverted into the bypass chamber and continue on to the downstream storm drain system.

MAINTENANCE

Please check the box that best describes the maintenance mechanism(s) for this project. Guidelines for each category are located in Chapter 5, Section 5.2 of the County SUSMP.

CATEGORY	SELECTED		SELECTED		SELECTED		SELECTED		SELECTED		SELECTED		SELECTED		SELECTED	
	MF-1		MF-2		MF-3		MF-4		PROFES-SIONAL OFFICE		SPORT / PARK		TOWN CENTER		PUMP STA./ STAGING AREA	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
First																
Second	X		X		X		X		X		X				X	
Third													X			
Fourth																

(Note: Projects in Category 2 or 3 may choose to establish or be included in a Stormwater Maintenance Assessment District for the long-term maintenance of treatment BMPs).

With the exception of the Town Center, the BMP facilities (i.e. bio-filtration swales, curb inlet low flow drop out boxes, the low flow channel drain inlets in front of some of the curb inlets, the low flow pipes leading to the bio-filtration swales and curb inlets equipped with fossil filter inserts) within the "B" designator sites fall under either the **first category** (for the bio-filtration swales) or the **second category** (for the remaining BMPs). Therefore, it is appropriate for the individual site HOAs and/or Tenant Associations to be given primary responsibility for on going maintenance of these BMPs. The County needs to be able to step in and perform the maintenance if the HOAs and Tenant Associations fail, and needs to have security to provide funding for such backup maintenance.

The Town Center falls under **third category** with its multiple storm drain inserts and oil/water separators. The Tenant Association would still be given the primary maintenance responsibility. The County needs to assure ongoing maintenance is heightened, to the point that the County is willing to take on this responsibility. A permanent funding mechanism needs to be established.

The developer will dedicate the streets as well as the effected storm drain system to the County, also the bio-filtration swales will be dedicated to the County. Since the project is still in TM stage, it is anticipated that an IOD will be used to assure permanent maintenance of these facilities.

With the exception of the Town Center, the developer will provide the County with security to substantiate the maintenance agreement, which will remain in place for 5 years. The amount of security would equal the estimated cost of 2 years of maintenance activities. The security can be a cash deposit, letter of credit or other form acceptable to the County.

The Town Center will have a special assessment under the authority of a proposed landscape maintenance district. The assessment will be collected with property tax. Because this primary funding mechanism will require substantial amount of time to establish and collect assessments, a developer fee will be needed to cover the initial maintenance period of 24 months.

ATTACHMENTS

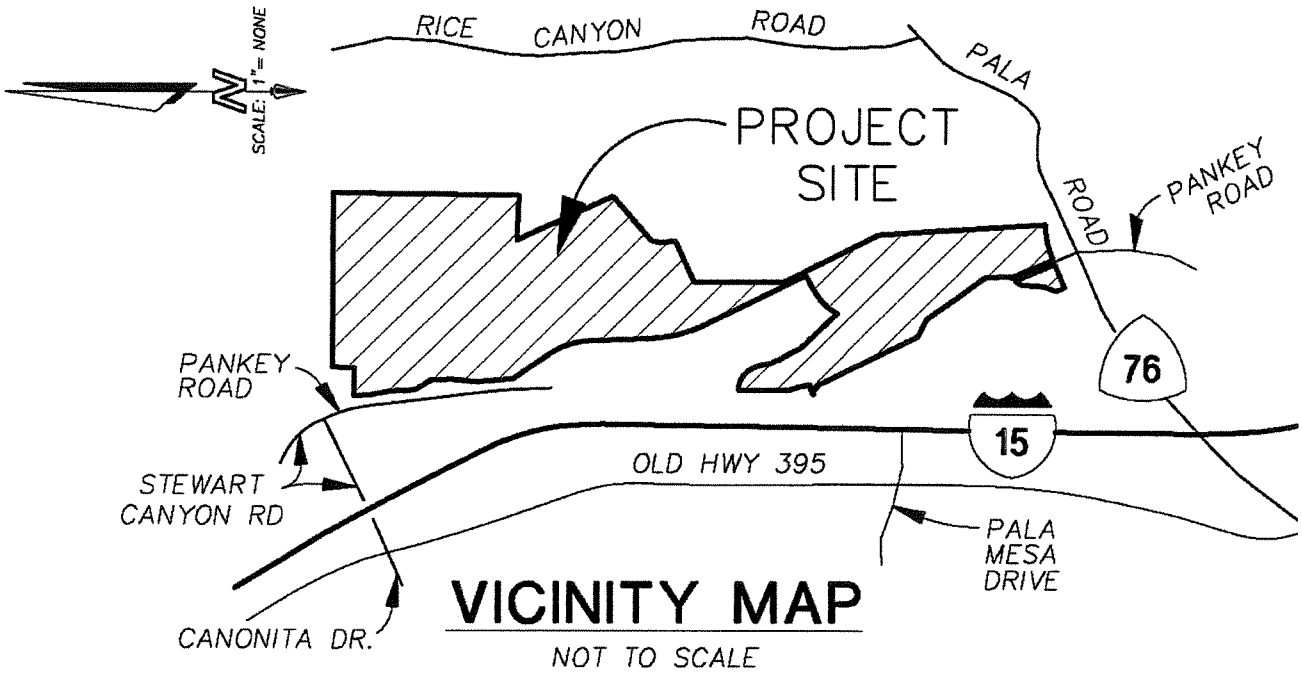
Please include the following attachments.

ATTACHMENT		COMPLETED	N/A
A	Project Location Map	X	
B	Site Map	X	
C	Relevant Monitoring Data		X
D	LID and Treatment BMP Location Map	X	
E	Treatment BMP Datasheets	X	
F	Operation and Maintenance Program for Treatment BMPs	X	
G	Fiscal Resources	X	
F	Engineer's Certification Sheet	X	
I	Addendum		X

Note: Attachments A and B may be combined.

ATTACHMENT A

LOCATION MAP



ATTACHMENT B

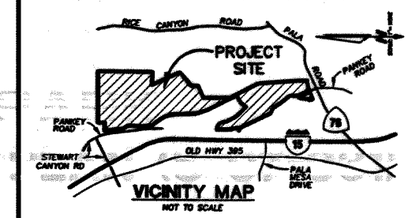
PROJECT SITE MAP

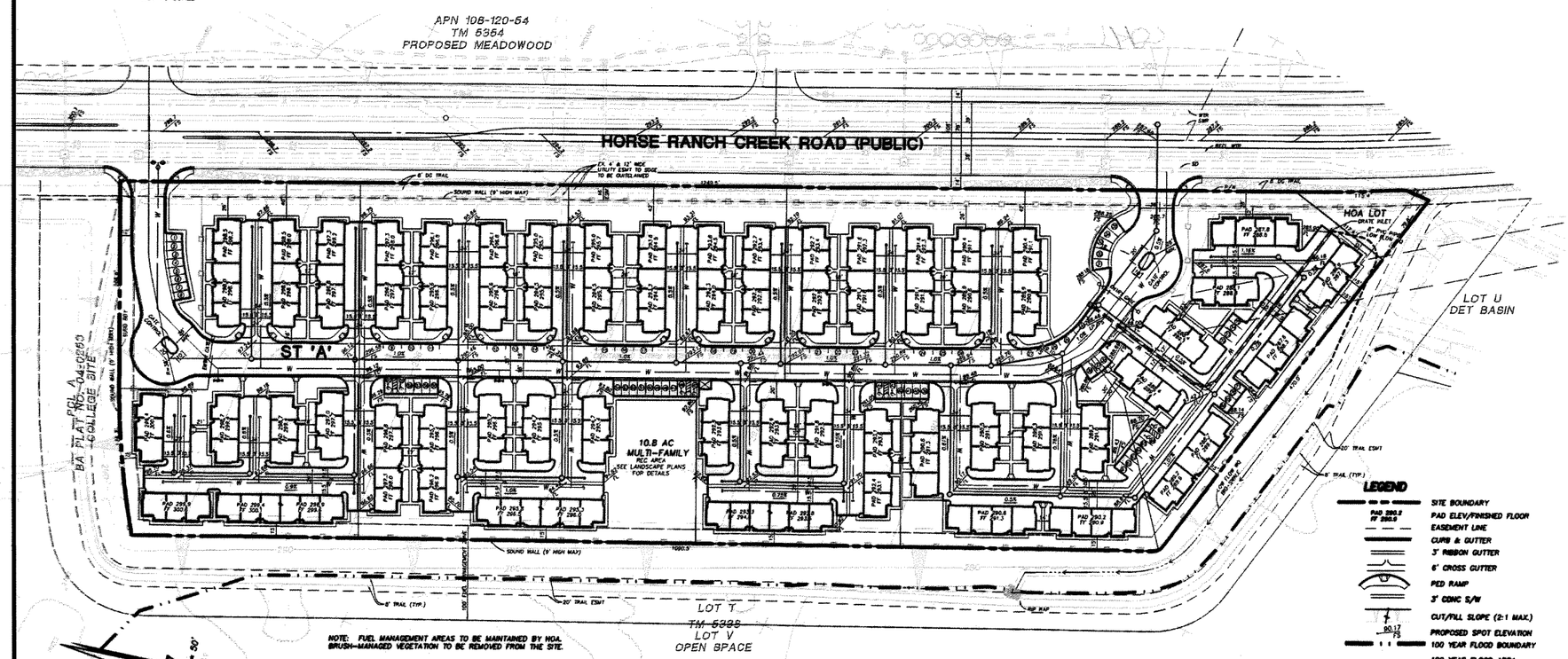
COUNTY OF SAN DIEGO TRACT 5338 RPL-5

VESTING SITE PLAN

CAMPUS PARK

"B" DESIGNATOR SITE PLAN (S 07-031)





GENERAL NOTES

1. TOTAL GROSS SITE AREA: 10.8 ACRES
   TOTAL NET SITE AREA: 10.8 ACRES
2. TOTAL NUMBER OF LOTS: 1
3. TOTAL NUMBER OF UNITS: 192 (192 MULTIFAMILY CONDOMINIUM UNITS)
4. ASSESSOR'S PARCEL NUMBER: 108-121-17, 125-081-03
5. EXISTING GENERAL PLAN LAND USE DESIGNATION: SPA 21
   PROPOSED GENERAL PLAN LAND USE DESIGNATION: SPA 21
6. EXISTING GENERAL PLAN REGIONAL CATEGORY: SSA
   PROPOSED GENERAL PLAN REGIONAL CATEGORY: CUDA
7. EXISTING ZONING: SEE ZONING BOX, THIS SHEET
   PROPOSED ZONING: SEE ZONING BOX, THIS SHEET
8. GROSS DENSITY: 17.8 DU/AC (192 DU'S/10.8 GROSS AC.)
9. EXISTING USE: VACANT
10. PROPOSED USE: RESIDENTIAL (MULTIFAMILY UNITS)
11. TAX RATE AREA: 57161
12. THOMAS BROTHERS COORDINATES: 1028, J7
    LAMBERT COORDINATES: 428-1723
13. COMMUNITY/SUBREGIONAL AREA: FALLBROOK/SPA 21(3.0)
14. SPA: CAMPUS PARK

GENERAL DESIGN NOTES

1. ALL GRADING FOR PROPOSED AND FUTURE STREETS SHALL CONFORM TO THE COUNTY DESIGN STANDARDS AND AS REQUIRED BY THE COUNTY ENGINEER.
2. ALL PROPOSED UTILITIES SHALL BE UNDERGROUND. EASEMENTS SHALL BE PROVIDED, REMOVED OR RELOCATED AS REQUIRED BY THE COUNTY ENGINEER, PUBLIC UTILITIES AND THEIR APPROPRIATE DISTRICTS.
3. SOURCE OF TOPOGRAPHY: MORENO AERIAL PHOTO SURVEY, DATED _____
4. THERE SHALL BE NO PARKING DELINEATED BY RED CURBS WITHIN THE FIRE LANES.
5. MANUFACTURED SLOPE RATIOS SHALL BE VARIABLE (2:1 MAX.)
6. FINISHED GRADES ARE APPROXIMATE ONLY AND SUBJECT TO CHANGE AT FINAL DESIGN, CONSISTENT WITH THE COUNTY'S SUBSTANTIAL CONFORMANCE GUIDELINES.
7. SOIL INFORMATION WAS OBTAINED FROM THE PRELIMINARY SOILS REPORT PREPARED BY: SHEPARDSON ENGINEERS, DATED _____
8. MODEL UNITS MAY BE BUILT PRIOR TO FINAL MAP RECORDATION WITH APPROVAL FROM THE COUNTY ENGINEER AND PLANNING DIRECTOR.
9. ALL STREET DESIGNS, LANDSCAPING AND FIRE HYDRANTS SHALL CONFORM TO THE COUNTY DESIGN STANDARDS AND AS REQUIRED BY THE COUNTY ENGINEER.
10. THE SUBDIVIDER/DEVELOPER SHALL PROVIDE AND INSTALL APPROVED STREET LIGHT STANDARDS AND FIXTURES IN THE TYPE AND NUMBER APPROVED BY THE COUNTY OF SAN DIEGO AND THE PUBLIC WORKS DEPARTMENT.
11. THIS IS A MAP WHICH INCLUDES CONDOMINIUM PROJECTS AS DEFINED IN SECTION 1351 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND FILED PURSUANT TO THE SUBDIVISION MAP ACT. THE TOTAL NUMBER OF CONDOMINIUM UNITS SHALL NOT EXCEED 192 UNITS.
12. TRASH RECEPTACLES WILL BE KEPT IN GARAGES WITH WEEKLY PICK-UP.
13. FOR SIGNAGE, SITE WALL, FLOOR PLANS, ELEVATION AND FENCING, SEE LANDSCAPE PLANS.
14. ACCESS DRIVE TO GARAGES WILL BE MARKED AS FIRE LANES AND CURBS PAINTED RED.
15. THIS PROJECT IS SUBJECT TO UTILIZING LOW IMPACT DESIGN TECHNIQUES IN CONTAINING STORM WATER ON SITE PER THE SATISFACTION OF COUNTY ENGINEER.

PARK LAND DEDICATION STATEMENT

THE SUBDIVIDER INTENDS TO COMPLY WITH THE PARK LAND DEDICATION ORDINANCE THROUGH THE DEDICATION OF PARK LAND WITHIN THE SUBDIVISION AUTHORIZED BY THE ORDINANCE AND/OR BY PAYMENT OF IN LIEU PARK IMPACT FEES.

SPECIAL ASSESSMENT ACT STATEMENT

A REQUEST TO THE BOARD OF SUPERVISORS FOR PERMISSION TO INITIATE PROCEEDINGS UNDER THE SPECIAL ASSESSMENT ACT FOR CONSTRUCTION OF ANY SUBDIVISION IMPROVEMENTS IS NOT BEING MADE AT THIS TIME.

EASEMENT LEGEND

NO EASEMENT EXIST ON THIS SITE UNLESS SHOWN OTHERWISE.

LEGAL DESCRIPTION

PORTION OF PARCEL B OF BOUNDARY ADJUSTMENT PLAT NO. 04-0253, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, UNDER CERTIFICATE OF COMPLIANCE RECORDED DECEMBER 11, 2006 AS DOC. NO. 2006-0876284.

ADJACENT LAND USE

NORTH – COLLEGE SITE
SOUTH – OPEN SPACE
EAST – PROP. MEADOWOOD TM 5354
WEST – OPEN SPACE

LEGEND

- SITE BOUNDARY
- PAD ELEV/FINISHED FLOOR (PAD 290.0 FF 290.0)
- EASEMENT LINE
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- 3' CONC S/W
- CUT/FILL SLOPE (2:1 MAX.)
- PROPOSED SPOT ELEVATION (60.17 FS)
- 100 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD AREA
- FIRE MANAGEMENT ZONE
- EXISTING COUNTOURS
- PROPOSED COUNTOURS
- PROPOSED SEWER LINE & MANHOLE
- SEWER CLEANOUT
- PROPOSED WATER LINE
- PROPOSED RECLAIMED WATER LINE
- END CAP
- FIRE HYDRANT
- STORM DRAIN
- GRATED INLET
- CURB INLET
- SOUND/PERIMETER WALL (SEE LANDSCAPE PLANS FOR DETAILS)
- GUEST PARKING SPACE
- TRASH ENCLOSURE

SITE SUMMARY

SITE AREA		
MULTI FAMILY-1	10.8 AC	472,035 SF
TOTAL SITE AREA		472,035 SF
RESIDENT PARKING SPACES REQUIRED		
92 3-BEDROOM UNITS X 2.0 SPACES*		184
100 2-BEDROOM UNITS X 1.5 SPACES*		150
SUBTOTAL		334
GUEST PARKING SPACES REQUIRED		
192 (UNITS) X 0.2 GUEST SPACES/UNIT*		38
RECREATION CENTER PARKING*		--
SUBTOTAL		38
TOTAL SPACES REQUIRED		372
RESIDENT PARKING SPACES PROVIDED		
18 BUILDINGS X 6 COVERED SPACES/BUILDING		108
5 BUILDINGS X 8 COVERED SPACES/BUILDING		40
20 BUILDINGS X 10 COVERED SPACES/BUILDING		200
3 BUILDINGS X 12 COVERED SPACES/BUILDING		36
SUB TOTAL		384
GUEST PARKING SPACES PROVIDED		
STANDARD (9'X18')		45
PARALLEL		22
HANDICAP (14'X19')		8
SUB TOTAL		75
TOTAL SPACES PROVIDED		459

* PER SECTION 6758 OF THE SAN DIEGO COUNTY ZONING ORDINANCE

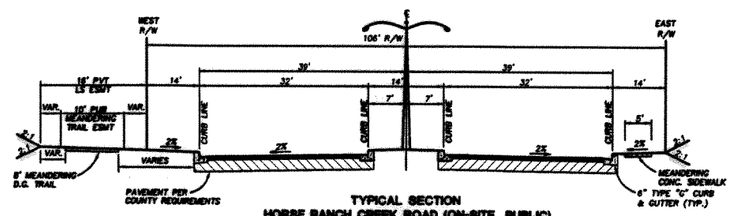
SHEET INDEX

SHEET 1 TITLE SHEET/SITE PLAN
SHEET 2 OPEN SPACE EXHIBIT
SHEET 3-4 LANDSCAPE PLANS
SHEET 5-10 ARCHITECTURAL PLANS
SHEET 11 REC BUILDING PLANS

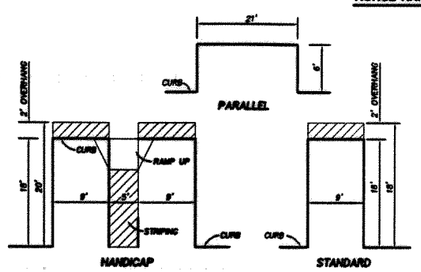
EXISTING AND PROPOSED ZONING

APN 108-121-17, 125-081-03

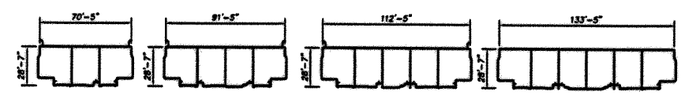
RESIDENTIAL S-1			
SPECIFIC PLAN AREA (SPA) PASSERELLE			
		EXISTING	PROPOSED
USE REGULATIONS		S-90	S-88/RM-15
ANIMAL REGS		K	S
DEVELOPMENT REGULATIONS	DENSITY	0.5	18.0
	LOT SIZE	20.0 AC.	--
	BUILDING TYPE	C	K
	MAXIMUM FLOOR AREA	--	--
	FLOOR AREA RATIO	--	--
	HEIGHT	G	L
	LOT COVERAGE	--	--
	SETBACK	A	V
	OPEN SPACE	--	F
SPECIAL AREA REGULATIONS		B, FOR F	B



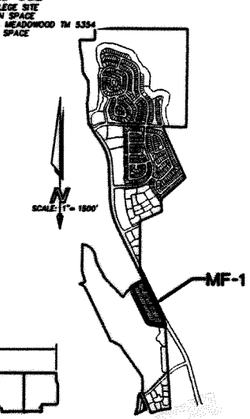
TYPICAL SECTION
HORSE RANCH CREEK ROAD (ON-SITE PUBLIC)
NO SCALE



TYPICAL PARKING DIMENSIONS
NOT TO SCALE



TYPICAL BUILDING SIZES
NOT TO SCALE



KEY MAP

ENGINEER OF WORK:
LANDMARK CONSULTING
9555 GENESEE AVENUE, SUITE 200
SAN DIEGO, CA 92121
TELEPHONE (858) 587-8070
FAX (858) 587-8750

REGISTERED PROFESSIONAL ENGINEER MARK A. BRENCICK NO. 48153 EXP. 6/30/10 CIVIL STATE OF CALIFORNIA

MARK A. BRENCICK
R.C.E. 48153
DATE

OWNER:
PASSERELLE, LLC
A CALIFORNIA LIMITED LIABILITY COMPANY
402 WEST BROADWAY, SUITE 1320
SAN DIEGO, CA 92101-3542
TELEPHONE (619) 696-7355

BY:
BRUCE TABB
DATE

LANDMARK CONSULTING
PLANNING • ENGINEERING • SURVEYING
9555 GENESEE AVE., SUITE 200
SAN DIEGO, CA 92121 (858)587-8070

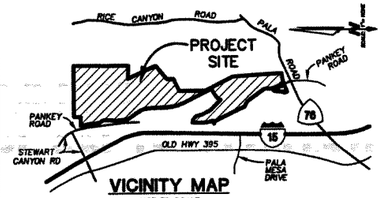
COUNTY OF SAN DIEGO TRACT 5338 RPL 5
VESTING SITE PLAN FOR
CAMPUS PARK
MULTI-FAMILY 1

COUNTY OF SAN DIEGO TRACT 5338 RPL-5

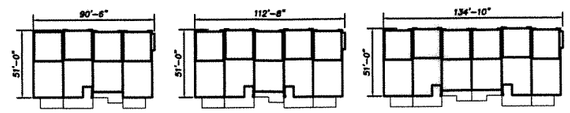
VESTING SITE PLAN

CAMPUS PARK

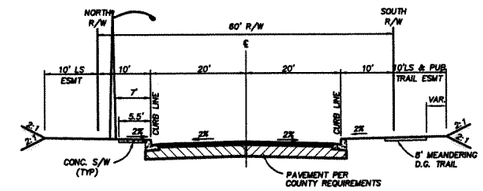
"B" DESIGNATOR SITE PLAN (S 07-031)



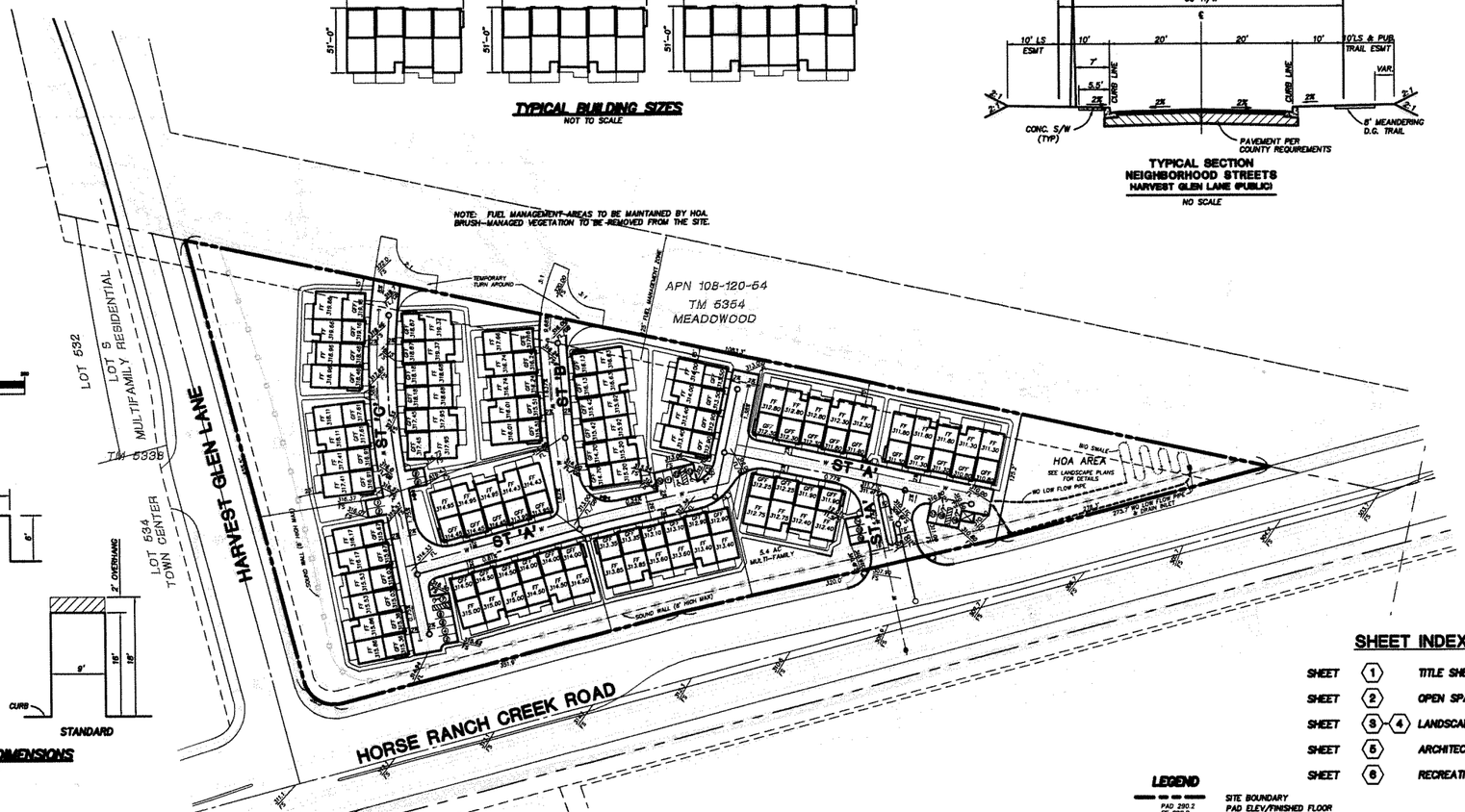
VICINITY MAP
NOT TO SCALE



TYPICAL BUILDING SIZES
NOT TO SCALE

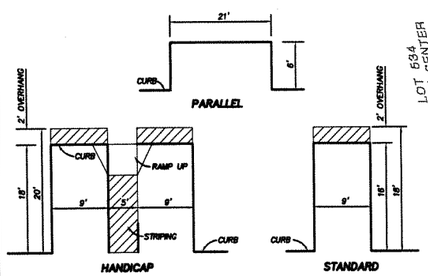


TYPICAL SECTION
NEIGHBORHOOD STREETS
HARVEST GLEN LANE (PUBLIC)
NO SCALE

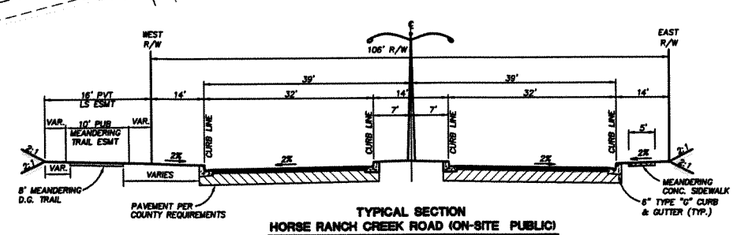


SCALE: 1"= 50'

GRAPHIC SCALE
(IN FEET)
1 inch = 50 ft.



TYPICAL PARKING DIMENSIONS
NOT TO SCALE



TYPICAL SECTION
HORSE RANCH CREEK ROAD (ON-SITE PUBLIC)
NO SCALE

GENERAL NOTES

1. TOTAL GROSS SITE AREA: 5.3 ACRES
   TOTAL NET SITE AREA: 5.3 ACRES
2. TOTAL NUMBER OF LOTS: 1
3. TOTAL NUMBER OF UNITS: 66 (66 MULTIFAMILY CONDOMINIUM UNITS)
4. ASSESSOR'S PARCEL NUMBER: 108-120-56
5. EXISTING GENERAL PLAN LAND USE DESIGNATION: SPA 21(2.8)
   PROPOSED GENERAL PLAN LAND USE DESIGNATION: SPA 21(3.0)
6. EXISTING GENERAL PLAN REGIONAL CATEGORY: SSA
   PROPOSED GENERAL PLAN REGIONAL CATEGORY: CUDA
7. EXISTING ZONING: SEE ZONING BOX, THIS SHEET
   PROPOSED ZONING: SEE ZONING BOX, THIS SHEET
8. GROSS DENSITY: 12.2 DU/AC (66 DU'S/5.4 GROSS AC.)
9. EXISTING USE: VACANT
10. PROPOSED USE: RESIDENTIAL (MULTIFAMILY UNITS)
11. TAX RATE AREA: 75168
12. THOMAS BROTHERS COORDINATES: 1028, J7
    LAMBERT COORDINATES: 426-1723
13. COMMUNITY/SUBREGIONAL AREA: FALLBROOK/SPA 21(3.0)
14. SPA: CAMPUS PARK

GENERAL DESIGN NOTES

1. ALL GRADING FOR PROPOSED AND FUTURE STREETS SHALL CONFORM TO THE COUNTY DESIGN STANDARDS AND AS REQUIRED BY THE COUNTY ENGINEER.
2. ALL PROPOSED UTILITIES SHALL BE UNDERGROUND. EASEMENTS SHALL BE PROVIDED, REMOVED OR RELOCATED AS REQUIRED BY THE COUNTY ENGINEER, PUBLIC UTILITIES AND THEIR APPROPRIATE DISTRICTS.
3. SOURCE OF TOPOGRAPHY: MORENO AERIAL PHOTO SURVEY, DATED _____
4. THERE SHALL BE NO PARKING DELINEATED BY RED CURBS WITHIN THE FIRE LANES.
5. MANUFACTURED SLOPE RATIOS SHALL BE VARIABLE (2:1 MAX.)
6. FINISHED GRADES ARE APPROXIMATE ONLY AND SUBJECT TO CHANGE AT FINAL DESIGN, CONSISTENT WITH THE COUNTY'S SUBSTANTIAL CONFORMANCE GUIDELINES.
7. SOIL INFORMATION WAS OBTAINED FROM THE PRELIMINARY SOILS REPORT PREPARED BY: SHEPARDSON ENGINEERS, DATED _____
8. MODEL UNITS MAY BE BUILT PRIOR TO FINAL MAP RECORDATION WITH APPROVAL FROM THE COUNTY ENGINEER AND PLANNING DIRECTOR.
9. ALL STREET DESIGNS, LANDSCAPING AND FIRE HYDRANTS SHALL CONFORM TO THE COUNTY DESIGN STANDARDS AND AS REQUIRED BY THE COUNTY ENGINEER.
10. THE SUBDIVIDER/DEVELOPER SHALL PROVIDE AND INSTALL APPROVED STREET LIGHT STANDARDS AND FIXTURES IN THE TYPE AND NUMBER APPROVED BY THE COUNTY OF SAN DIEGO AND THE PUBLIC WORKS DEPARTMENT.
11. THIS IS A MAP WHICH INCLUDES CONDOMINIUM PROJECTS AS DEFINED IN SECTION 1351 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND FILED PURSUANT TO THE SUBDIVISION MAP ACT. THE TOTAL NUMBER OF CONDOMINIUM UNITS SHALL NOT EXCEED 66 UNITS.
12. TRASH RECEPTACLES WILL BE KEPT IN GARAGES WITH WEEKLY PICK-UP.
13. FOR SIGNAGE, SITE WALL, FLOOR PLANS, ELEVATION AND FENCING, SEE LANDSCAPE PLANS.
14. ACCESS DRIVE TO GARAGES WILL BE MARKED AS FIRE LANES AND CURBS PAINTED RED.
15. THIS PROJECT IS SUBJECT TO UTILIZING LOW IMPACT DESIGN TECHNIQUES IN CONTAINING STORM WATER ON SITE PER THE SATISFACTION OF COUNTY ENGINEER.

PARK LAND DEDICATION STATEMENT

THE SUBDIVIDER INTENDS TO COMPLY WITH THE PARK LAND DEDICATION ORDINANCE THROUGH THE DEDICATION OF PARK LAND WITHIN THE SUBDIVISION AUTHORIZED BY THE ORDINANCE AND/OR BY PAYMENT OF IN LIEU PARK IMPACT FEES.

SPECIAL ASSESSMENT ACT STATEMENT

A REQUEST TO THE BOARD OF SUPERVISORS FOR PERMISSION TO INITIATE PROCEEDINGS UNDER THE SPECIAL ASSESSMENT ACT FOR CONSTRUCTION OF ANY SUBDIVISION IMPROVEMENTS IS NOT BEING MADE AT THIS TIME.

EASEMENT LEGEND

NO EASEMENT EXIST ON THIS SITE UNLESS SHOWN OTHERWISE.

LEGAL DESCRIPTION

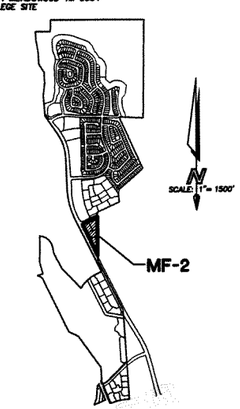
PORTION OF PARCEL B OF BOUNDARY ADJUSTMENT PLAT NO. 04-0253, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, UNDER CERTIFICATE OF COMPLIANCE RECORDED DECEMBER 11, 2006 AS DOC. NO. 2006-0876284.

ADJACENT LAND USE

NORTH - MULTIFAMILY RES & TOWN CENTER
SOUTH - COLLEGE SITE
EAST - PROP. MEADOWOOD TM 5354
WEST - COLLEGE SITE

SHEET INDEX

SHEET	1	TITLE SHEET/SITE PLAN
SHEET	2	OPEN SPACE EXHIBIT
SHEET	3-4	LANDSCAPE PLANS
SHEET	5	ARCHITECTURAL PLANS
SHEET	6	RECREATION BLDG PLANS



KEY MAP
SCALE: 1" = 1500'

LEGEND

- SITE BOUNDARY
- PAD 290.2 / FF 290.9 — PAD ELEV/FINISHED FLOOR
- EASEMENT LINE
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- 8' HIGH SOUND/PERIMETER WALL (PER LS PLANS)
- 90.17 FS — PROPOSED SPOT ELEVATION
- FIRE MANAGEMENT ZONE
- EXISTING COUNTOURS
- PROPOSED COUNTOURS
- PROPOSED SEWER LINE & MANHOLE
- W — PROPOSED WATER LINE
- RW — EX. RECLAIMED WATER LINE
- END CAP
- FIRE HYDRANT
- STORM DRAIN
- GRATED INLET
- CURB INLET
- GUEST PARKING SPACE
- TRASH RECYCLING AREA
- 4' CONC WALKWAYS

SITE SUMMARY

SITE AREA		
MULTI FAMILY-2	5.3 AC	229,192 SF
TOTAL SITE AREA		229,192 SF

RESIDENTS PARKING SPACES REQUIRED	
46 3-BEDROOM UNITS X 2.0 SPACES*	96
18 2-BEDROOM UNITS X 1.5 SPACES*	27
SUB TOTAL	123
GUEST PARKING SPACES REQUIRED	
66 (UNITS) X 0.2 GUEST SPACES/UNIT*	13
RECREATION CENTER PARKING*	–
SUB TOTAL	13
TOTAL SPACES REQUIRED	136

RESIDENT PARKING SPACES PROVIDED	
4 BUILDING X 8 COVERED SPACES/BUILDING	32
4 BUILDINGS X 10 COVERED SPACES/BUILDING	40
5 BUILDINGS X 12 COVERED SPACES/BUILDING	60
SUB TOTAL	132
GUEST PARKING SPACES PROVIDED	
16 STANDARD (9'X18')	14
5 HANDICAP (14'X19')	5
SUB TOTAL	19
TOTAL SPACES PROVIDED	151

* PER SECTION 6758 OF THE SAN DIEGO COUNTY ZONING ORDINANCE

EXISTING AND PROPOSED ZONING

APN 108-120-56			
WOODLEY MF-2			
SPECIFIC PLAN AREA (SPA)		PASSERELLE	
		EXISTING	PROPOSED
USE REGULATIONS		S-90	S-88/RM-15
ANIMAL REGS		K	S
DEVELOPMENT REGULATIONS	DENSITY	0.5	15
	LOT SIZE	20.0 AC.	–
	BUILDING TYPE	C	K
	MAXIMUM FLOOR AREA	–	–
	FLOOR AREA RATIO	–	–
	HEIGHT	G	G
	LOT COVERAGE	–	–
	SETBACK	A	V
	OPEN SPACE	–	F
SPECIAL AREA REGULATIONS		B, POR F	B

ENGINEER OF WORK:

LANDMARK CONSULTING
9555 GENESEE AVENUE, SUITE 200
SAN DIEGO, CA 92121
TELEPHONE (858) 587-8070
FAX (858) 587-8750

REGISTERED PROFESSIONAL ENGINEER
MARK A. BRENCICK
NO. 48153
EXP. 6/30/10
CIVIL
STATE OF CALIFORNIA

MARK A. BRENCICK
R.C.E. 48153 DATE

OWNER:

PASSERELLE, LLC
A CALIFORNIA LIMITED LIABILITY COMPANY
402 WEST BROADWAY, SUITE 1320
SAN DIEGO, CA 92101-3542
TELEPHONE (619) 696-7355

BY:
BRUCE TABB DATE

LANDMARK CONSULTING
PLANNING • ENGINEERING • SURVEYING
9555 GENESEE AVE., SUITE 200
SAN DIEGO, CA 92121, (858)587-8070

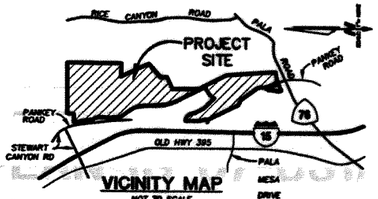
COUNTY OF SAN DIEGO TRACT 5338 RPL 5
VESTING SITE PLAN FOR
CAMPUS PARK
MULTI-FAMILY 2

COUNTY OF SAN DIEGO TRACT 5338 RPL-5

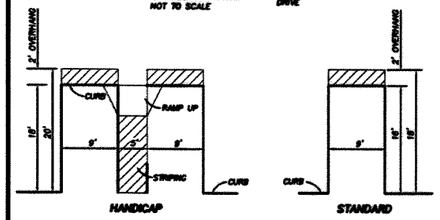
VESTING SITE PLAN

CAMPUS PARK

"B" DESIGNATOR SITE PLAN (S 07-031)



VICINITY MAP
NOT TO SCALE



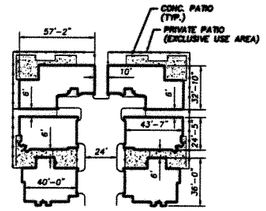
TYPICAL PARKING DIMENSIONS
NOT TO SCALE

SHEET INDEX

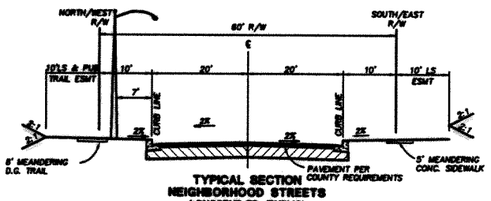
SHEET	1	TITLE SHEET/SITE PLAN
SHEET	2	OPEN SPACE EXHIBIT
SHEET	3 - 4	LANDSCAPE PLANS
SHEET	5 - 18	ARCHITECTURAL PLANS
SHEET	19	REC BUILDING PLANS

NOTE: FUEL MANAGEMENT AREAS TO BE MAINTAINED BY HOA. BRUSH-MANAGED VEGETATION TO BE REMOVED FROM THE SITE.

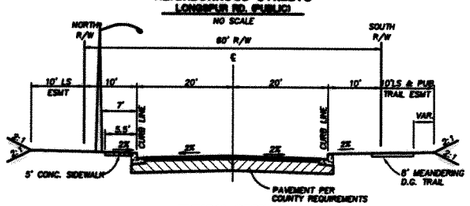
GRAPHIC SCALE



TYPICAL BUILDING SIZE
NOT TO SCALE



TYPICAL SECTION
NEIGHBORHOOD STREETS
LONGSPUR RD. (PUBLIC)
NO SCALE



TYPICAL SECTION
NEIGHBORHOOD STREETS
HARVEST GLEN LANE
NO SCALE

LEGEND

- SITE BOUNDARY
- PAD ELEV/FINISHED FLOOR (PAD 325.2 / FF 326.0)
- EASEMENT LINE
- CURB & GUTTER
- 3' RIBBON GUTTER
- 10' CROSS GUTTER
- PED RAMP
- 4' CONC SIDEWALK
- CUT/FILL SLOPE (2:1 MAX.)
- PROPOSED SPOT ELEVATION (50.12 / FS)
- FIRE MANAGEMENT ZONE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- PROPOSED SEWER LINE & MANHOLE
- PROPOSED WATER LINE
- END CAP
- FIRE HYDRANT
- STORM DRAIN
- GRATED INLET
- CURB INLET
- SOUND/PERIMETER WALL (SEE LANDSCAPE PLANS FOR DETAILS)
- GUEST PARKING SPACE

GENERAL NOTES

1. TOTAL GROSS SITE AREA: 18.4 ACRES
   TOTAL NET SITE AREA: 18.4 ACRES
2. TOTAL NUMBER OF LOTS: 1
3. TOTAL NUMBER OF UNITS: 189 (189 MULTIFAMILY CONDOMINIUM UNITS)
4. ASSESSOR'S PARCEL NUMBER: 108-120-58
5. EXISTING GENERAL PLAN LAND USE DESIGNATION: SPA 21(2.9)
   PROPOSED GENERAL PLAN LAND USE DESIGNATION: SPA 21(3.0)
6. EXISTING GENERAL PLAN REGIONAL CATEGORY: SSA
   PROPOSED GENERAL PLAN REGIONAL CATEGORY: CUDA
7. EXISTING ZONING: SEE ZONING BOX, THIS SHEET
   PROPOSED ZONING: SEE ZONING BOX, THIS SHEET
8. GROSS DENSITY: 10.3 DU/AC (189 DU'S/18.4 GROSS AC.)
9. EXISTING USE: VACANT
10. PROPOSED USE: RESIDENTIAL (MULTIFAMILY UNITS)
11. TAX RATE AREA: 75169
12. THOMAS BROTHERS COORDINATES: 1028, J7
    LAMBERT COORDINATES: 428-1723
13. COMMUNITY/SUBREGIONAL AREA: FALLBROOK/SPA 21(3.0)
14. SPA: CAMPUS PARK

GENERAL DESIGN NOTES

1. ALL GRADING FOR PROPOSED AND FUTURE STREETS SHALL CONFORM TO THE COUNTY DESIGN STANDARDS AND AS REQUIRED BY THE COUNTY ENGINEER.
2. ALL PROPOSED UTILITIES SHALL BE UNDERGROUND. EASEMENTS SHALL BE PROVIDED, REMOVED OR RELOCATED AS REQUIRED BY THE COUNTY ENGINEER, PUBLIC UTILITIES AND THEIR APPROPRIATE DISTRICTS.
3. SOURCE OF TOPOGRAPHY: MORENO AERIAL PHOTO SURVEY, DATED _____
4. THERE SHALL BE NO PARKING DELINEATED BY RED CURBS WITHIN THE FIRE LANES.
5. MANUFACTURED SLOPE RATIOS SHALL BE VARIABLE (2:1 MAX.)
6. FINISHED GRADES ARE APPROXIMATE ONLY AND SUBJECT TO CHANGE AT FINAL DESIGN, CONSISTENT WITH THE COUNTY'S SUBSTANTIAL CONFORMANCE GUIDELINES.
7. SOIL INFORMATION WAS OBTAINED FROM THE PRELIMINARY SOILS REPORT PREPARED BY: SHEPARDSON ENGINEERS, DATED _____
8. MODEL UNITS MAY BE BUILT PRIOR TO FINAL MAP RECORDATION WITH APPROVAL FROM THE COUNTY ENGINEER AND PLANNING DIRECTOR.
9. ALL STREET DESIGNS, LANDSCAPING AND FIRE HYDRANTS SHALL CONFORM TO THE COUNTY DESIGN STANDARDS AND AS REQUIRED BY THE COUNTY ENGINEER.
10. THE SUBDIVIDER/DEVELOPER SHALL PROVIDE AND INSTALL APPROVED STREET LIGHT STANDARDS AND FIXTURES IN THE TYPE AND NUMBER APPROVED BY THE COUNTY OF SAN DIEGO AND THE PUBLIC WORKS DEPARTMENT.
11. THIS IS A MAP WHICH INCLUDES CONDOMINIUM PROJECTS AS DEFINED IN SECTION 1351 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND FILED PURSUANT TO THE SUBDIVISION MAP ACT. THE TOTAL NUMBER OF CONDOMINIUM UNITS SHALL NOT EXCEED 189 UNITS.
12. TRASH RECEPTACLES WILL BE KEPT IN GARAGES WITH WEEKLY PICK-UP.
13. FOR SIGNAGE, SITE WALL, FLOOR PLANS, ELEVATION AND FENCING, SEE LANDSCAPE PLANS.
14. ACCESS DRIVE TO GARAGES WILL BE MARKED AS FIRE LANES.
15. THIS PROJECT IS SUBJECT TO UTILIZING LOW IMPACT DESIGN TECHNIQUES IN CONTAINING STORM WATER ON SITE PER THE SATISFACTION OF COUNTY ENGINEER.

PARK LAND DEDICATION STATEMENT

THE SUBDIVIDER INTENDS TO COMPLY WITH THE PARK LAND DEDICATION ORDINANCE THROUGH THE DEDICATION OF PARK LAND WITHIN THE SUBDIVISION AUTHORIZED BY THE ORDINANCE AND/OR BY PAYMENT OF IN LIEU PARK IMPACT FEES.

SPECIAL ASSESSMENT ACT STATEMENT

A REQUEST TO THE BOARD OF SUPERVISORS FOR PERMISSION TO INITIATE PROCEEDINGS UNDER THE SPECIAL ASSESSMENT ACT FOR CONSTRUCTION OF ANY SUBDIVISION IMPROVEMENTS IS NOT BEING MADE AT THIS TIME.

EASEMENT LEGEND

NO EASEMENT EXIST ON THIS SITE UNLESS SHOWN OTHERWISE.

LEGAL DESCRIPTION

PORTION OF PARCEL B OF BOUNDARY ADJUSTMENT PLAT NO. 04-0253, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, UNDER CERTIFICATE OF COMPLIANCE RECORDED DECEMBER 11, 2006 AS DOC. NO. 2006-0876284.

ADJACENT LAND USE

NORTH – SINGLE FAMILY RESIDENTIAL
SOUTH – PROP MEADOWOOD TM 5354
EAST – SINGLE FAMILY RESIDENTIAL
WEST – TOWN CENTER

SITE SUMMARY

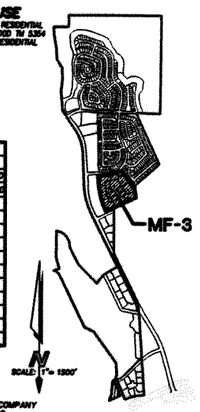
SITE AREA		
MULTI FAMILY-3	16.4 AC	802,348 SF
TOTAL SITE AREA		802,348 SF
RESIDENT PARKING SPACES REQUIRED		
189 3-BEDROOM UNITS X 2.0 SPACES*		378
SUB TOTAL		378
GUEST PARKING SPACES REQUIRED		
189 (UNITS) X 0.2 GUEST SPACES/UNIT*		38
RECREATION CENTER PARKING*		--
SUB TOTAL		38
TOTAL SPACES REQUIRED		416
RESIDENT PARKING SPACES PROVIDED		
189 BUILDINGS X 2 COVERED SPACES/BUILDING		378
SUB TOTAL		378
GUEST PARKING SPACES PROVIDED		
PARALLEL		117
HANDICAP (14'X18')		10
SUB TOTAL		127
TOTAL SPACES PROVIDED		505

* PER SECTION 6793 OF THE SAN DIEGO COUNTY ZONING ORDINANCE

EXISTING AND PROPOSED ZONING

APN 108-120-58

CANTERBURY			
SPECIFIC PLAN AREA (SPA) PASSERELLE			
		EXISTING	PROPOSED
USE REGULATIONS		S-80	S-88/RM-10
ANIMAL REGS		K	S
DEVELOPMENT REGULATIONS	DENSITY	0.5	10
	LOT SIZE	20 AC.	--
	BUILDING TYPE	C	K
	MAXIMUM FLOOR AREA	--	--
	FLOOR AREA RATIO	--	--
	HEIGHT	G	H
	LOT COVERAGE	--	--
	SETBACK	A	V
	OPEN SPACE	--	F
SPECIAL AREA REGULATIONS		B, FOR F	B



KEY MAP
SCALE: 1" = 1500'

ENGINEER OF WORK:
LANDMARK CONSULTING
9665 GENESEE AVENUE, SUITE 200
SAN DIEGO, CA 92121
TELEPHONE (858) 587-8070
FAX (858) 587-8750

REGISTERED PROFESSIONAL ENGINEER MARK A. BRENCICK NO. 48153 EXP. 6/30/10 CIVIL STATE OF CALIFORNIA

MARK A. BRENCICK
R.C.E. 48153
DATE

OWNER:
PASSERELLE, LLC
A CALIFORNIA LIMITED LIABILITY COMPANY
402 WEST BROADWAY, SUITE 1320
SAN DIEGO, CA 92101-3542
TELEPHONE (619) 696-7355

BY:
BRUCE YABB
DATE

LANDMARK CONSULTING
PLANNING • ENGINEERING • SURVEYING
9665 GENESEE AVE., SUITE 200
SAN DIEGO, CA 92121, (858)587-8070

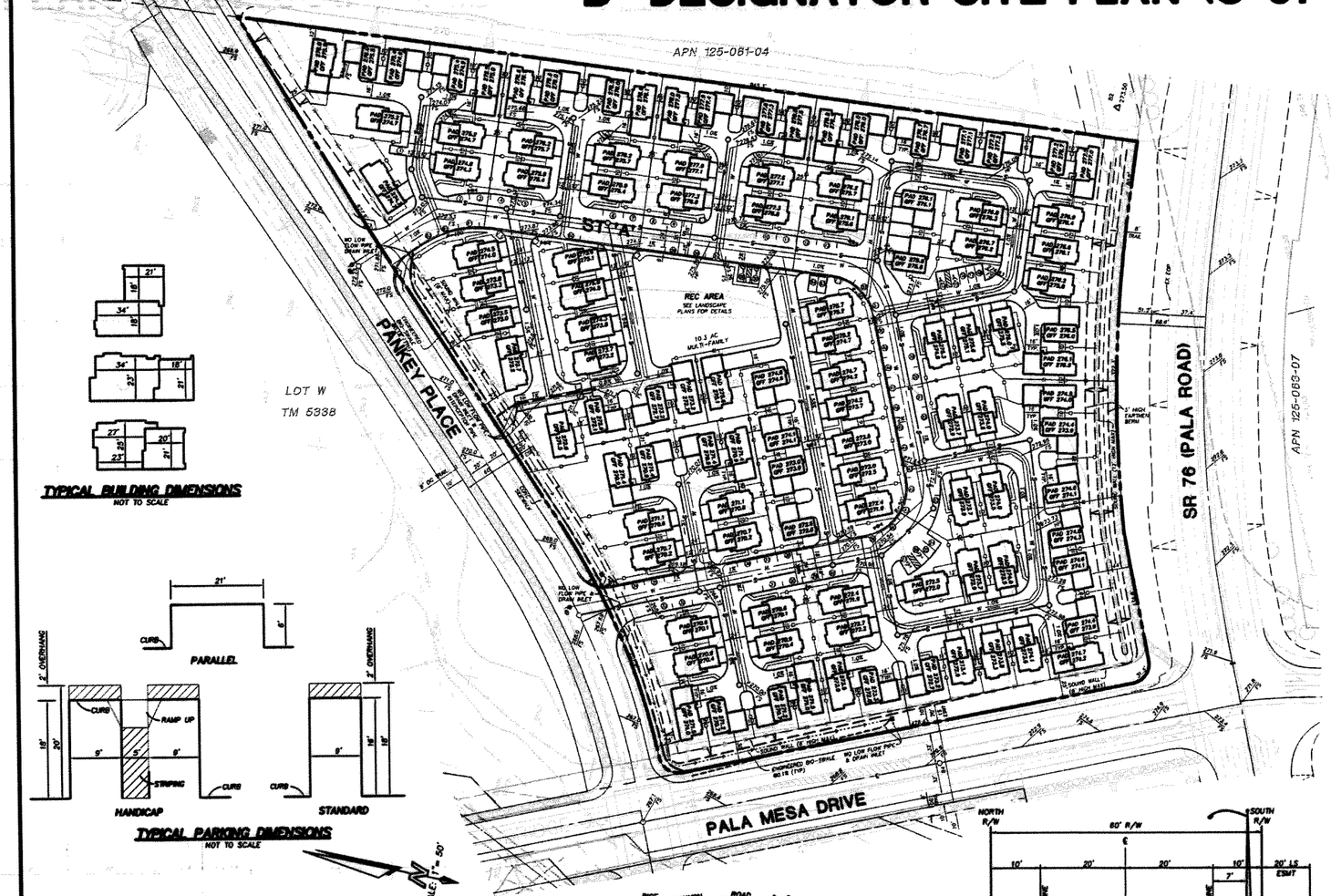
COUNTY OF SAN DIEGO TRACT 5338 RPL 5
VESTING SITE PLAN FOR
CAMPUS PARK
MULTI-FAMILY 3

COUNTY OF SAN DIEGO TRACT 5338 RPL-5

VESTING SITE PLAN

CAMPUS PARK

"B" DESIGNATOR SITE PLAN (S 07-031)



TYPICAL BUILDING DIMENSIONS

NOT TO SCALE

TYPICAL PARKING DIMENSIONS

NOT TO SCALE

SCALE: 1" = 50'

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

SITE SUMMARY

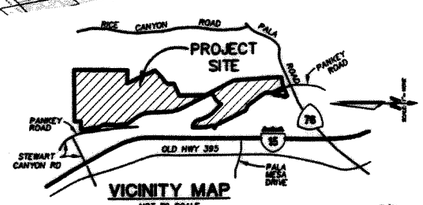
SITE AREA		
MULTI FAMILY-4	10.3 AC	448,419 SF
TOTAL SITE AREA		448,419 SF
RESIDENT PARKING SPACES REQUIRED		
108 3-BEDROOM UNITS X 2.0 SPACES*		216
SUBTOTAL		216
GUEST PARKING SPACES REQUIRED		
108 UNITS X 0.2 GUEST SPACES/UNIT*		22
RECREATION CENTER PARKING*		–
SUBTOTAL		22
TOTAL SPACES REQUIRED		238
RESIDENT PARKING SPACES PROVIDED		
108 BUILDINGS X 2 COVERED SPACES/BUILDING		216
SUB TOTAL		216
GUEST PARKING SPACES PROVIDED		
STANDARD (9'X18')		6
PARALLEL		72
HANDICAP (14'X19')		6
SUB TOTAL		84
TOTAL SPACES PROVIDED		300

* PER SECTION 6758 OF THE SAN DIEGO COUNTY ZONING ORDINANCE

EXISTING AND PROPOSED ZONING

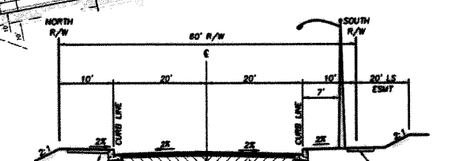
APN 125-081-03

SPECIFIC PLAN AREA (SPA) PASSERELLE			
		EXISTING	PROPOSED
USE REGULATIONS		S-90	S-88/RM-12
ANIMAL SDG		K	S
DEVELOPMENT REGULATIONS	DENSITY	0.5	12.0
	LOT SIZE	20 AC	–
	BUILDING TYPE	C	K
	MAXIMUM FLOOR AREA	–	–
	FLOOR AREA RATIO	–	–
	HEIGHT	G	G
	LOT COVERAGE	–	–
	SETBACK	A	V
	OPEN SPACE	–	F
SPECIAL AREA REGULATIONS		B, FOR F	B



VICINITY MAP

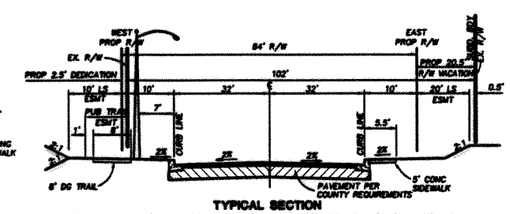
NOT TO SCALE



TYPICAL SECTION NEIGHBORHOOD STREETS

PANKEY PLACE (PUBLIC)

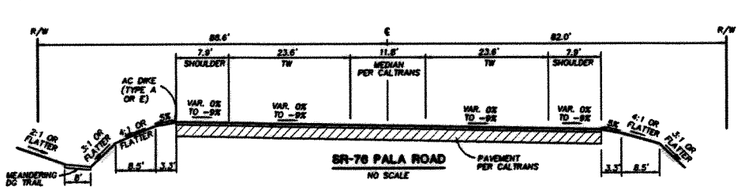
NO SCALE



TYPICAL SECTION

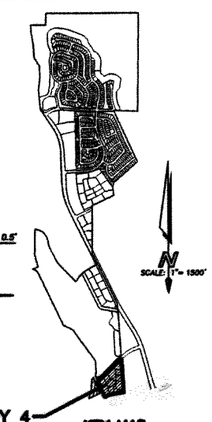
PALA MESA DR (PUBLIC) (EX PANKEY RD SOUTH OF PANKEY PL)

NO SCALE



SR-76 PALA ROAD

NO SCALE



KEY MAP

SCALE: 1" = 100'

LEGEND

- SITE BOUNDARY
- PAD ELEV/FINISHED FLOOR (PAD 200.2 FF 203.5)
- EASEMENT LINE
- CURB & GUTTER
- 3' RIBBON GUTTER
- 10' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- PROPOSED SPOT ELEVATION (90.17 TG)
- 100 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD AREA
- FIRE MANAGEMENT ZONE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- PROPOSED SEWER LINE & MANHOLE
- PROPOSED WATER LINE
- END CAP
- FIRE HYDRANT
- STORM DRAIN
- GRATED INLET
- CURB INLET
- 4' CONC WALKWAYS
- SOUND/PERIMETER WALL (SEE LANDSCAPE PLANS FOR DETAILS)
- FENCE
- GUEST PARKING SPACE

SHEET INDEX

SHEET	1	TITLE SHEET/SITE PLAN
SHEET	2	OPEN SPACE EXHIBIT
SHEET	3-4	LANDSCAPE PLANS
SHEET	5-6	ARCHITECTURAL PLANS
SHEET	7	POOL BUILDING PLANS

ADJACENT LAND USE

NORTH – OPEN SPACE
SOUTH – PALA ROAD HIGHWAY 76
EAST – PROP. MEADOWOOD TM 5354
WEST – SEWER PUMP STATION/OPEN SPACE

OWNER:

PASSERELLE, LLC
A CALIFORNIA LIMITED LIABILITY COMPANY
402 WEST BROADWAY, SUITE 1320
SAN DIEGO, CA 92101-3542
TELEPHONE (619) 696-7355

BY:
BRUCE TABB DATE

ENGINEER OF WORK:

LANDMARK CONSULTING
9333 GENESEE AVENUE, SUITE 200
SAN DIEGO, CA 92121
TELEPHONE (858) 587-8070
FAX (858) 587-8750

MARK A. BRENCICK DATE
R.C.E. 48153

REGISTERED PROFESSIONAL ENGINEER MARK A. BRENCICK NO. 48153 EXP. 6/30/10 CIVIL STATE OF CALIFORNIA

GENERAL NOTES

1. TOTAL GROSS SITE AREA: 10.3 ACRES TOTAL NET SITE AREA: 10.3 ACRES
2. TOTAL NUMBER OF LOTS: 1
3. TOTAL NUMBER OF UNITS: 108 (108 MULTI FAMILY CONDOMINIUM UNITS)
4. ASSESSOR'S PARCEL NUMBER: 125-081-03
5. EXISTING GENERAL PLAN LAND USE DESIGNATION: SPA 21(2.8)
   PROPOSED GENERAL PLAN LAND USE DESIGNATION: SPA 21(3.0)
6. EXISTING GENERAL PLAN REGIONAL CATEGORY: SSA
   PROPOSED GENERAL PLAN REGIONAL CATEGORY: CUDA
7. EXISTING ZONING: SEE ZONING BOX, THIS SHEET
   PROPOSED ZONING: SEE ZONING BOX, THIS SHEET
8. GROSS DENSITY: 10.5 DU'S/AC (108 DU'S/10.3 GROSS AC)
9. EXISTING USE: VACANT PROPOSED USE: RESIDENTIAL (MULTIFAMILY UNITS)
10. TAX RATE AREA: 57161
11. THOMAS BROTHERS COORDINATES: 1048, J1
    LAMBERT COORDINATES: 428-1719
12. COMMUNITY/SUBREGIONAL AREA: FALLBROOK/SPA 21(3.0)
13. SPA: CAMPUS PARK

GENERAL DESIGN NOTES

1. ALL GRADING FOR PROPOSED AND FUTURE STREETS SHALL CONFORM TO THE COUNTY DESIGN STANDARDS AND AS REQUIRED BY THE COUNTY ENGINEER.
2. ALL PROPOSED UTILITIES SHALL BE UNDERGROUND. EASEMENTS SHALL BE PROVIDED, REMOVED OR RELOCATED AS REQUIRED BY THE COUNTY ENGINEER, PUBLIC UTILITIES AND THEIR APPROPRIATE DISTRICTS.
3. SOURCE OF TOPOGRAPHY: MORENO AERIAL PHOTO SURVEY, DATED _____
4. THERE SHALL BE NO PARKING DELINEATED BY RED CURBS WITHIN THE FIRE LANES.
5. MANUFACTURED SLOPE RATIOS SHALL BE VARIABLE (2:1 MAX.)
6. FINISHED GRADES ARE APPROXIMATE ONLY AND SUBJECT TO CHANGE AT FINAL DESIGN, CONSISTENT WITH THE COUNTY'S SUBSTANTIAL CONFORMANCE GUIDELINES.
7. SOIL INFORMATION WAS OBTAINED FROM THE PRELIMINARY SOILS REPORT PREPARED BY: SHEPARDSON ENGINEERS, DATED _____
8. MODEL UNITS MAY BE BUILT PRIOR TO FINAL MAP RECORDATION WITH APPROVAL FROM THE COUNTY ENGINEER AND PLANNING DIRECTOR.
9. ALL STREET DESIGNS, LANDSCAPING AND FIRE HYDRANTS SHALL CONFORM TO THE COUNTY DESIGN STANDARDS AND AS REQUIRED BY THE COUNTY ENGINEER.
10. THE SUBDIVIDER/DEVELOPER SHALL PROVIDE AND INSTALL APPROVED STREET LIGHT STANDARDS AND FIXTURES IN THE TYPE AND NUMBER APPROVED BY THE COUNTY OF SAN DIEGO AND THE PUBLIC WORKS DEPARTMENT.
11. THIS IS A MAP WHICH INCLUDES CONDOMINIUM PROJECTS AS DEFINED IN SECTION 1351 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND FILED PURSUANT TO THE SUBDIVISION MAP ACT. THE TOTAL NUMBER OF CONDOMINIUM UNITS SHALL NOT EXCEED 108 UNITS.
12. TRASH RECEPTACLES WILL BE KEPT IN GARAGES WITH WEEKLY PICK-UP.
13. FOR SIGNAGE, SITE WALL, FLOOR PLANS, ELEVATION AND FENCING, SEE LANDSCAPE PLANS.
14. ACCESS DRIVE TO GARAGES WILL BE MARKED AS FIRE LANES AND CURBS PAINTED RED.
15. THIS PROJECT IS SUBJECT TO UTILIZING LOW IMPACT DESIGN TECHNIQUES IN CONTAINING STORM WATER ON SITE PER THE SATISFACTION OF COUNTY ENGINEER.

PARK LAND DEDICATION STATEMENT

THE SUBDIVIDER INTENDS TO COMPLY WITH THE PARK LAND DEDICATION ORDINANCE THROUGH THE DEDICATION OF PARK LAND WITHIN THE SUBDIVISION AUTHORIZED BY THE ORDINANCE AND/OR BY PAYMENT OF IN LIEU PARK IMPACT FEES.

SPECIAL ASSESSMENT ACT STATEMENT

A REQUEST TO THE BOARD OF SUPERVISORS FOR PERMISSION TO INITIATE PROCEEDINGS UNDER THE SPECIAL ASSESSMENT ACT FOR CONSTRUCTION OF ANY SUBDIVISION IMPROVEMENTS IS NOT BEING MADE AT THIS TIME.

EASEMENT LEGEND

NO EASEMENT EXIST ON THIS SITE UNLESS OTHERWISE SHOWN.

LEGAL DESCRIPTION

PORTION OF PARCEL B OF BOUNDARY ADJUSTMENT PLAT NO. 04-0253, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, UNDER CERTIFICATE OF COMPLIANCE RECORDED DECEMBER 11, 2006 AS DOC. NO. 2006-0876394.

LANDMARK CONSULTING
A PROFESSIONAL CORPORATION
9333 GENESEE AVE., SUITE 200
SAN DIEGO, CA 92121, (858)587-8070

COUNTY OF SAN DIEGO TRACT 5338 RPL 5
VESTING SITE PLAN FOR
CAMPUS PARK
MULTI-FAMILY 4

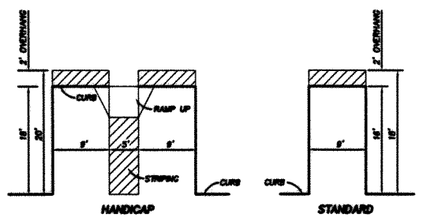
SHEET NO. 1 OF 7 SHEETS

COUNTY OF SAN DIEGO TRACT 5338 RPL-5

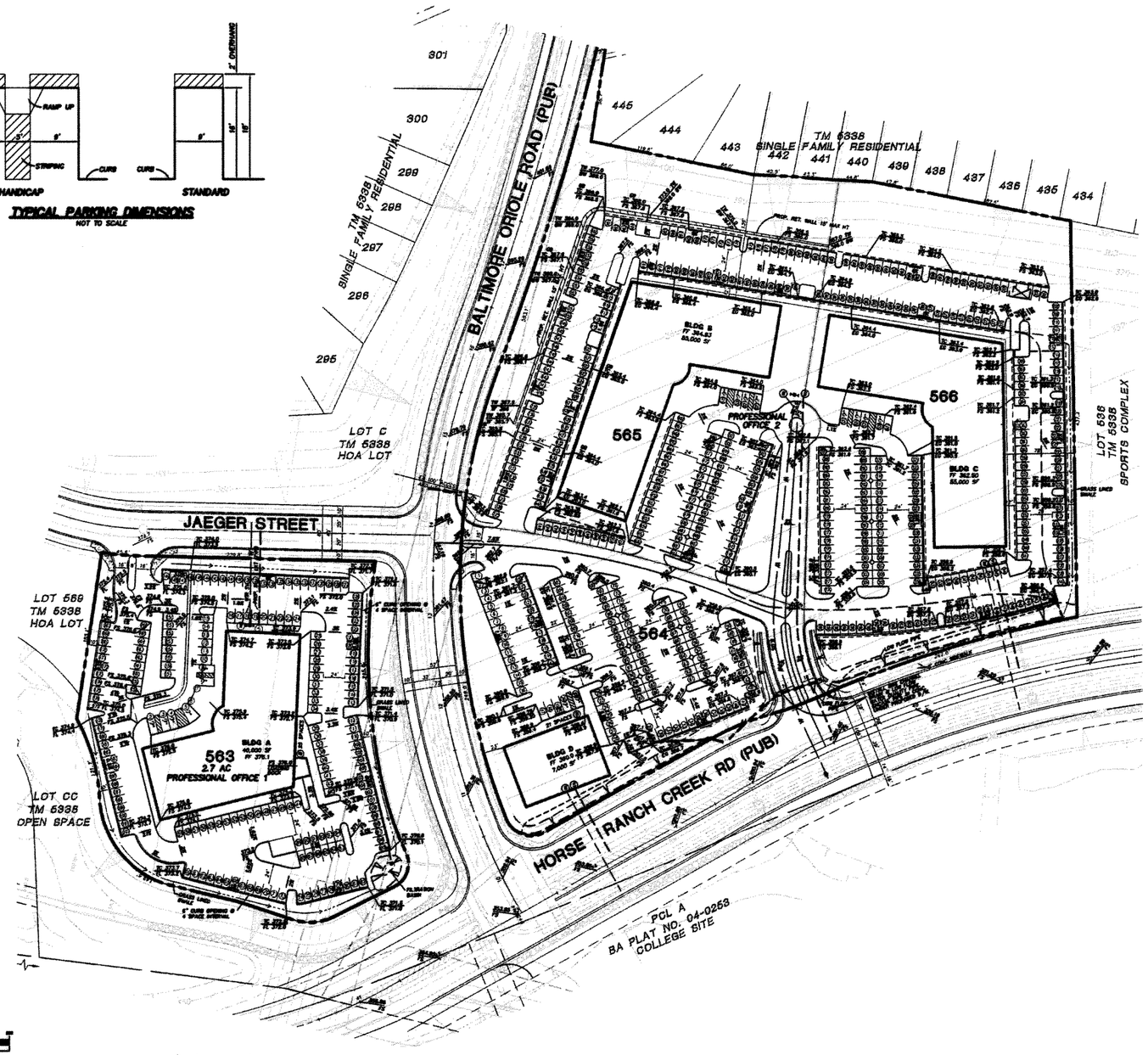
VESTING SITE PLAN

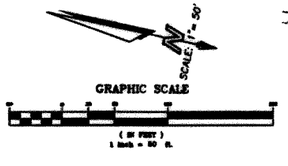
CAMPUS PARK

"B" DESIGNATOR SITE PLAN (S 07-031)



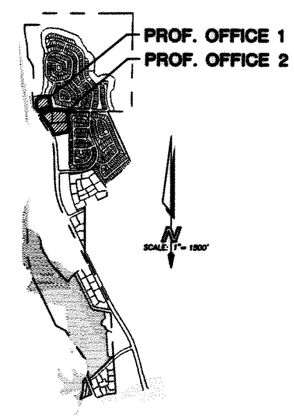
TYPICAL PARKING DIMENSIONS
NOT TO SCALE





LEGEND

- SITE BOUNDARY
- PAD ELEV/FINISHED FLOOR
- EASEMENT LINE
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- PROPOSED SPOT ELEVATION
- FIRE MANAGEMENT ZONE
- EXISTING COUNTOURS
- PROPOSED COUNTOURS
- PROPOSED SEWER LINE & MANHOLE
- SEWER CLEANOUT
- PROPOSED SEWER LAT
- PROPOSED WATER SVC
- PROPOSED WATER LINE
- PROPOSED RECLAIMED WATER LINE
- END CAP
- FIRE HYDRANT
- STORM DRAIN
- GRATED INLET
- CURB INLET
- PROPOSED BUILDING
- TRASH/RECYCLING AREA
- NO. OF PARKING SPACES
- BICYCLE PARKING 1.5 PER 10 PS – 107 SPACES TOTAL
- 566 LOT NUMBER
- PHASE LINE
- RET WALL



KEY MAP
SCALE: 1" = 1500'

LANDMARK CONSULTING
PLANNING • ENGINEERING • SURVEYING
1020 SECOND AVE., SUITE 200
SAN DIEGO, CA 92101 (619) 297-8200

COUNTY OF SAN DIEGO TRACT 5338 RPL 5
VESTING SITE PLAN FOR
CAMPUS PARK

PROFESSIONAL OFFICE

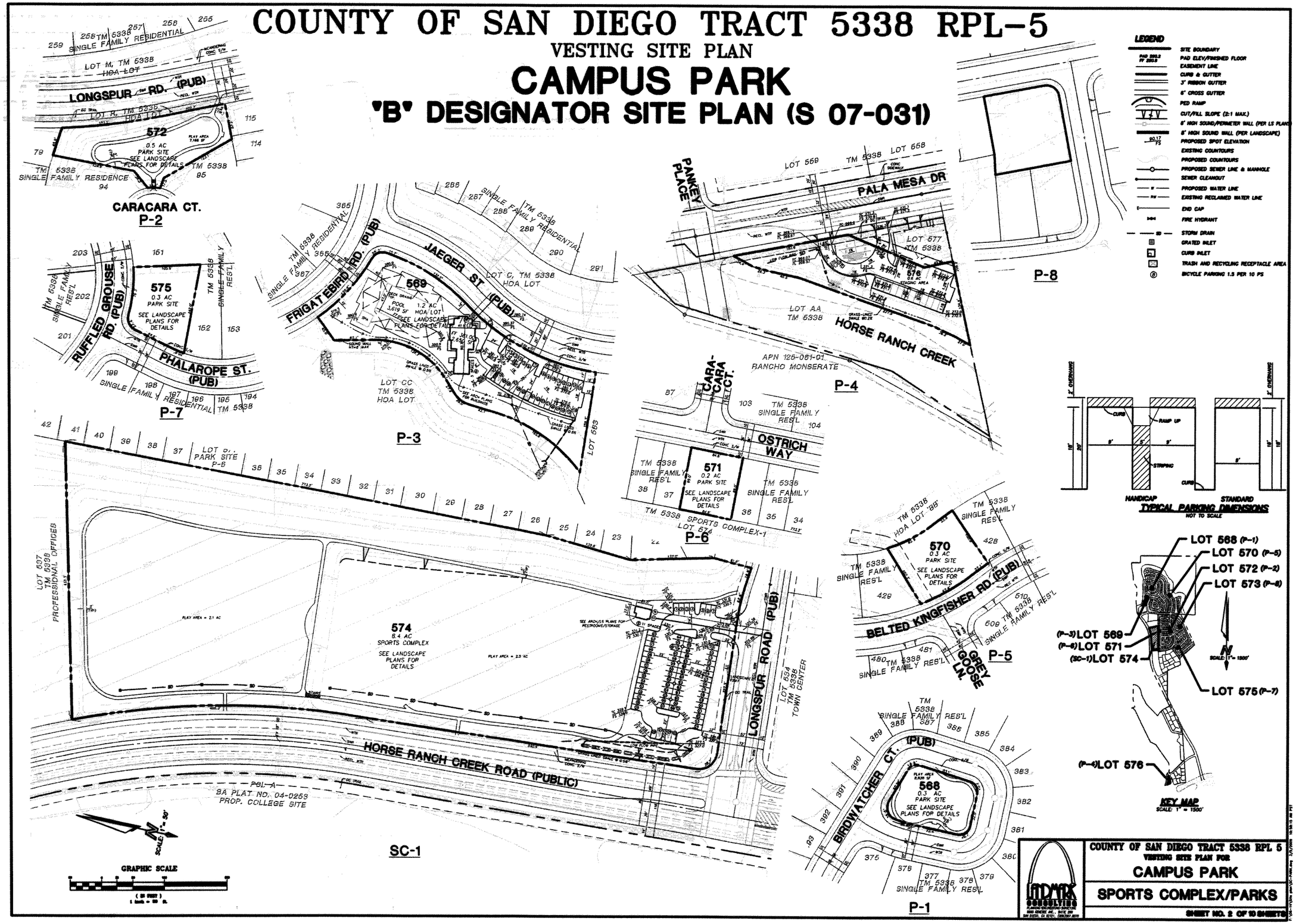
SHEET NO. 2 OF 10 SHEETS

COUNTY OF SAN DIEGO TRACT 5338 RPL-5

VESTING SITE PLAN

CAMPUS PARK

"B" DESIGNATOR SITE PLAN (S 07-031)



COUNTY OF SAN DIEGO TRACT 5338 RPL-5

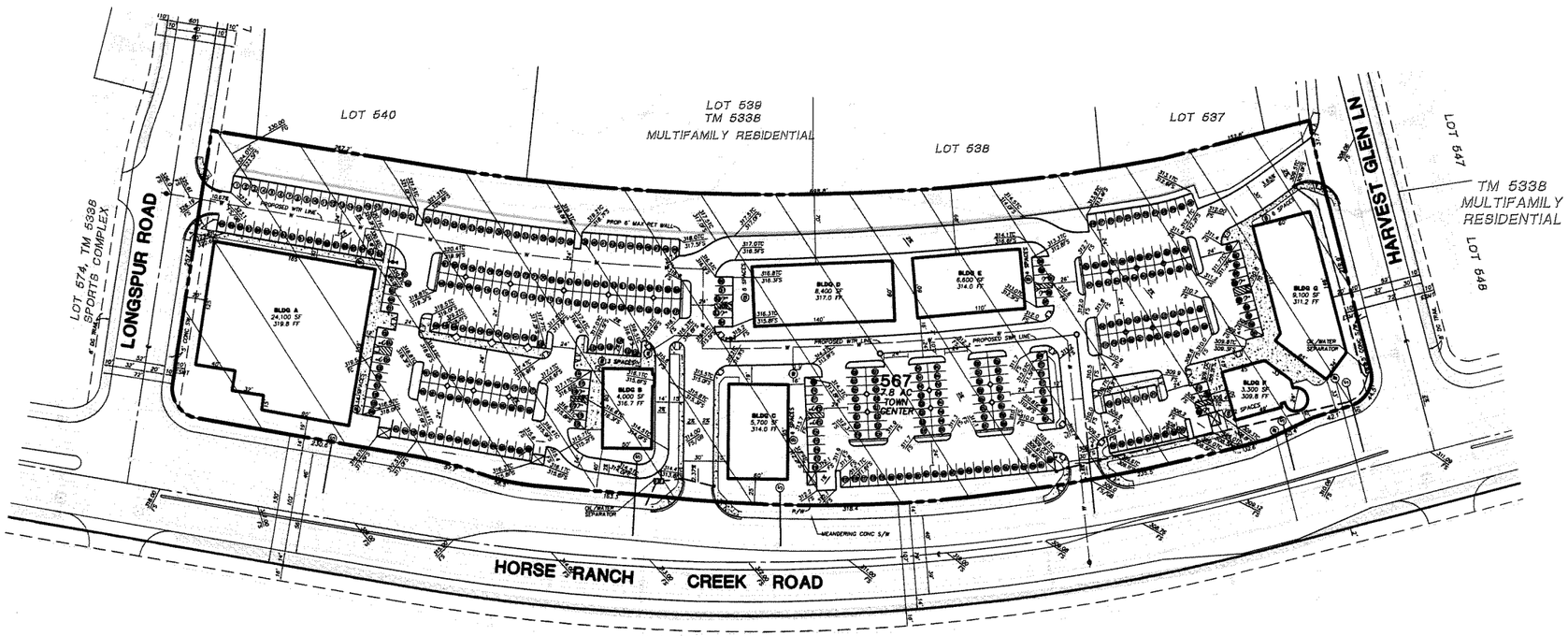
VESTING SITE PLAN

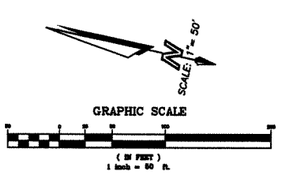
CAMPUS PARK

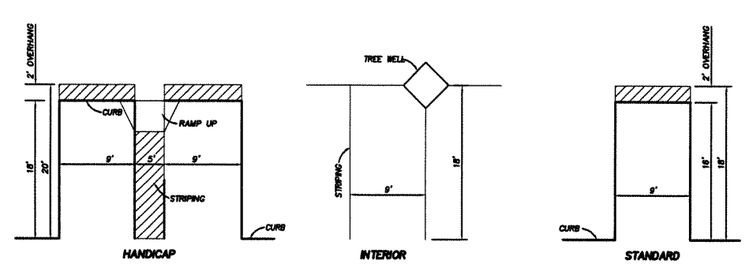
"B" DESIGNATOR SITE PLAN (S 07-031)

LEGEND

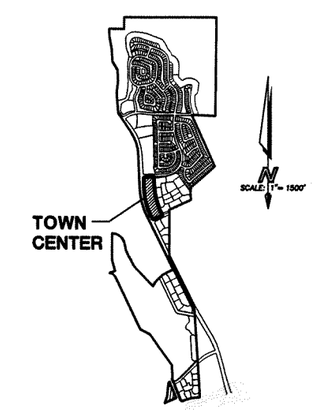
- SITE BOUNDARY
- PAD 292.2 FF 295.8 — PAD ELEV/FINISHED FLOOR
- EASEMENT LINE
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6" CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- 80.17 FS — PROPOSED SPOT ELEVATION
- EXISTING COUNTOURS
- PROPOSED COUNTOURS
- SEWER CLEANOUT
- PROPOSED SEWER LINE & MANHOLE
- PROPOSED SEWER LAT
- W — PROPOSED WATER LINE
- RW — PROPOSED RECLAIMED WATER LINE
- PROPOSED WATER SVC
- END CAP
- FIRE HYDRANT
- STORM DRAIN
- GRATED INLET
- CURB INLET
- PROPOSED BUILDING
- RETAINING WALL
- TRASH/RECYCLING AREA
- NO. OF PARKING SPACES
- BICYCLE PARKING 1 PER 10 PS – 41 SPACES TOTAL







TYPICAL PARKING DIMENSIONS
NOT TO SCALE



KEY MAP
SCALE: 1" = 1500'

LANDMARK CONSULTING
LANDSCAPE ARCHITECTURE
9333 GENESEE AVE., SUITE 200
SAN DIEGO, CA 92121, (858)587.8070

COUNTY OF SAN DIEGO TRACT 5338 RPL 5
VESTING SITE PLAN FOR
CAMPUS PARK
TOWN CENTER

SHEET NO. 2 OF 10 SHEETS

F:\08-11\Site plan\TC.dwg 3/4/2008 8:48:37 AM PST

ATTACHMENT C

RELEVANT MONITORING DATA

*(**NOTE:** PROVIDE RELEVANT WATER QUALITY MONITORING DATA IF AVAILABLE.)*

N/A

ATTACHMENT D

LID AND TREATMENT BMP LOCATION MAP

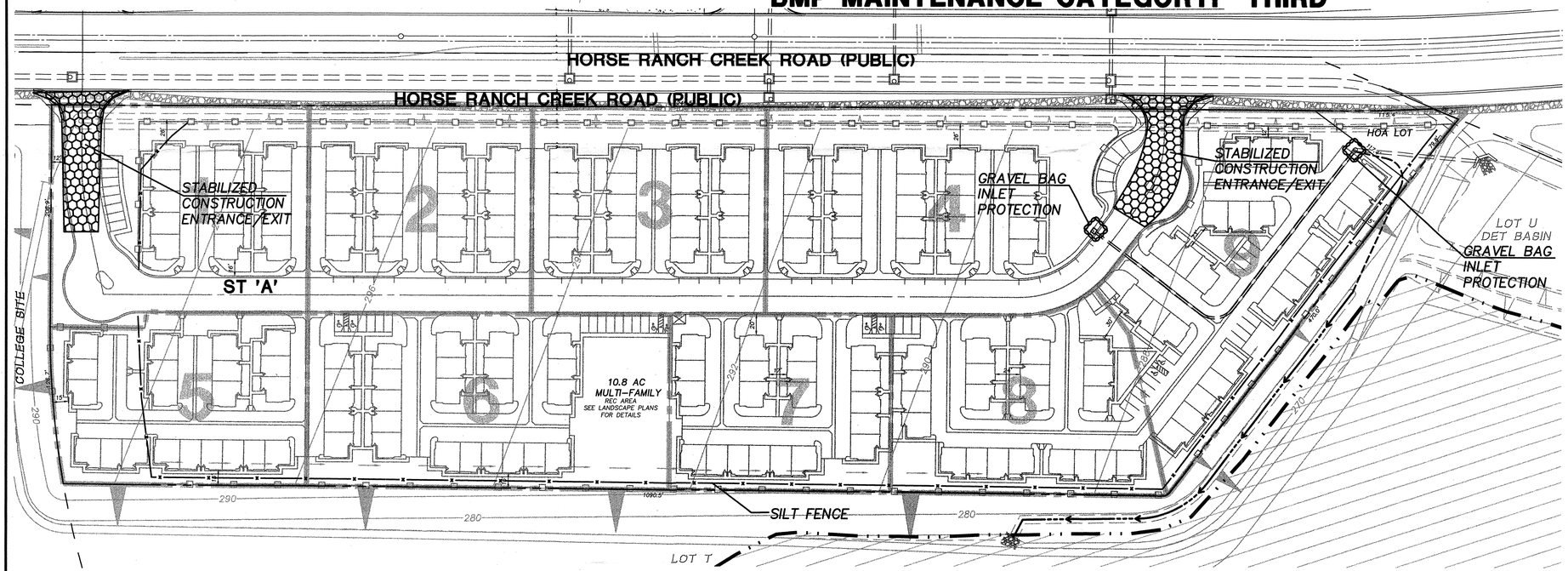
COUNTY OF SAN DIEGO TRACT 5338 RPL-6

BMP SITE PLAN

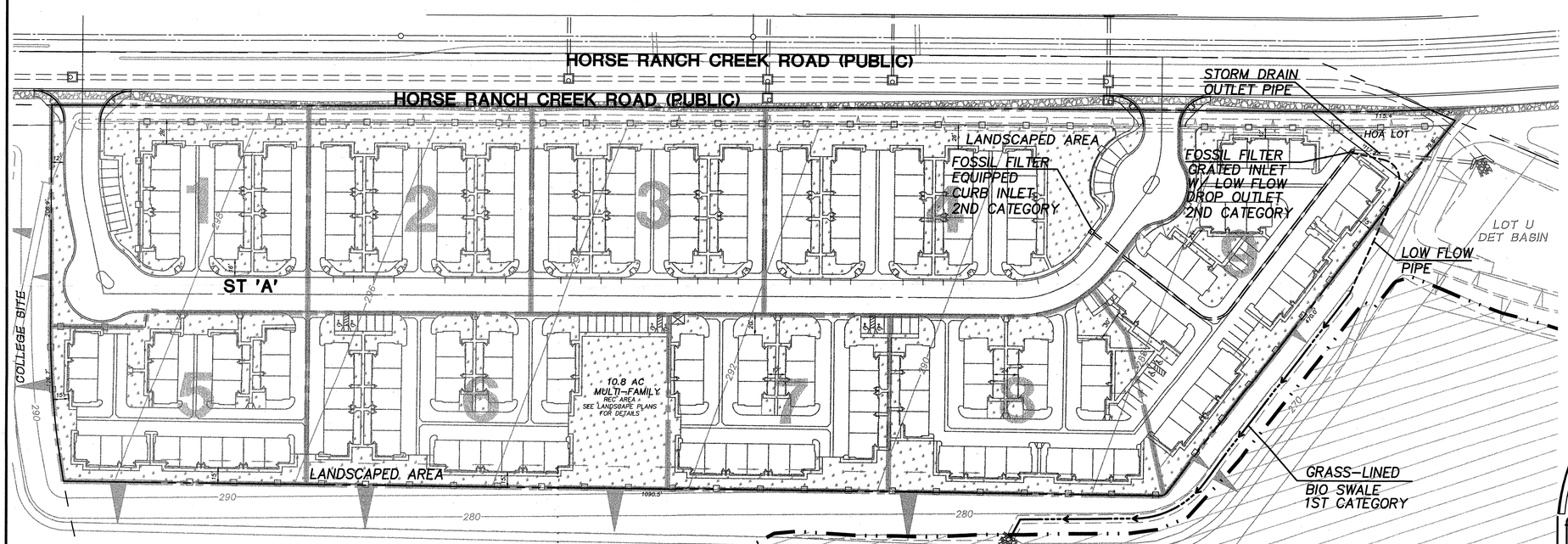
CAMPUS PARK

"B" DESIGNATOR SITE PLAN (STP 07-030)

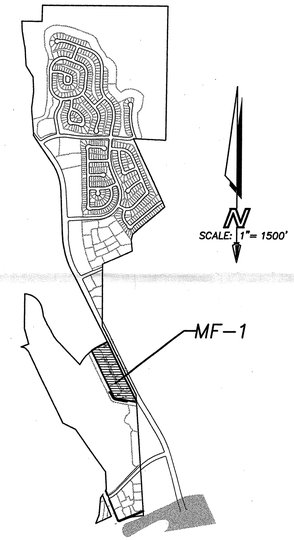
BMP MAINTENANCE CATEGORY: THIRD

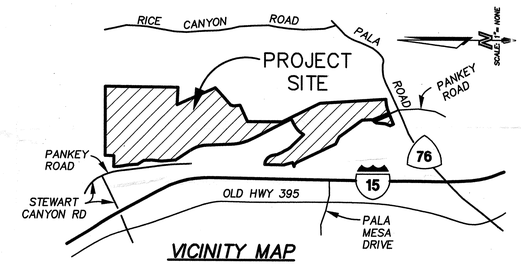


CONSTRUCTION BMP



POST-CONSTRUCTION (PERMANENT)





VICINITY MAP

NOT TO SCALE

LEGEND

- SITE BOUNDARY
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- 100 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD AREA
- STORM DRAIN
- GRATED INLET
- CURB INLET

SCALE: 1" = 60'

0 15 30 45 60 120 180 240 300

SCALE: 1" = 60'

LANDMARK CONSULTING
PLANNING·ENGINEERING·SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

COUNTY OF SAN DIEGO TRACT 5338 RPL 6

BMP SITE PLAN FOR

CAMPUS PARK

MULTI-FAMILY 1, MF1

SHEET NO. 1 OF 1 SHEET

J.N.: 6-14

F:\06-14\swmp\MF-1bmp.dwg 3/4/2009 3:28:44 PM PST

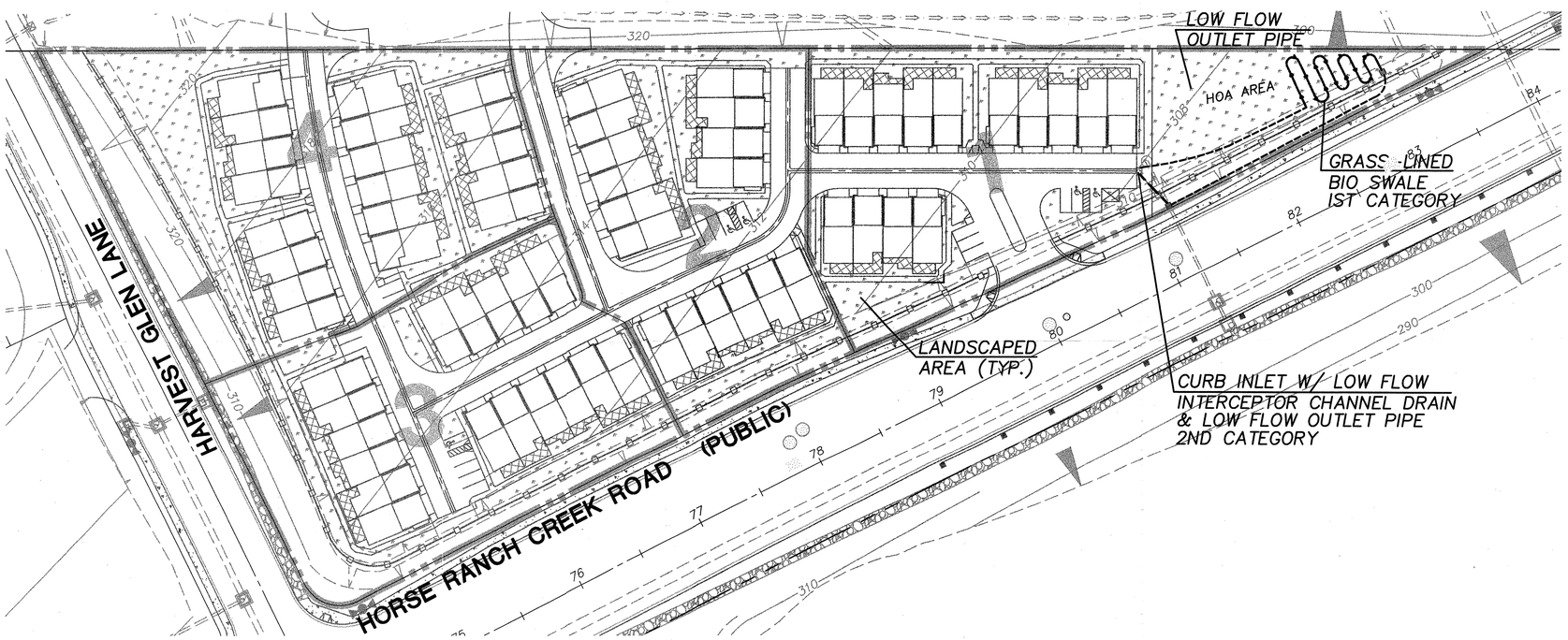
COUNTY OF SAN DIEGO TRACT 5338 RPL-6

BMP SITE PLAN

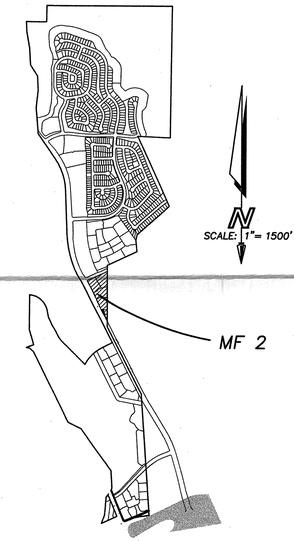
CAMPUS PARK

"B" DESIGNATOR SITE PLAN (STP 07-030)

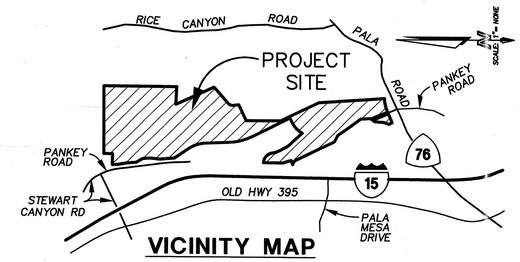
CONSTRUCTION BMP



POST CONSTRUCTION (PERMANENT) BMP



KEY MAP
SCALE: 1" = 1500'



VICINITY MAP
NOT TO SCALE

LEGEND

- SITE BOUNDARY
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- 100 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD AREA
- PHASE LINE
- STORM DRAIN
- GRATED INLET
- CURB INLET
- STREET LIGHT

SCALE: 1" = 50'

0 50 100 150 200 250

SCALE: 1" = 50'

LANDMARK CONSULTING
PLANNING•ENGINEERING•SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.0070

COUNTY OF SAN DIEGO TRACT 5338 RPL 6
BMP SITE PLAN FOR

CAMPUS PARK

MULTI-FAMILY 2, MF2

SHEET NO. 1 OF 1 SHEET

J.N.: 6-14

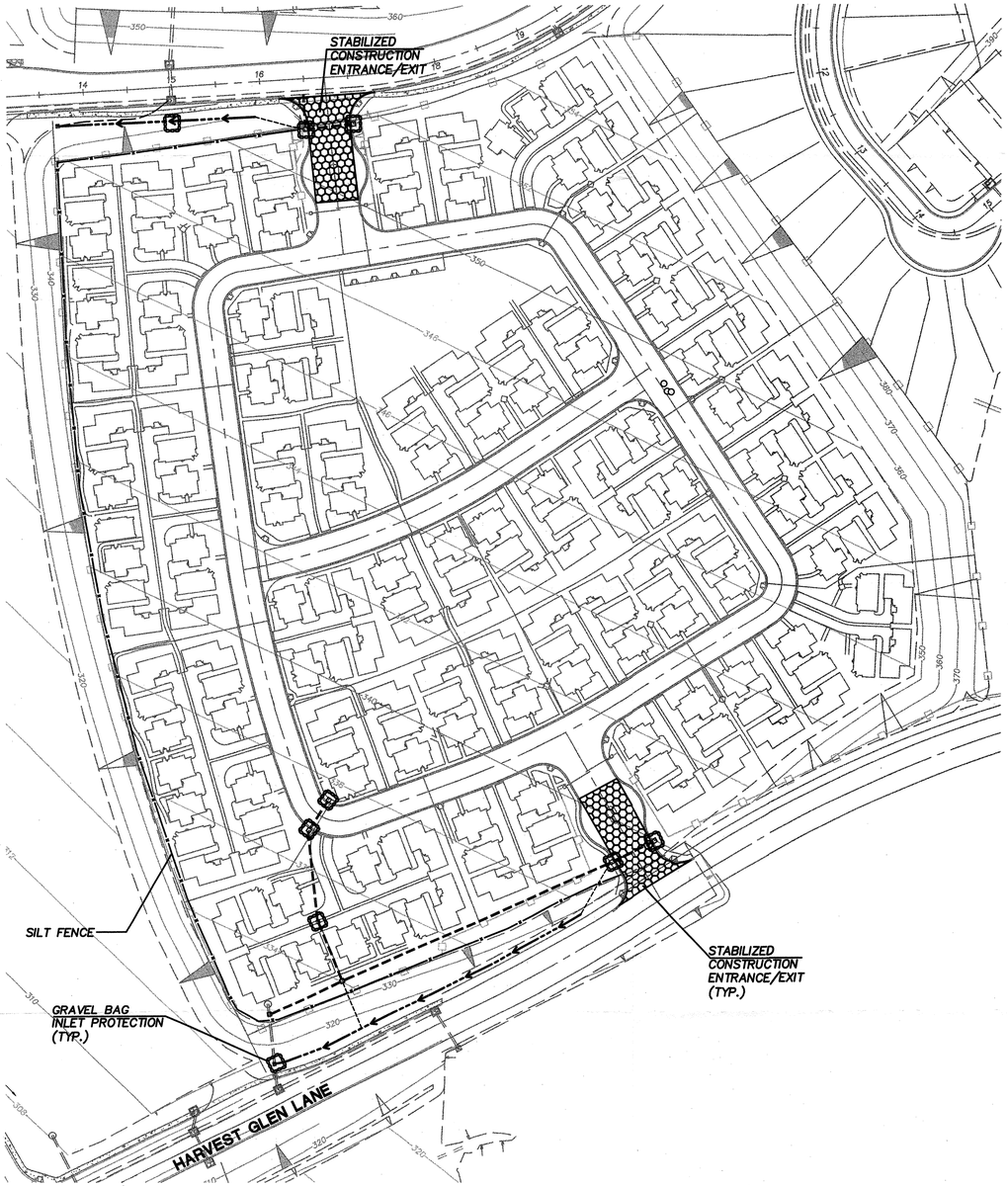
F:\06-14\swmp\MF-2BMP.dwg 3/4/2009 5:20:45 PM PST

COUNTY OF SAN DIEGO TRACT 5338 RPL-6

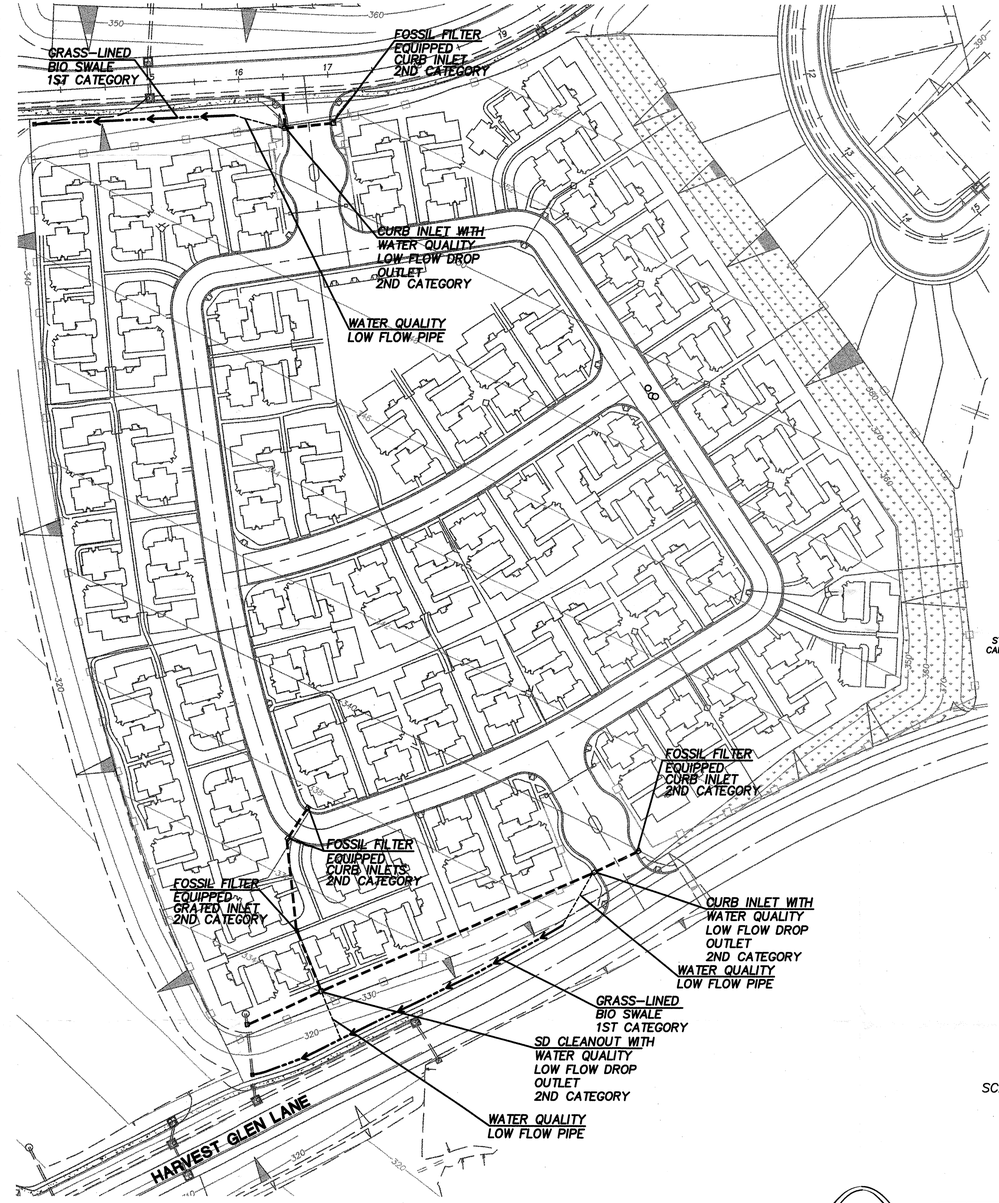
BMP SITE PLAN

CAMPUS PARK

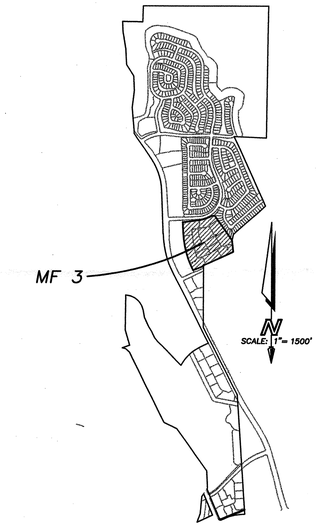
"B" DESIGNATOR SITE PLAN (STP 07-030)



CONSTRUCTION BMP SITE PLAN

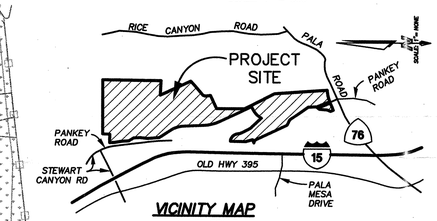


POST CONSTRUCTION (PERMANENT) BMP SITE PLAN



KEY MAP

SCALE: 1" = 500'



VICINITY MAP

NOT TO SCALE

LEGEND

- SITE BOUNDARY
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- 100 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD AREA
- STORM DRAIN
- GRATED INLET
- CURB INLET

N

SCALE: 1"= 100'

0 100 200 300 400 500

SCALE: 1" = 100'

LANDMARK CONSULTING
PLANNING·ENGINEERING·SURVEYING
9555 GENESSE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

COUNTY OF SAN DIEGO TRACT 5338 RPL 6
BMP SITE PLAN FOR

CAMPUS PARK

MULTI-FAMILY 3, MF3

SHEET NO. 1 OF 1 SHEET

J.N.: 6-14

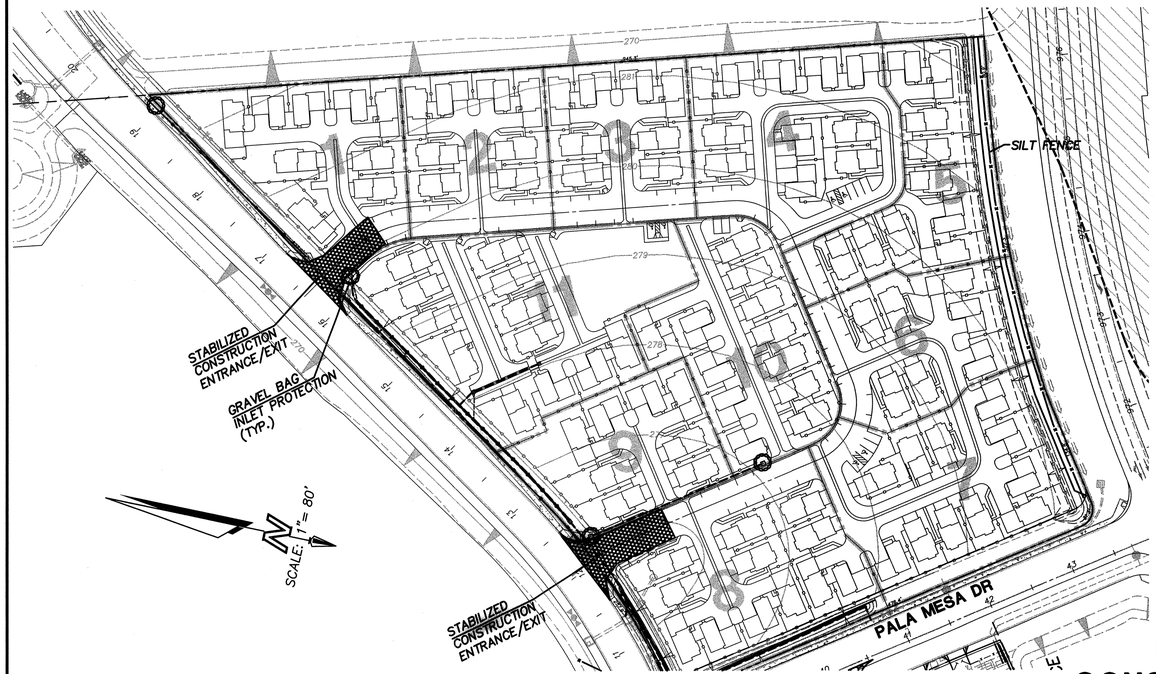
F:\06-14\swmp\MF-3BMP.dwg 3/4/2009 5:45:29 PM PST

COUNTY OF SAN DIEGO TRACT 5338 RPL-6

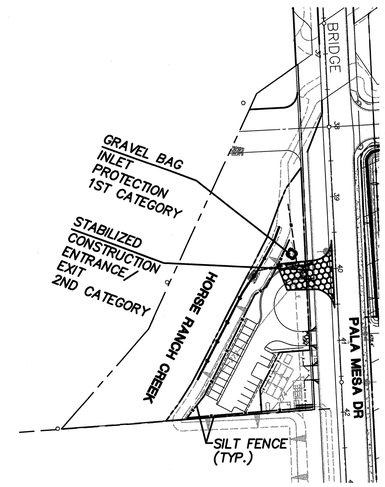
BMP SITE PLAN

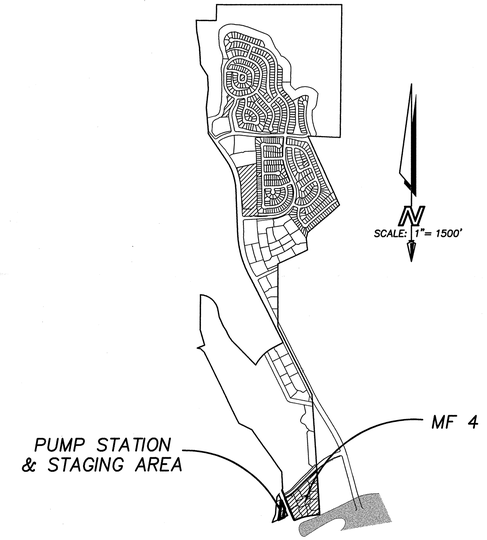
CAMPUS PARK

"B" DESIGNATOR SITE PLAN (STP 07-030)



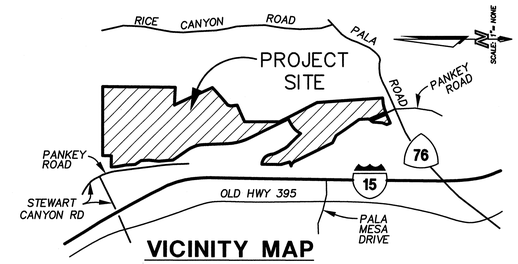
CONSTRUCTION BMP





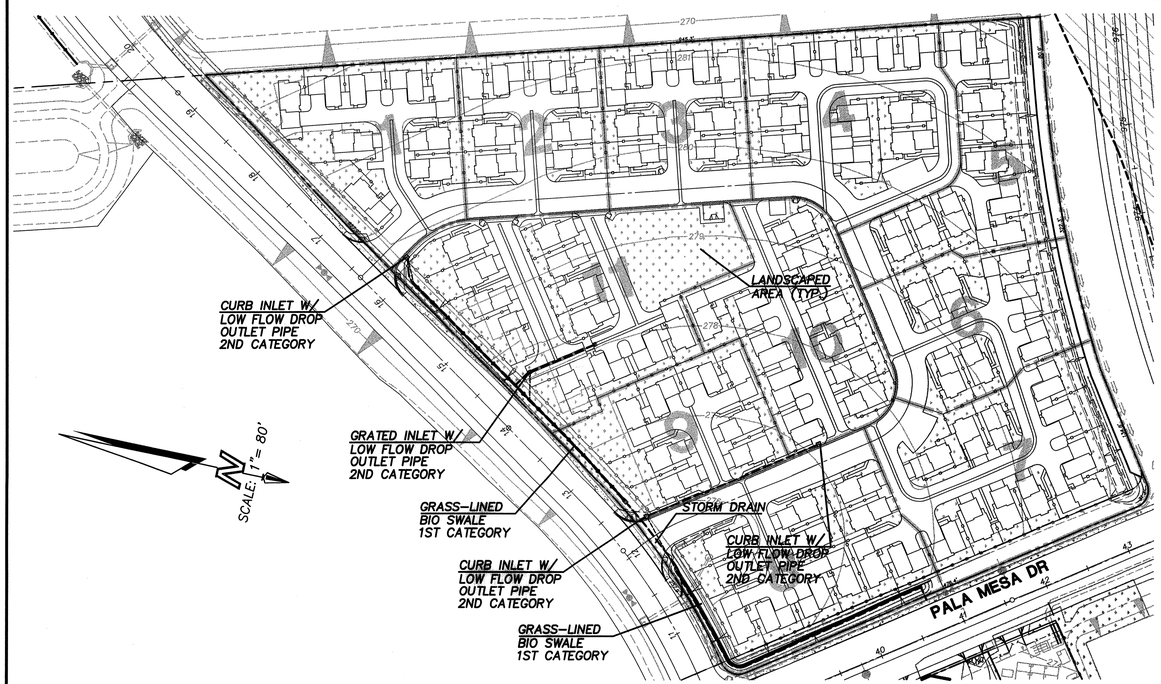
KEY MAP

SCALE: 1" = 1500'

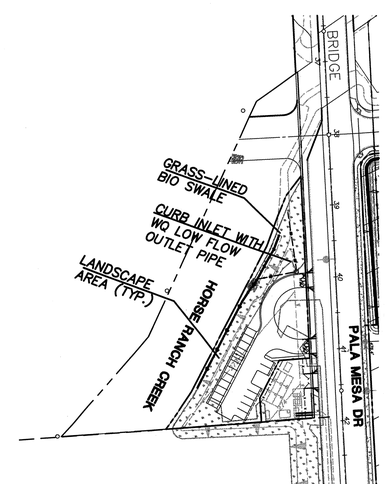


VICINITY MAP

NOT TO SCALE



POST CONSTRUCTION (PERMANENT) BMP



LEGEND

- SITE BOUNDARY
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- 100 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD AREA
- PHASE LINE
- STORM DRAIN
- GRATED INLET
- CURB INLET
- STREET LIGHT

SCALE: 1" = 80'

0 50 100 150 200 250

SCALE: 1" = 50'

LANDMARK CONSULTING
PLANNING•ENGINEERING•SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

COUNTY OF SAN DIEGO TRACT 5338 RPL 6

BMP SITE PLAN FOR

CAMPUS PARK

MULTI-FAMILY 4, MF4
PUMP STATION & STAGING AREA

SHEET NO. 1 OF 1 SHEET

J.N.: 6-14

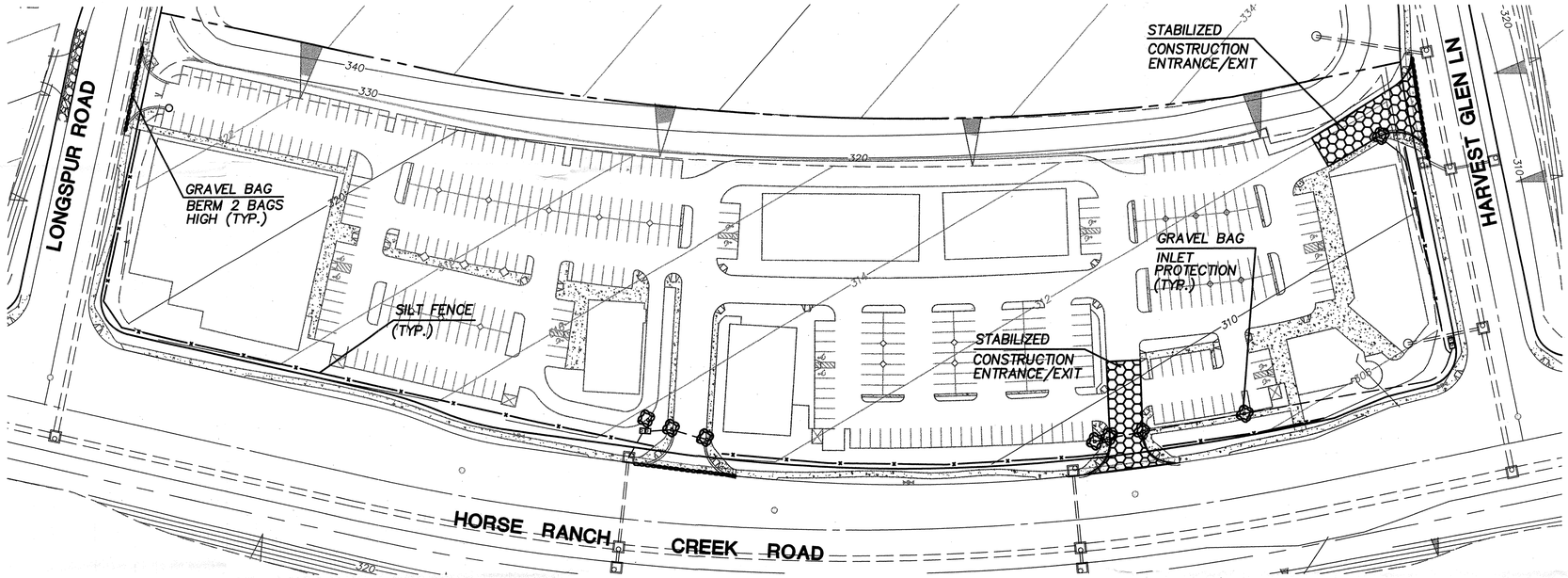
F:\06-14\swmp\MF-4BMP.dwg 8/19/2009 10:55:45 AM PDT

COUNTY OF SAN DIEGO TRACT 5338 RPL-6

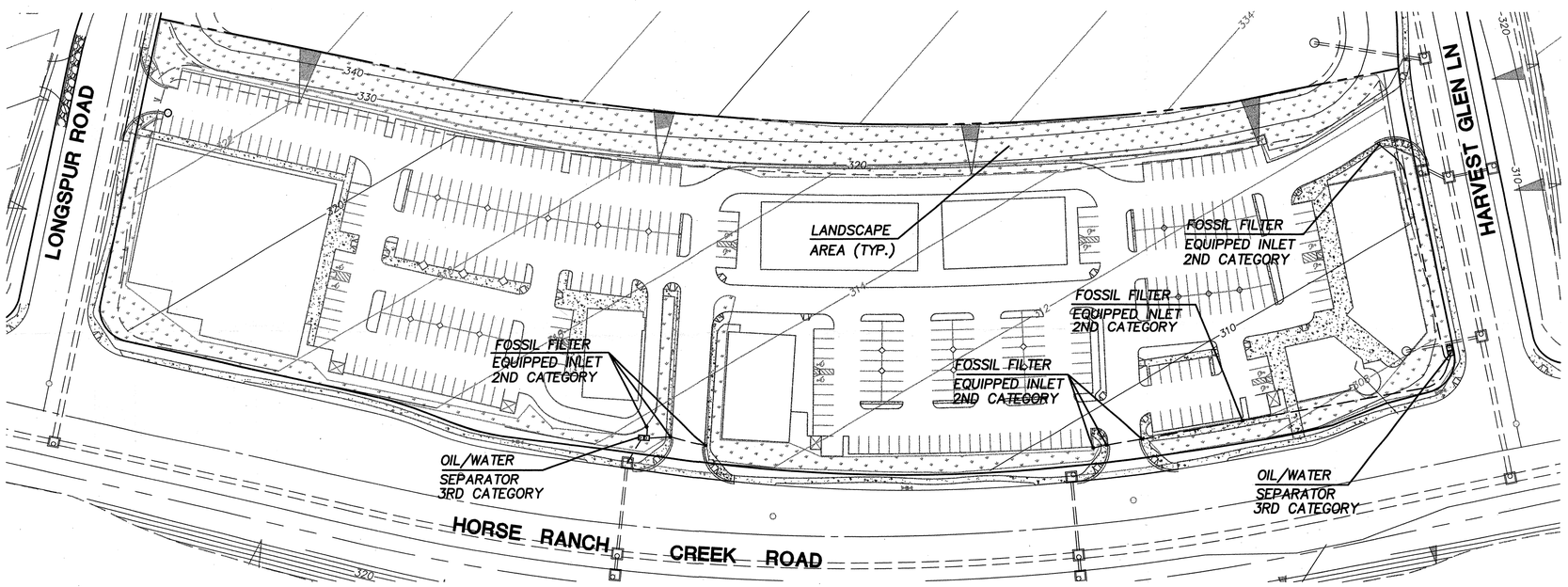
BMP SITE PLAN

CAMPUS PARK

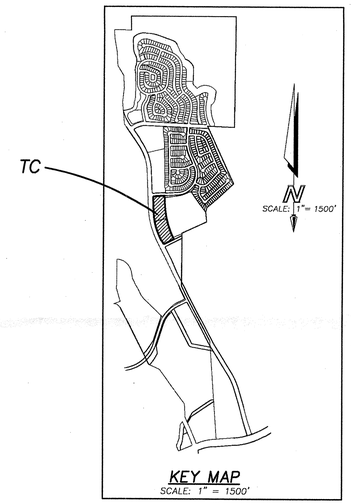
"B" DESIGNATOR SITE PLAN (STP 07-030)



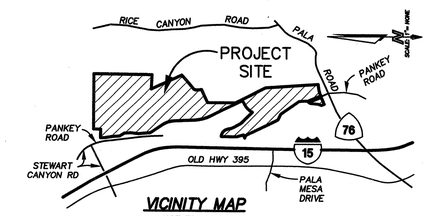
CONSTRUCTION BMP SITE PLAN



POST CONSTRUCTION (PERMANENT) BMP SITE PLAN



KEY MAP
SCALE: 1" = 1500'



VICINITY MAP
NOT TO SCALE

LEGEND

- SITE BOUNDARY
- CURB & GUTTER
- 3' RIBBON GUTTER
- 10' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- STORM DRAIN
- GRATED INLET
- CURB INLET
- PROPOSED BUILDING
- TRASH ENCLOSURE

N
SCALE: 1" = 100'

0 100 200 300 400 500

SCALE: 1" = 100'

LANDMARK CONSULTING
PLANNING·ENGINEERING·SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

COUNTY OF SAN DIEGO TRACT 5338 RPL 6
BMP SITE PLAN FOR

CAMPUS PARK

TOWN CENTER, TC

SHEET NO. 1 OF 1 SHEET

J.N.: 6-14

F:\06-14\swmp\TC-BMP.dwg 3/4/2009 11:59:11 AM PST

COUNTY OF SAN DIEGO TRACT 5338 RPL-6

BMP SITE PLAN

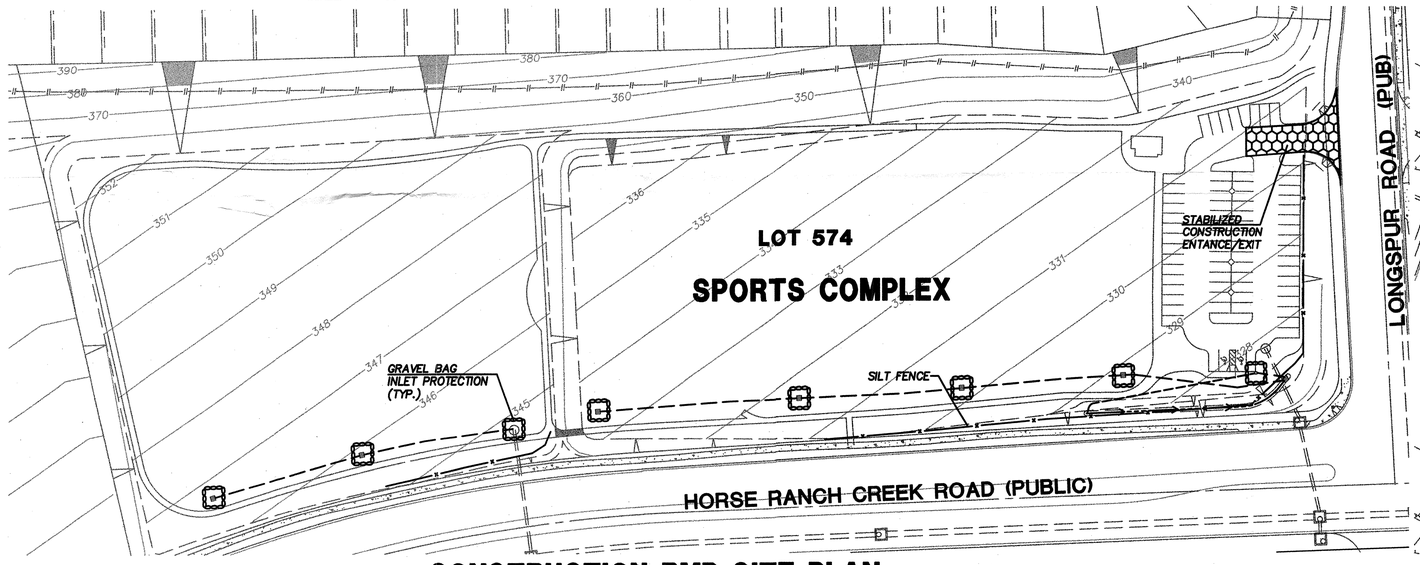
CAMPUS PARK

"B" DESIGNATOR SITE PLAN (STP 07-030)

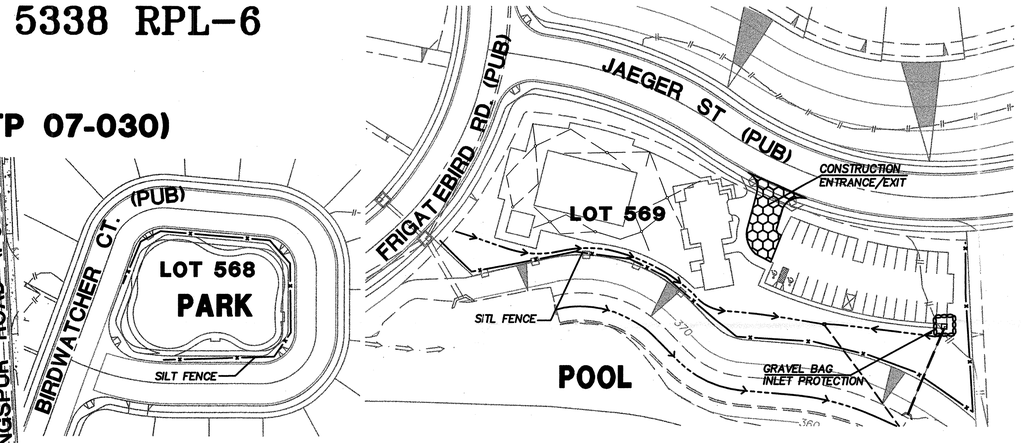
SCALE: 1" = 60'

0 15 30 45 60 120 180 240 300

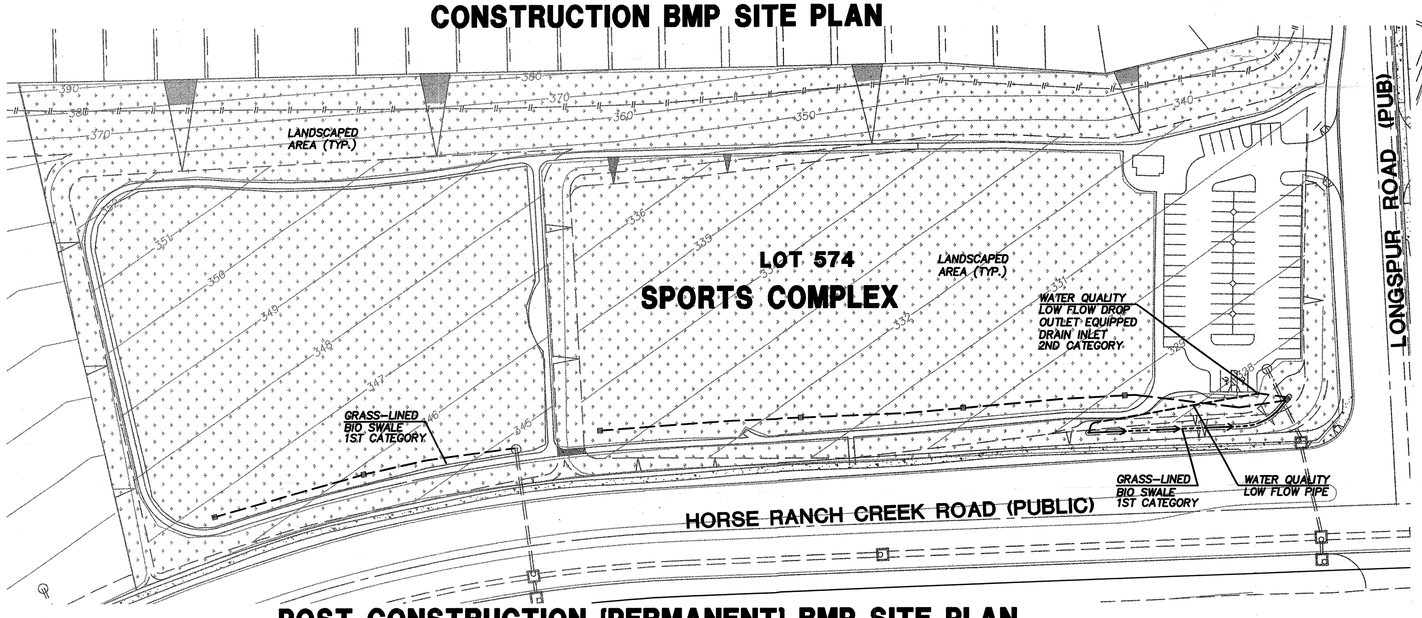
SCALE: 1" = 60'



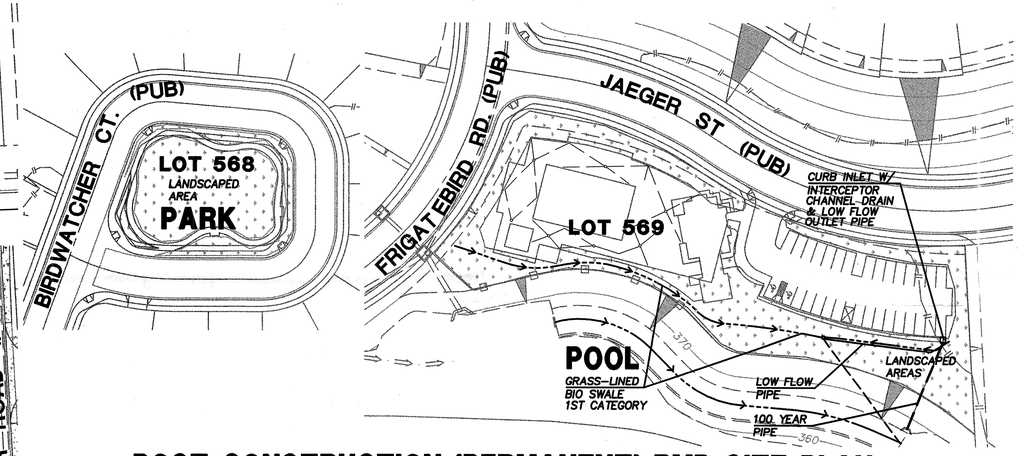
CONSTRUCTION BMP SITE PLAN



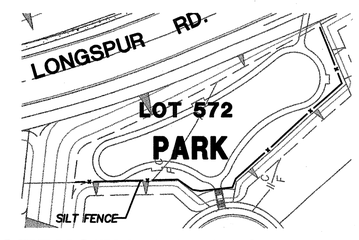
CONSTRUCTION BMP SITE PLAN



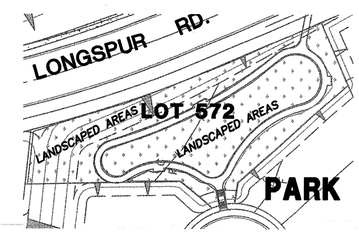
POST CONSTRUCTION (PERMANENT) BMP SITE PLAN



POST CONSTRUCTION (PERMANENT) BMP SITE PLAN



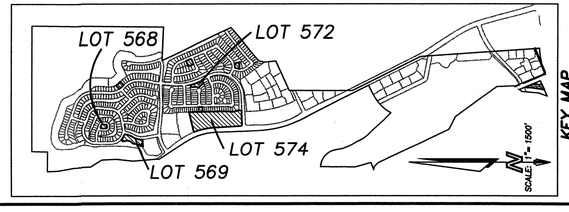
CONSTRUCTION BMP SITE PLAN

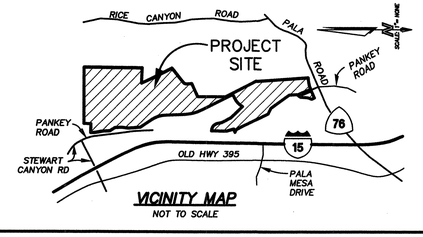


POST CONSTRUCTION (PERMANENT) BMP SITE PLAN

LEGEND

- SITE BOUNDARY
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- STORM DRAIN
- GRATED INLET
- CURB INLET





LANDMARK CONSULTING
PLANNING • ENGINEERING • SURVEYING
5555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

COUNTY OF SAN DIEGO TRACT 5338 RPL 6

BMP SITE PLAN FOR

CAMPUS PARK

SPORTS COMPLEX AND PARKS

SHEET NO. 1 OF 1 SHEET

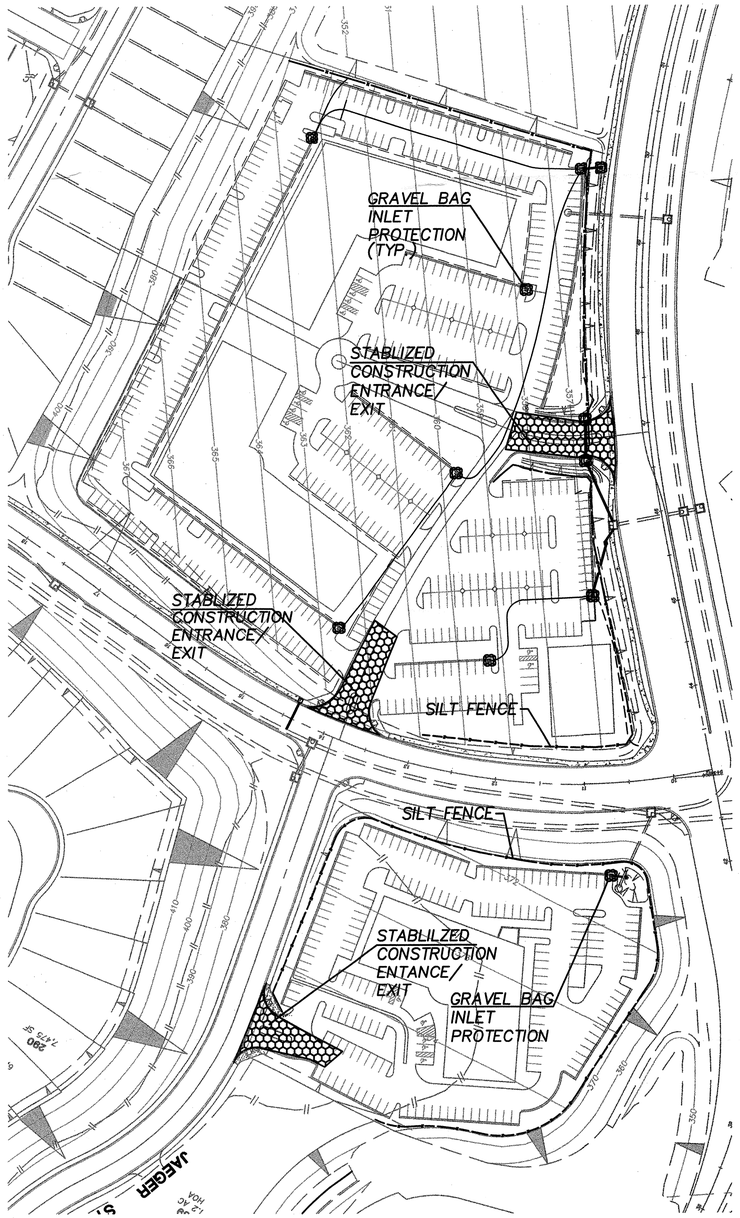
J.N.: 6-14

COUNTY OF SAN DIEGO TRACT 5338 RPL-6

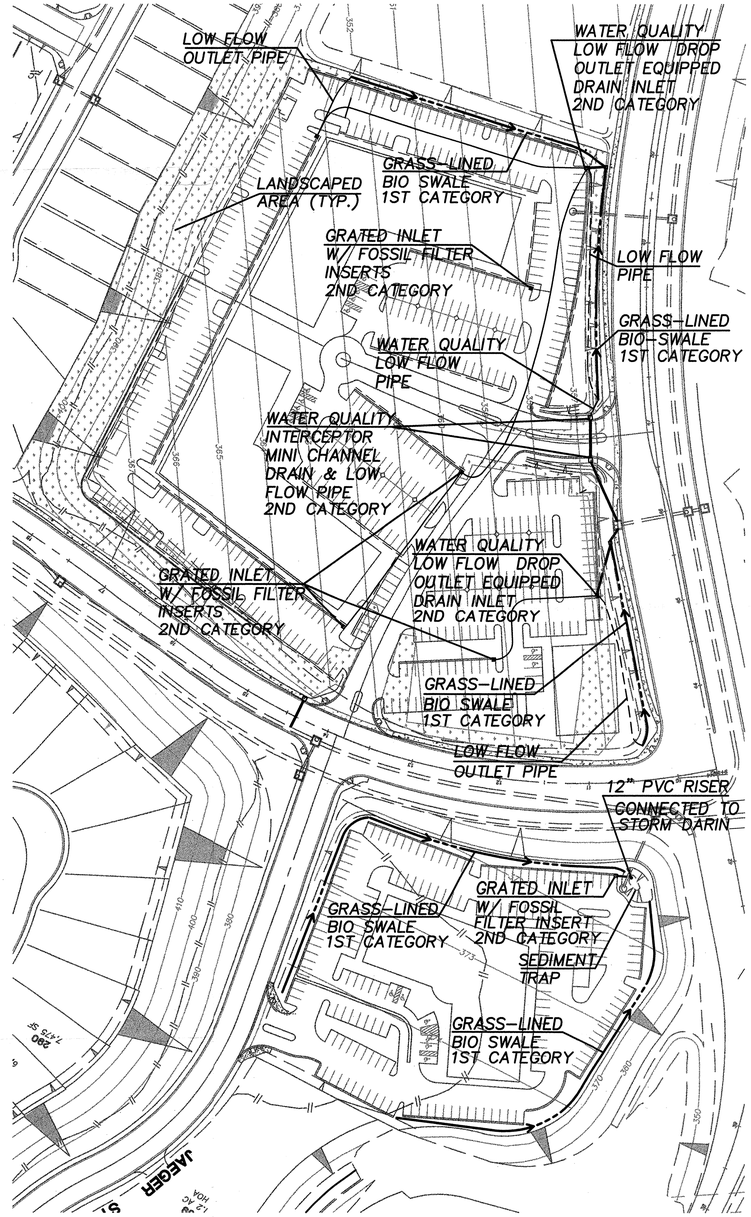
BMP SITE PLAN

CAMPUS PARK

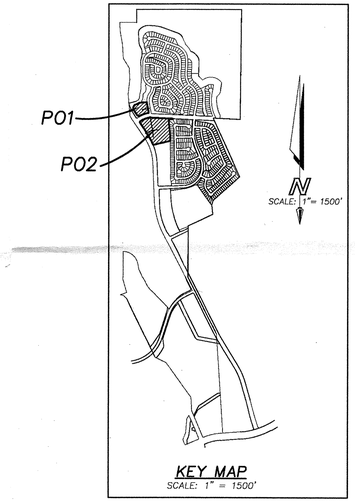
"B" DESIGNATOR SITE PLAN (STP 07-030)



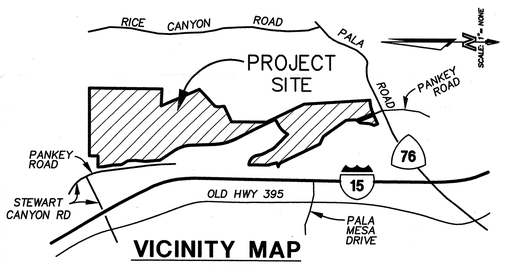
CONSTRUCTION BMP SITE PLAN



POST CONSTRUCTION (PERMANENT) BMP SITE PLAN



KEY MAP
SCALE: 1" = 1500'



VICINITY MAP
NOT TO SCALE

LEGEND

- SITE BOUNDARY
- CURB & GUTTER
- 3' RIBBON GUTTER
- 6' CROSS GUTTER
- PED RAMP
- CUT/FILL SLOPE (2:1 MAX.)
- STORM DRAIN
- GRATED INLET
- CURB INLET
- PROPOSED BUILDING
- TRASH ENCLOSURE

N
SCALE: 1" = 100'

0 100 200 300 400 500

SCALE: 1" = 100'

LANDMARK CONSULTING
PLANNING • ENGINEERING • SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

COUNTY OF SAN DIEGO TRACT 5338 RPL 6
BMP SITE PLAN FOR

CAMPUS PARK

PROFESSIONAL OFFICE
PO1 & PO2

SHEET NO. 1 OF 1 SHEET

J.N.: 6-14

F:\06-14\swmp\PO-BMP.dwg 3/5/2009 11:04:54 AM PST

ATTACHMENT E

TREATMENT BMP DATASHEET

*(**NOTE:** POSSIBLE SOURCE FOR DATASHEETS CAN BE FOUND AT WWW.CABMPHANDBOOKS.COM. INCLUDE ENGINEERING CALCULATIONS FOR SIZING THE TREATMENT BMP.)*

FOSSIL FILTER INSERTS

E-Mail Suntree
Order Catalog
Home Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

Suntree Technologies Inc.

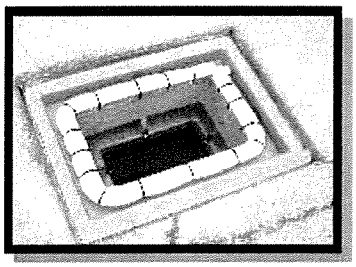
Grate Inlet Skimmer Box

Grated Inlet Stormwater Treatment System

Since 1993

Built Strong To Last!

Engineered To Be Permanent Infrastructure



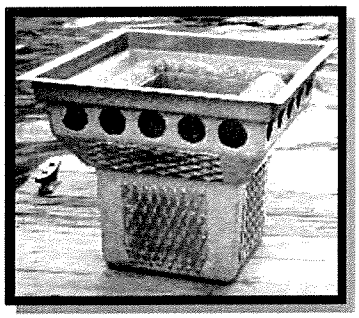
Installs Quickly

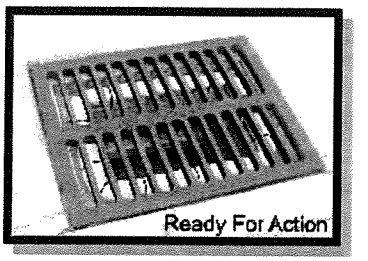
Step 1: **Remove the grate.**

Step 2: **Drop in the filter.**

Step 3: **Replace the grate.**

Custom Sizes... No Problem





Great For Retrofits...
Will Not Impede The Original Designed Flow Of The Inlet

E-Mail Suntree | Order Catalog | Home Page | Next Page

E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

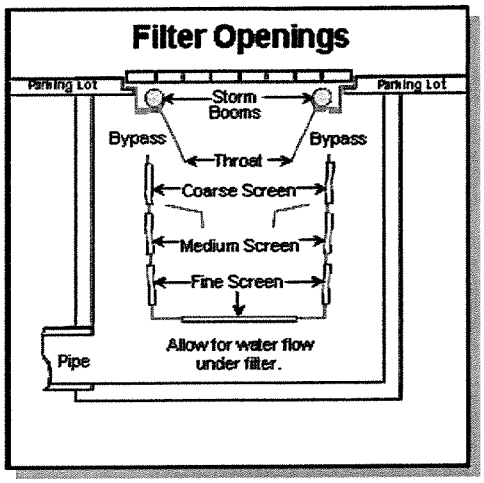
Grate Inlet Skimmer Box

Sizing and Flow Rates

Although certain sizes are recommended, The *Grate Inlet Skimmer Box* can be sized to fit any size inlet.

Custom Sizes No Problem

The **maximum flow rate** of a *Grate Inlet Skimmer Box* is determined by the amount of flow that can pass through the throat, the exception is found only in very large units



To determine the **minimum flow rate** of a *Grate Inlet Skimmer Box*, consider only the potential flow through the throat and bypass. If the potential flow through the throat is less than the potential flow through the bypass, then the then the throat determines the minimum flow. If the potential water flow through the bypass is less than that of the throat, then the bypass determines the minimum flow.

The table below represents the flow rates of 8 different sizes of Grate Inlet Skimmer Box.

Filtered Flow represents the potential flow rate through all screens, and does not include the potential flow through the bypass. Water flow through the bypass happens only when the flow rate through the grate exceeds the flow rate through all the screens.

Flow Rate Table						
	Dimensions of the flange around the top of the Grate Inlet Skimmer Box			Flow Rate (cubic feet per second)		
Model Number	Width (inches)	Length (inches)	Depth (inches)	Throat	Filtered Flow	Bypass Flow
GISB-I-24-24-25	24	24	25	4.4	14.9	6.7
GISB-A-24-37-25	24	37	25	10.2	21.1	8.7
GISB-C-28-37-25	28	37	25	12.2	19.4	7.4
GISB-J-24-41-25	24	41	25	12	24.6	10
GISB-NK-32-32-25	32	32	25	12.5	19.1	10.3
GISB-36-36-25	36	36	25	18.8	23.4	13.4
GISB-D-36-48-18	36	48	18	33.2	26.3	13.3
GISB-G-52-58-18	52	58	18	89.3	40.1	25
♦ The yellow blocks represent the minimum flow rates. ♦ Filtered flow is based on unobstructed screens.						

Drawings and flow specifications for any size Grate Inlet Skimmer Box is available upon request.

E-Mail Suntree | Order Catalog | Home Page | Next Page

E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

Grate Inlet Skimmer Box

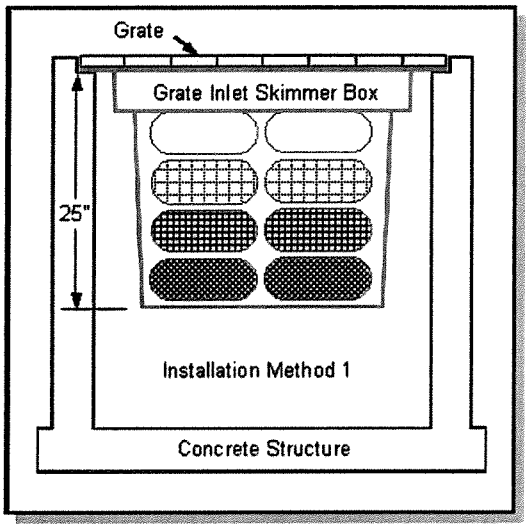
Installation

Although certain sizes are recommended, The *Grate Inlet Skimmer Box* can be sized to fit any size inlet.

Can Be Sized To Fit Any Inlet

Installation Method 1

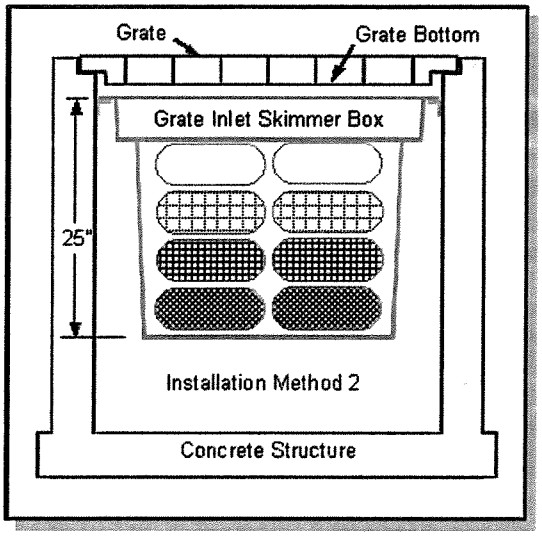
- Remove the grate.
- Place the *Grate Inlet Skimmer Box* into the catchbasin so that it rests on the same landing as the grate.
- Replace the grate so that the flange around the top of the *Grate Inlet Skimmer Box* is sandwiched between the grate and the landing.



A second method of installing a *Grate Inlet Skimmer Box* involves the use of an aluminum landing kit which is supplied separately. This method is used for installing larger units, and in catchbasins fitted with extra thick grates.

Installation Method 2

- Remove the grate.
- Attach the aluminum landing kit



to the catchbasin wall 2" below the grate bottom.

- Place the *Grate Inlet Skimmer Box* into the catchbasin so that it rests on the aluminum landing kit.
- Replace the grate.

E-Mail Suntree | Order Catalog | Home Page | Next Page

E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

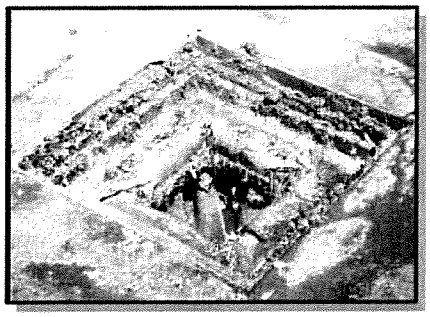
Grate Inlet Skimmer Box

Captured Debris

The Challenge...

Take On The Toughest Inlets...
Capture & Keep The Debris...
Keep The Inlet Flowing!

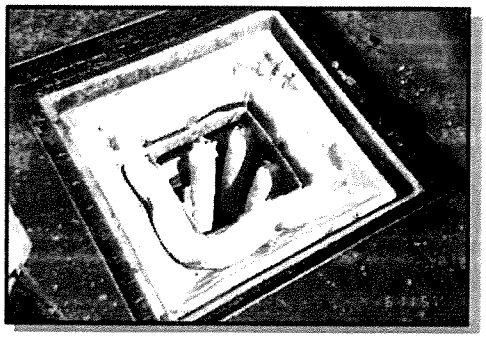
The picture to the right shows an inlet with a ***Grate Inlet Skimmer Box*** immediately after the grate was removed, just 45 days after it was installed. Because this inlet is adjacent to a wash down area, it experiences a simulated storm event everyday. The filter is full to capacity and has been operating in bypass mode for some time.



The picture to the left shows the ***Grate Inlet Skimmer Box*** immediately after the removal of booms and skimmer tray. Notice the bypass openings around the top are completely unobstructed. The filter is full to capacity and is operating bypass mode. Because this inlet experiences an extra heavy hydrocarbon pollutant load it is fitted with extra ***Storm Booms***.

Stainless Steel Screens are easily cleaned to restore the original unobstructed flow rates to the Grate Inlet Skimmer Box

Although the inlet is relatively small with a grate that measures 24" x 24", debris weighing 232 pounds with a volume of 78 quarts was removed during this servicing. To the right is a photo of the same *Grate Inlet Skimmer Box* after being serviced.



Ready For The Next Storm Event!

E-Mail Suntree | Order Catalog | Home Page | Next Page

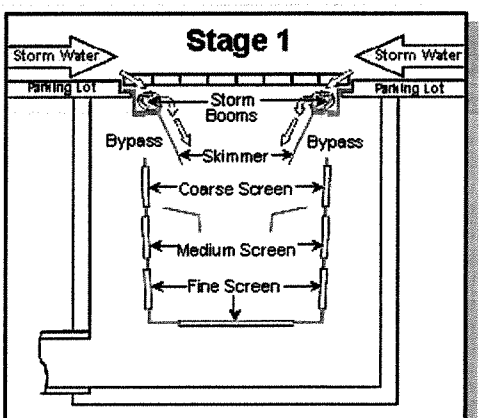
E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

Grate Inlet Skimmer Box

Functional Description

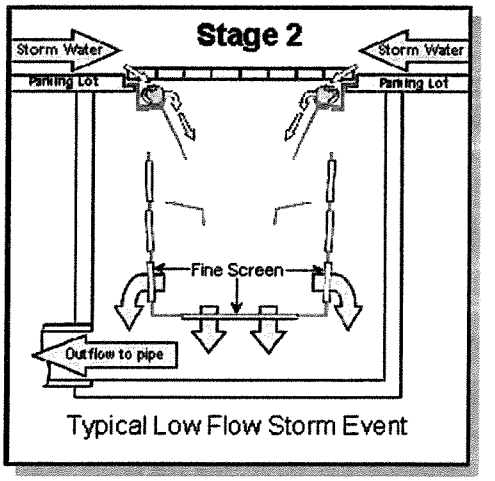
Multi-Stage Filtration Utilizes Screens Of Different Sieve Sizes Optimize Filtration And Water Flow

Stage 1: As stormwater enters the inlet through the grate it comes in contact with and passes through a ***Storm Boom*** located around the top perimeter of the ***Grate Inlet Skimmer Box***. After making contact with the ***Storm Boom***, the stormwater flows down into the lower filtration chamber which is equipped with 3 different sieve size filtration screens and bypass openings.



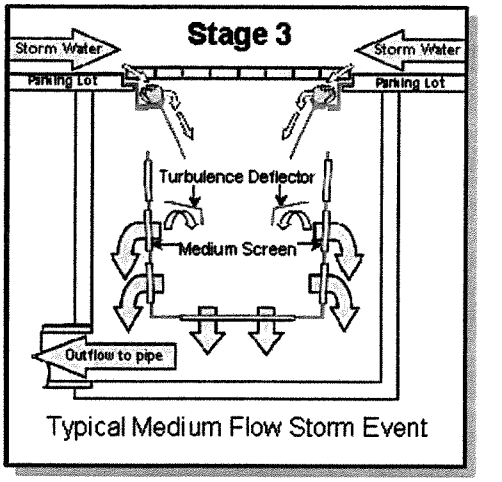
As Stormwater Enters The Inlet

Stage 2: Throughout the entire storm event, stormwater continues to come in contact with the ***Storm Boom*** and then flow into the lower filtration chamber, adjacent to the fine sieve size screens. The fines sieve size screens are sized to be able to capture sediment such as sand, clay, phosphates, etc. A sand filter quickly forms across the bottom which has the potential to capture the finest of particles.



Typical Low Flow Storm Event

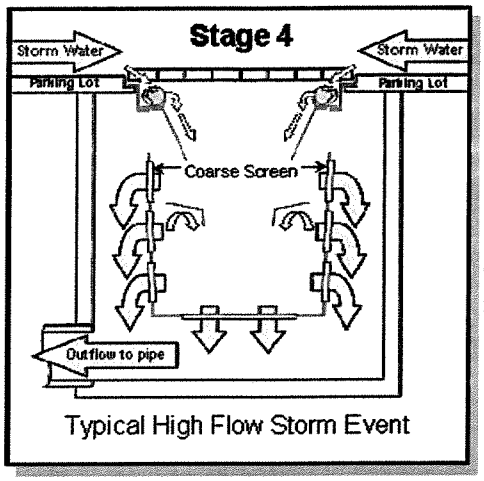
Stage 3: As the storm event increases in intensity the water level in the ***Grate Inlet Skimmer box*** rises to a level adjacent to the medium sieve size screens and the *turbulence deflector*. The medium screen provides additional flow with less chance of obstruction than the fine screen. The *turbulence deflector* dramatically reduces the turbulence in the lower filtration chamber, which allows sediment to continue to settle, without re-suspending sediment that has previously been captured.



Typical Medium Flow Storm Event

Stage 4: As the storm event increases in intensity to that of high flow storm event, the water level in the ***Grate Inlet Skimmer box*** rises to a level adjacent to the coarse sieve size screens above *turbulence deflector*.

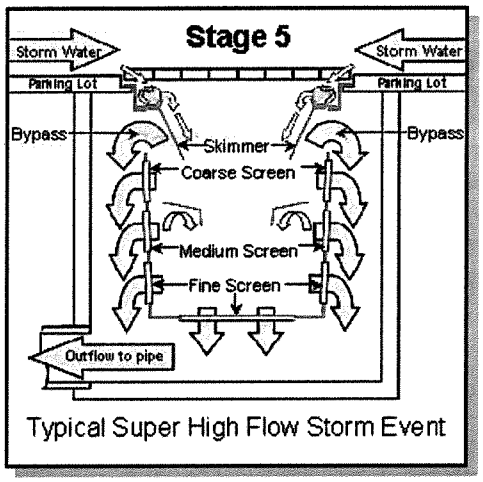
The coarse screen provides yet more additional filtered flow with less chance for obstruction than either the medium or fine screen. The coarse screen is sized to capture floatables like foliage and litter. At this stage water is flowing through all the different sieve size screens, the *turbulence deflector*



Typical High Flow Storm Event

continues to dramatically reduce the turbulence in the lower filtration chamber, and sediment continues to settle and collect toward the bottom.

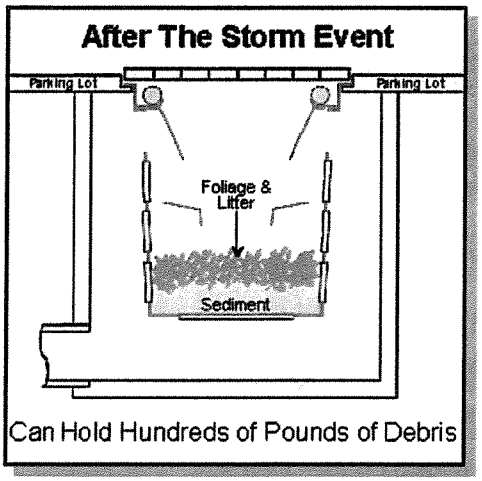
Stage 5: If the storm event creates an extremely high flow rate into the inlet which exceeds the flow through all the screens, the water flow can bypass the filtration screens through skimmer protected bypass openings near the top of the ***Grate Inlet Skimmer Box***. As water flows through the bypass openings, it also continues to flow through all the other screens. Storm events that produce such high flow rates are rare and typically don't last very long.



Typical Super High Flow Storm Event

Drains Dry After Storm

After The Storm Event: The stormwater drains completely out of the ***Grate Inlet Skimmer Box*** after the storm event. The debris collected in the unit is stored in a dry state which helps to contain the nutrient pollutant load, prevents the filter from going septic, and prevents mosquitoes from breeding in the unit. After each storm event more debris is collected, which can ultimately weigh many hundreds of



pounds.

E-Mail Suntree | Order Catalog | Home Page | Next Page

E-Mail Suntree
Order Catalog
Home Page
Previous Page
Next Page
Features
Functional Description
Installation
Flow Rate
Drawings

Suntree Technologies Inc.

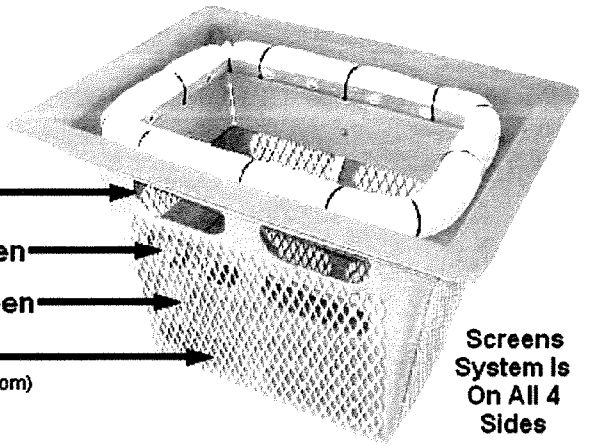
Grate Inlet Skimmer Box

Unique Features

Multi-Stage Filtration

Screens of Different Sieve Sizes Optimize Filtration And Water Flow

All Screens Are Stainless Steel



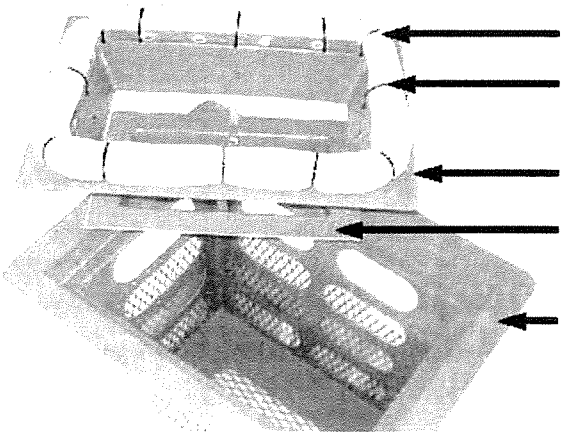
- Bypass Openings
- Coarse Sieve Size Screen
- Medium Sieve Size Screen
- Fine Sieve Size Screen
  (Fine Sieve Size Screen Also On Bottom)

Screens System Is On All 4 Sides

Interior components are easily removed to allow easy access to lower filtration chamber.

Fiberglass components have gelcoated finish with UV filter.

- Storm Boom Absorbs Hydrocarbons
- Zip Tie
- Skimmer Tray
- Deflection Shield



Flange is reinforced
With knitted 1808 ± 45°
Biaxial fiberglass

E-Mail Suntree | Order Catalog | Home Page | Next Page

Pages: 1, 2, 3, 4, 5, 6

E-Mail Suntree | Order Catalog | Suntree Technologies Inc. | Home Page | First Page

Features
Functional Description
Installation
Flow Rate
Drawings

For More Information

on our Grate Inlet Skimmer Box
Please contact us directly:

Since 1993

Suntree Technologies, Inc.
798 Clearlake RD
Cocoa, FL 32922

Ph: (321) 637-7552
FAX: (321) 637-7554

Infrastructure
Stormwater Filtration Systems

Page 1

Pages: 1, 2, 3, 4, 5, 6, 7

E-Mail Suntree | Home Page | Suntree Technologies Inc. | Order Catalog | Next Page

Curb Inlet Basket

Patented

A stormwater filtration system for Curb Inlets where access to the catchbasin is through a manhole.

Captures Everything From Litter, Foliage, Sediment, To Hydrocarbons...Everything!

- ***Fits any catchbasin***
- ***No need to enter the catchbasin to service.***
- ***No need to enter or lay in the street to service.***
- ***Filtration screens of different sieve sizes can be utilized to optimize filtration and water flow.***

Will Not Impede The Water Flow Into The Inlet

Order Catalog

E-Mail Suntree | Home Page

For more information on Curb Inlet Baskets, click on the **Next Page** button or the specific page links below.

Next Page

Curb Inlet Basket Pages:
1, 2, 3, 4, 5, 6, 7

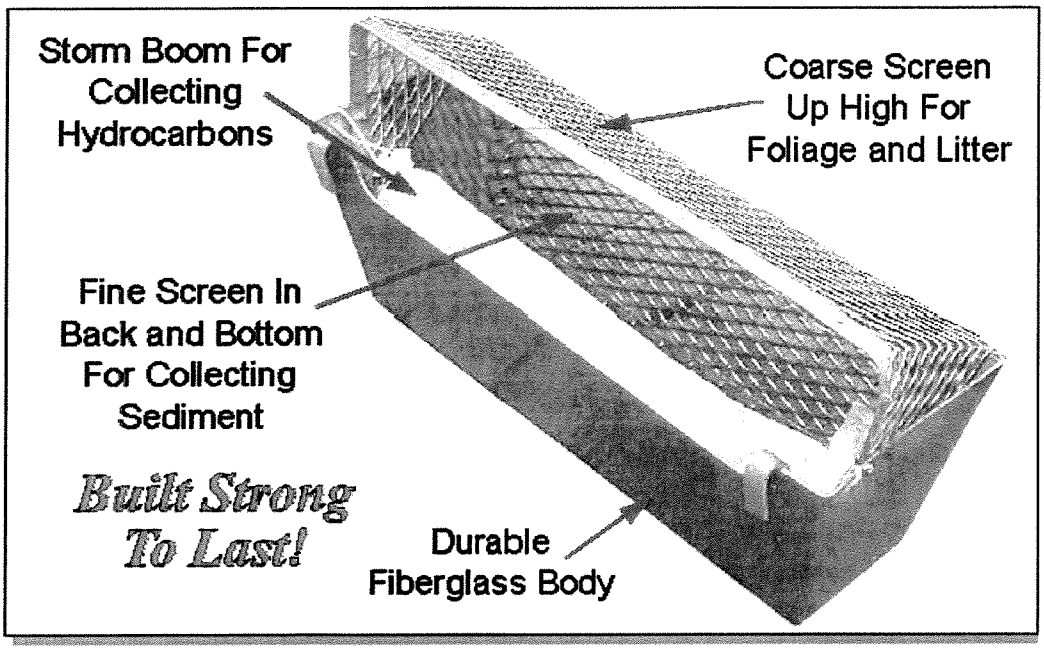
Page 2

Pages: 1, **2**, 3, 4, 5, 6, 7

E-Mail Suntree | Home Page | Suntree Technologies Inc. | Previous Page | Next Page

Curb Inlet Basket

Patented



Order Catalog | E-Mail Suntree | Home Page

For more information on **Curb Inlet Baskets**, click on **the Next Page** button or the **specific page links below.**

First Page | Previous Page | Next Page

Curb Inlet Basket Pages:
1, **2**, 3, 4, 5, 6, 7

Page 3

Pages: 1, 2, 3, 4, 5, 6, 7

E-Mail Suntree | Home Page | Suntree Technologies Inc. | Previous Page | Next Page

Curb Inlet Basket

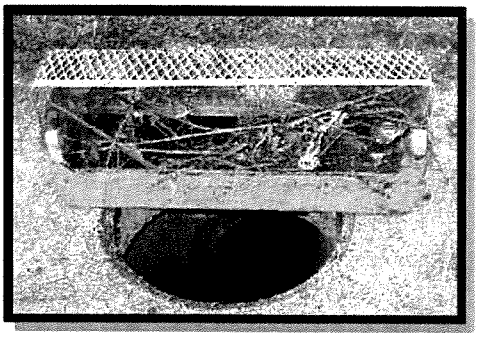
No Need To Enter The Confined Space Of The Catchbasin To Service

To Service:

- Remove the manhole lid
- Reach in with by hand or with a manhole hook and remove the basket
- Empty the contents of the basket and replace the Storm Boom
- Replace the basket and manhole lid

Heavy and Expensive Equipment Is Not Required To Do Service Work

Multi-stage Filtration Captures Everything From Hydrocarbons, To Sediment, To Grass Clippings, To Litter...Everything!



Once The Basket Is Removed From The Catchbasin It Can Be Easily Emptied.

Order Catalog

E-Mail Suntree

Home Page

For more information on Curb Inlet Baskets, click on the Next Page button or the specific page links below.

First Page

Previous Page

Next Page

Curb Inlet Basket Pages:

1, 2, **3**, 4, 5, 6, 7

Curb Inlet Basket (CIB)

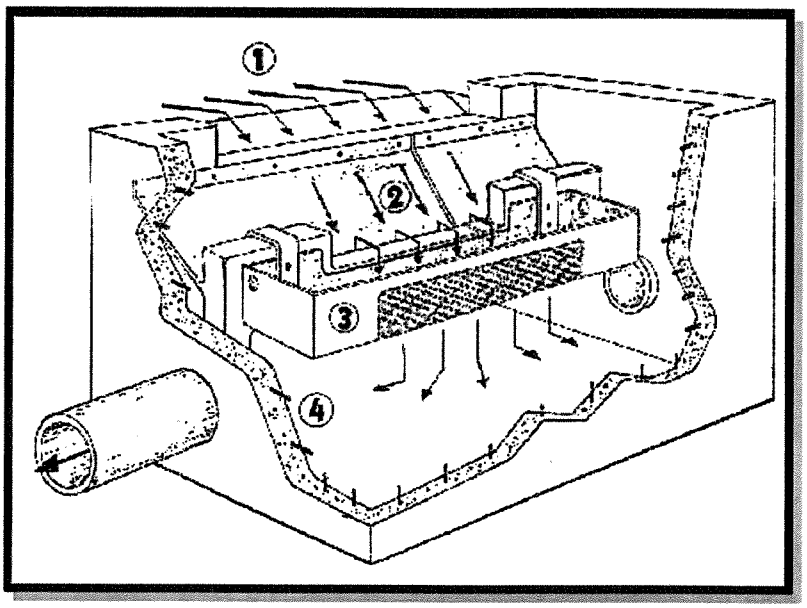
Functional Description

① Stormwater runoff carrying debris and pollutants enters curb inlet.

② Adjustable throat width funnels water to weir. The immediate drop in the throat elevation prevents head losses through the inlet. Sediment will collect along the incoming side of the weir.

③ Water flows over weir and into removable basket, filtering trash, leaves, yard clippings, sediment, etc.. If desired, a hydrocarbon absorption boom can be fitted along the incoming edge of the basket.

④ Cleaner water leaves basket and enters catchbasin, then flows down stream. The position of the CIB, high in the catch basin, avoids any restriction of up-stream pipes flowing through the catchbasin.

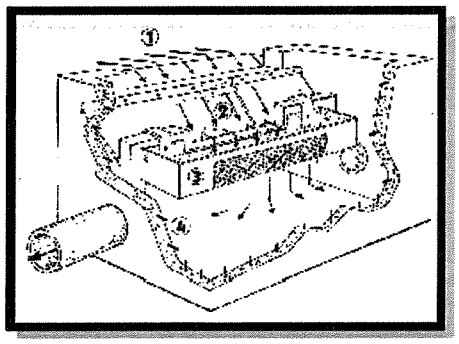


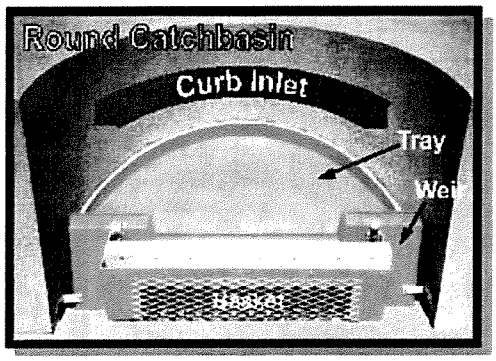
The CIB telescopes to change size so that it can fit almost any catchbasin. In addition, CIBs that fit a round catchbasin are also available.

Curb Inlet Basket (CIB)

Installation

Square Catchbasin:
For installation into a square catchbasin, there is a left half and a right half that telescope together to adjust for size, which make up the main body of the CIB and mounts solid to the catchbasin wall with either drive pins or *Tap-Cons*. The non-removable portion consists of a tray area that directs the flow toward the weir, and a weir that channels the flow into the removable basket. The basket is placed on last, and is simply dropped in place and hangs from the top of the weir.





Round Catchbasin:
To install the CIB into a round catchbasin there are 3 main pieces; the weir, which attaches to the catch basin wall, the tray which attaches to the catchbasin wall and weir, and the removable basket. The weir and tray attach to the catchbasin wall with either *Tap-Cons* or drive pins. The basket is placed on last, and is just dropped in place and hangs from the top of the weir.

For more information on Curb Inlet Baskets, click on the **Next Page** button or the specific page links below.

Page 6

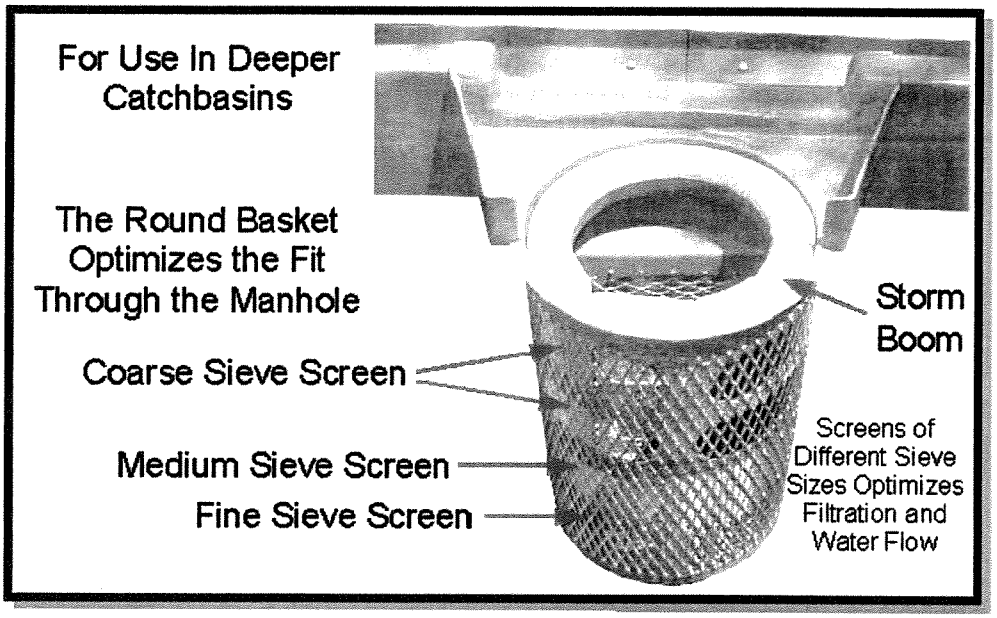
Pages: 1, 2, 3, 4, 5, 6, 7

E-Mail Suntree | Home Page | Previous Page | Next Page

Suntree Technologies Inc.

High Capacity Curb Inlet Basket

Patented



Captures Everything From Litter, Foliage, Sediment, To Hydrocarbons...Everything!

Installation and servicing is similar to the standard Curb Inlet Basket

Built Strong To Last!

Order Catalog
E-Mail Suntree
Home Page

For more information on Curb Inlet Baskets, click on the **Next Page** button or the specific page links below.

First Page
Previous Page
Next Page

Curb Inlet Basket Pages:
1, 2, 3, 4, 5, 6, 7

Suntree Technologies Inc.

High Capacity Curb Inlet Basket
In The Field

View of Debris In High Capacity Curb Inlet Basket Before Removal From Catchbasin

This unit did not utilize a Storm Boom.

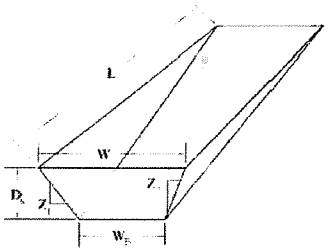
Once Removed From The Catch Basin, The Collected Debris Was Emptied And The Basket Put Back.

200 Pounds of Debris Was Emptied From This Curb Inlet Basket.

BIOFILTER/GRASS-LINED SWALE

Provide for scour protection.

(a) Cross section of swale with check dam.



(b) Dimensional view of swale impoundment area.

Notation:

L = Length of swale impoundment area per check dam (ft)
D_k = Depth of check dam (ft)
S_s = Bottom slope of swale (ft/ft)
W = Top width of check dam (ft)
W_B = Bottom width of check dam (ft)
$Z_{h:v}$ = Ratio of horizontal to vertical change in swale side slope (ft/ft)

Vegetated Swale TC-30

Design Considerations

- Tributary Area
- Area Required
- Slope
- Water Availability

Description

Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems.

Targeted Constituents

☑ Sediment	▲
☑ Nutrients	●
☑ Trash	●
☑ Metals	▲
☑ Bacteria	●
☑ Oil and Grease	▲
☑ Organics	▲

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

Caltrans constructed and monitored six vegetated swales in southern California. These swales were generally effective in reducing the volume and mass of pollutants in runoff. Even in the areas where the annual rainfall was only about 10 inches/yr, the vegetation did not require additional irrigation. One factor that strongly affected performance was the presence of large numbers of gophers at most of the sites. The gophers created earthen mounds, destroyed vegetation, and generally reduced the effectiveness of the controls for TSS reduction.

Advantages

- If properly designed, vegetated, and operated, swales can serve as an aesthetic, potentially inexpensive urban development or roadway drainage conveyance measure with significant collateral water quality benefits.

- Roadside ditches should be regarded as significant potential swale/buffer strip sites and should be utilized for this purpose whenever possible.

Limitations

- Can be difficult to avoid channelization.
- May not be appropriate for industrial sites or locations where spills may occur
- Grassed swales cannot treat a very large drainage area. Large areas may be divided and treated using multiple swales.
- A thick vegetative cover is needed for these practices to function properly.
- They are impractical in areas with steep topography.
- They are not effective and may even erode when flow velocities are high, if the grass cover is not properly maintained.
- In some places, their use is restricted by law: many local municipalities require curb and gutter systems in residential areas.
- Swales are mores susceptible to failure if not properly maintained than other treatment BMPs.

Design and Sizing Guidelines

- Flow rate based design determined by local requirements or sized so that 85% of the annual runoff volume is discharged at less than the design rainfall intensity.
- Swale should be designed so that the water level does not exceed 2/3rds the height of the grass or 4 inches, which ever is less, at the design treatment rate.
- Longitudinal slopes should not exceed 2.5%
- Trapezoidal channels are normally recommended but other configurations, such as parabolic, can also provide substantial water quality improvement and may be easier to mow than designs with sharp breaks in slope.
- Swales constructed in cut are preferred, or in fill areas that are far enough from an adjacent slope to minimize the potential for gopher damage. Do not use side slopes constructed of fill, which are prone to structural damage by gophers and other burrowing animals.
- A diverse selection of low growing, plants that thrive under the specific site, climatic, and watering conditions should be specified. Vegetation whose growing season corresponds to the wet season are preferred. Drought tolerant vegetation should be considered especially for swales that are not part of a regularly irrigated landscaped area.
- The width of the swale should be determined using Manning's Equation using a value of 0.25 for Manning's n.

Construction/Inspection Considerations

- Include directions in the specifications for use of appropriate fertilizer and soil amendments based on soil properties determined through testing and compared to the needs of the vegetation requirements.
- Install swales at the time of the year when there is a reasonable chance of successful establishment without irrigation; however, it is recognized that rainfall in a given year may not be sufficient and temporary irrigation may be used.
- If sod tiles must be used, they should be placed so that there are no gaps between the tiles; stagger the ends of the tiles to prevent the formation of channels along the swale or strip.
- Use a roller on the sod to ensure that no air pockets form between the sod and the soil.
- Where seeds are used, erosion controls will be necessary to protect seeds for at least 75 days after the first rainfall of the season.

Performance

The literature suggests that vegetated swales represent a practical and potentially effective technique for controlling urban runoff quality. While limited quantitative performance data exists for vegetated swales, it is known that check dams, slight slopes, permeable soils, dense grass cover, increased contact time, and small storm events all contribute to successful pollutant removal by the swale system. Factors decreasing the effectiveness of swales include compacted soils, short runoff contact time, large storm events, frozen ground, short grass heights, steep slopes, and high runoff velocities and discharge rates.

Conventional vegetated swale designs have achieved mixed results in removing particulate pollutants. A study performed by the Nationwide Urban Runoff Program (NURP) monitored three grass swales in the Washington, D.C., area and found no significant improvement in urban runoff quality for the pollutants analyzed. However, the weak performance of these swales was attributed to the high flow velocities in the swales, soil compaction, steep slopes, and short grass height.

Another project in Durham, NC, monitored the performance of a carefully designed artificial swale that received runoff from a commercial parking lot. The project tracked 11 storms and concluded that particulate concentrations of heavy metals (Cu, Pb, Zn, and Cd) were reduced by approximately 50 percent. However, the swale proved largely ineffective for removing soluble nutrients.

The effectiveness of vegetated swales can be enhanced by adding check dams at approximately 17 meter (50 foot) increments along their length (See Figure 1). These dams maximize the retention time within the swale, decrease flow velocities, and promote particulate settling. Finally, the incorporation of vegetated filter strips parallel to the top of the channel banks can help to treat sheet flows entering the swale.

Only 9 studies have been conducted on all grassed channels designed for water quality (Table 1). The data suggest relatively high removal rates for some pollutants, but negative removals for some bacteria, and fair performance for phosphorus.

Table 1 Grassed swale pollutant removal efficiency data

Study	TSS	TP	TN	NO_3	Metals	Bacteria	Type
	Removal Efficiencies (% Removal)						
Caltrans 2002	77	8	67	66	83-90	-33	dry swales
Goldberg 1993	67.8	4.5	-	31.4	42–62	-100	grassed channel
Seattle Metro and Washington Department of Ecology 1992	60	45	-	-25	2–16	-25	grassed channel
Seattle Metro and Washington Department of Ecology, 1992	83	29	-	-25	46–73	-25	grassed channel
Wang et al., 1981	80	-	-	-	70–80	-	dry swale
Dorman et al., 1989	98	18	-	45	37–81	-	dry swale
Harper, 1988	87	83	84	80	88–90	-	dry swale
Kercher et al., 1983	99	99	99	99	99	-	dry swale
Harper, 1988.	81	17	40	52	37–69	-	wet swale
Koon, 1995	67	39	-	9	-35 to 6	-	wet swale

While it is difficult to distinguish between different designs based on the small amount of available data, grassed channels generally have poorer removal rates than wet and dry swales, although some swales appear to export soluble phosphorus (Harper, 1988; Koon, 1995). It is not clear why swales export bacteria. One explanation is that bacteria thrive in the warm swale soils.

Siting Criteria

The suitability of a swale at a site will depend on land use, size of the area serviced, soil type, slope, imperviousness of the contributing watershed, and dimensions and slope of the swale system (Schueler et al., 1992). In general, swales can be used to serve areas of less than 10 acres, with slopes no greater than 5 %. Use of natural topographic lows is encouraged and natural drainage courses should be regarded as significant local resources to be kept in use (Young et al., 1996).

Selection Criteria (NCTCOG, 1993)

- Comparable performance to wet basins
- Limited to treating a few acres
- Availability of water during dry periods to maintain vegetation
- Sufficient available land area

Research in the Austin area indicates that vegetated controls are effective at removing pollutants even when dormant. Therefore, irrigation is not required to maintain growth during dry periods, but may be necessary only to prevent the vegetation from dying.

The topography of the site should permit the design of a channel with appropriate slope and cross-sectional area. Site topography may also dictate a need for additional structural controls. Recommendations for longitudinal slopes range between 2 and 6 percent. Flatter slopes can be used, if sufficient to provide adequate conveyance. Steep slopes increase flow velocity, decrease detention time, and may require energy dissipating and grade check. Steep slopes also can be managed using a series of check dams to terrace the swale and reduce the slope to within acceptable limits. The use of check dams with swales also promotes infiltration.

Additional Design Guidelines

Most of the design guidelines adopted for swale design specify a minimum hydraulic residence time of 9 minutes. This criterion is based on the results of a single study conducted in Seattle, Washington (Seattle Metro and Washington Department of Ecology, 1992), and is not well supported. Analysis of the data collected in that study indicates that pollutant removal at a residence time of 5 minutes was not significantly different, although there is more variability in that data. Therefore, additional research in the design criteria for swales is needed. Substantial pollutant removal has also been observed for vegetated controls designed solely for conveyance (Barrett et al, 1998); consequently, some flexibility in the design is warranted.

Many design guidelines recommend that grass be frequently mowed to maintain dense coverage near the ground surface. Recent research (Colwell et al., 2000) has shown mowing frequency or grass height has little or no effect on pollutant removal.

Summary of Design Recommendations

1) The swale should have a length that provides a minimum hydraulic residence time of at least 10 minutes. The maximum bottom width should not exceed 10 feet unless a dividing berm is provided. The depth of flow should not exceed 2/3rds the height of the grass at the peak of the water quality design storm intensity. The channel slope should not exceed 2.5%.

2) A design grass height of 6 inches is recommended.

3) Regardless of the recommended detention time, the swale should be not less than 100 feet in length.

4) The width of the swale should be determined using Manning's Equation, at the peak of the design storm, using a Manning's n of 0.25.

5) The swale can be sized as both a treatment facility for the design storm and as a conveyance system to pass the peak hydraulic flows of the 100-year storm if it is located "on-line." The side slopes should be no steeper than 3:1 (H:V).

6) Roadside ditches should be regarded as significant potential swale/buffer strip sites and should be utilized for this purpose whenever possible. If flow is to be introduced through curb cuts, place pavement slightly above the elevation of the vegetated areas. Curb cuts should be at least 12 inches wide to prevent clogging.

7) Swales must be vegetated in order to provide adequate treatment of runoff. It is important to maximize water contact with vegetation and the soil surface. For general purposes, select fine, close-growing, water-resistant grasses. If possible, divert runoff (other than necessary irrigation) during the period of vegetation

establishment. Where runoff diversion is not possible, cover graded and seeded areas with suitable erosion control materials.

Maintenance

The useful life of a vegetated swale system is directly proportional to its maintenance frequency. If properly designed and regularly maintained, vegetated swales can last indefinitely. The maintenance objectives for vegetated swale systems include keeping up the hydraulic and removal efficiency of the channel and maintaining a dense, healthy grass cover.

Maintenance activities should include periodic mowing (with grass never cut shorter than the design flow depth), weed control, watering during drought conditions, reseeding of bare areas, and clearing of debris and blockages. Cuttings should be removed from the channel and disposed in a local composting facility. Accumulated sediment should also be removed manually to avoid concentrated flows in the swale. The application of fertilizers and pesticides should be minimal.

Another aspect of a good maintenance plan is repairing damaged areas within a channel. For example, if the channel develops ruts or holes, it should be repaired utilizing a suitable soil that is properly tamped and seeded. The grass cover should be thick; if it is not, reseed as necessary. Any standing water removed during the maintenance operation must be disposed to a sanitary sewer at an approved discharge location. Residuals (e.g., silt, grass cuttings) must be disposed in accordance with local or State requirements. Maintenance of grassed swales mostly involves maintenance of the grass or wetland plant cover. Typical maintenance activities are summarized below:

- Inspect swales at least twice annually for erosion, damage to vegetation, and sediment and debris accumulation preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the swale is ready for winter. However, additional inspection after periods of heavy runoff is desirable. The swale should be checked for debris and litter, and areas of sediment accumulation.
- Grass height and mowing frequency may not have a large impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.
- Trash tends to accumulate in swale areas, particularly along highways. The need for litter removal is determined through periodic inspection, but litter should always be removed prior to mowing.
- Sediment accumulating near culverts and in channels should be removed when it builds up to 75 mm (3 in.) at any spot, or covers vegetation.
- Regularly inspect swales for pools of standing water. Swales can become a nuisance due to mosquito breeding in standing water if obstructions develop (e.g. debris accumulation, invasive vegetation) and/or if proper drainage slopes are not implemented and maintained.

Cost

Construction Cost

Little data is available to estimate the difference in cost between various swale designs. One study (SWRPC, 1991) estimated the construction cost of grassed channels at approximately $0.25 per ft^2. This price does not include design costs or contingencies. Brown and Schueler (1997) estimate these costs at approximately 32 percent of construction costs for most stormwater management practices. For swales, however, these costs would probably be significantly higher since the construction costs are so low compared with other practices. A more realistic estimate would be a total cost of approximately $0.50 per ft^2, which compares favorably with other stormwater management practices.

Table 3 Estimated Maintenance Costs (SEWRPC, 1991)

Component	Unit Cost	Swale Size (Depth and Top Width)		Comment
		1.5 Foot Depth, One-Foot Bottom Width, 10-Foot Top Width	3-Foot Depth, 3-Foot Bottom Width, 21-Foot Top Width	
Lawn Mowing	$0.85 / 1,000 ft²/ mowing	$0.14 / linear foot	$0.21 / linear foot	Lawn maintenance area=(top width + 10 feet) x length. Mow eight times per year
General Lawn Care	$9.00 / 1,000 ft²/ year	$0.16 / linear foot	$0.28 / linear foot	Lawn maintenance area = (top width + 10 feet) x length
Swale Debris and Litter Removal	$0.10 / linear foot / year	$0.10 / linear foot	$0.10 / linear foot	–
Grass Reseeding with Mulch and Fertilizer	$0.30 / yd²	$0.01 / linear foot	$0.01 / linear foot	Area revegetated equals 1% of lawn maintenance area per year
Program Administration and Swale Inspection	$0.15 / linear foot / year, plus $25 / inspection	$0.15 / linear foot	$0.15 / linear foot	Inspect four times per year
Total	--	$0.58 / linear foot	$ 0.75 / linear foot	--

Maintenance Cost

Caltrans (2002) estimated the expected annual maintenance cost for a swale with a tributary area of approximately 2 ha at approximately $2,700. Since almost all maintenance consists of mowing, the cost is fundamentally a function of the mowing frequency. Unit costs developed by SEWRPC are shown in Table 3. In many cases vegetated channels would be used to convey runoff and would require periodic mowing as well, so there may be little additional cost for the water quality component. Since essentially all the activities are related to vegetation management, no special training is required for maintenance personnel.

References and Sources of Additional Information

Barrett, Michael E., Walsh, Patrick M., Malina, Joseph F., Jr., Charbeneau, Randall J, 1998, "Performance of vegetative controls for treating highway runoff," *ASCE Journal of Environmental Engineering*, Vol. 124, No. 11, pp. 1121-1128.

Brown, W., and T. Schueler. 1997. *The Economics of Stormwater BMPs in the Mid-Atlantic Region*. Prepared for the Chesapeake Research Consortium, Edgewater, MD, by the Center for Watershed Protection, Ellicott City, MD.

Center for Watershed Protection (CWP). 1996. *Design of Stormwater Filtering Systems*. Prepared for the Chesapeake Research Consortium, Solomons, MD, and USEPA Region V, Chicago, IL, by the Center for Watershed Protection, Ellicott City, MD.

Colwell, Shanti R., Horner, Richard R., and Booth, Derek B., 2000. *Characterization of Performance Predictors and Evaluation of Mowing Practices in Biofiltration Swales*. Report to King County Land And Water Resources Division and others by Center for Urban Water Resources Management, Department of Civil and Environmental Engineering, University of Washington, Seattle, WA

Dorman, M.E., J. Hartigan, R.F. Steg, and T. Quasebarth. 1989. *Retention, Detention and Overland Flow for Pollutant Removal From Highway Stormwater Runoff. Vol. 1*. FHWA/RD 89/202. Federal Highway Administration, Washington, DC.

Goldberg. 1993. *Dayton Avenue Swale Biofiltration Study*. Seattle Engineering Department, Seattle, WA.

Harper, H. 1988. *Effects of Stormwater Management Systems on Groundwater Quality*. Prepared for Florida Department of Environmental Regulation, Tallahassee, FL, by Environmental Research and Design, Inc., Orlando, FL.

Kercher, W.C., J.C. Landon, and R. Massarelli. 1983. Grassy swales prove cost-effective for water pollution control. *Public Works*, 16: 53–55.

Koon, J. 1995. *Evaluation of Water Quality Ponds and Swales in the Issaquah/East Lake Sammamish Basins*. King County Surface Water Management, Seattle, WA, and Washington Department of Ecology, Olympia, WA.

Metzger, M. E., D. F. Messer, C. L. Beitia, C. M. Myers, and V. L. Kramer. 2002. The Dark Side Of Stormwater Runoff Management: Disease Vectors Associated With Structural BMPs. Stormwater 3(2): 24-39.Oakland, P.H. 1983. An evaluation of stormwater pollutant removal

through grassed swale treatment. In *Proceedings of the International Symposium of Urban Hydrology, Hydraulics and Sediment Control, Lexington, KY*. pp. 173–182.

Occoquan Watershed Monitoring Laboratory. 1983. Final Report: *Metropolitan Washington Urban Runoff Project*. Prepared for the Metropolitan Washington Council of Governments, Washington, DC, by the Occoquan Watershed Monitoring Laboratory, Manassas, VA.

Pitt, R., and J. McLean. 1986. *Toronto Area Watershed Management Strategy Study: Humber River Pilot Watershed Project*. Ontario Ministry of Environment, Toronto, ON.

Schueler, T. 1997. Comparative Pollutant Removal Capability of Urban BMPs: A reanalysis. *Watershed Protection Techniques* 2(2):379–383.

Seattle Metro and Washington Department of Ecology. 1992. *Biofiltration Swale Performance: Recommendations and Design Considerations*. Publication No. 657. Water Pollution Control Department, Seattle, WA.

Southeastern Wisconsin Regional Planning Commission (SWRPC). 1991. *Costs of Urban Nonpoint Source Water Pollution Control Measures*. Technical report no. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI.

U.S. EPA, 1999, Stormwater Fact Sheet: Vegetated Swales, Report # 832-F-99-006 http://www.epa.gov/owm/mtb/vegswale.pdf, Office of Water, Washington DC.

Wang, T., D. Spyridakis, B. Mar, and R. Horner. 1981. *Transport, Deposition and Control of Heavy Metals in Highway Runoff*. FHWA-WA-RD-39-10. University of Washington, Department of Civil Engineering, Seattle, WA.

Washington State Department of Transportation, 1995, *Highway Runoff Manual*, Washington State Department of Transportation, Olympia, Washington.

Welborn, C., and J. Veenhuis. 1987. *Effects of Runoff Controls on the Quantity and Quality of Urban Runoff in Two Locations in Austin, TX*. USGS Water Resources Investigations Report No. 87-4004. U.S. Geological Survey, Reston, VA.

Yousef, Y., M. Wanielista, H. Harper, D. Pearce, and R. Tolbert. 1985. *Best Management Practices: Removal of Highway Contaminants By Roadside Swales*. University of Central Florida and Florida Department of Transportation, Orlando, FL.

Yu, S., S. Barnes, and V. Gerde. 1993. *Testing of Best Management Practices for Controlling Highway Runoff*. FHWA/VA-93-R16. Virginia Transportation Research Council, Charlottesville, VA.

Information Resources

Maryland Department of the Environment (MDE). 2000. *Maryland Stormwater Design Manual*. www.mde.state.md.us/environment/wma/stormwatermanual. Accessed May 22, 2001.

Reeves, E. 1994. Performance and Condition of Biofilters in the Pacific Northwest. *Watershed Protection Techniques* 1(3):117–119.

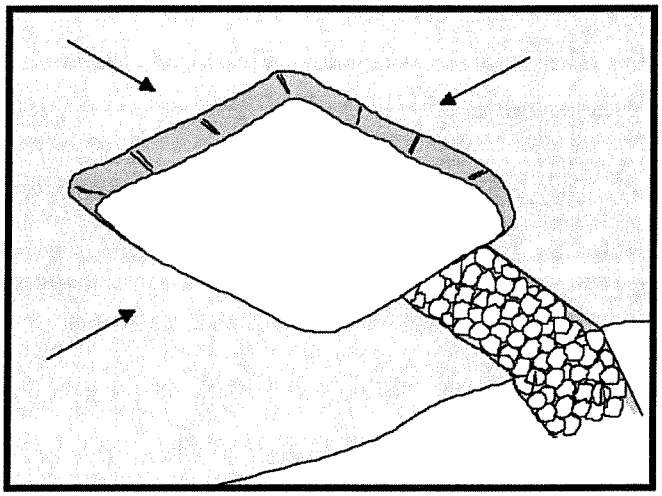
Seattle Metro and Washington Department of Ecology. 1992. *Biofiltration Swale Performance.* Recommendations and Design Considerations. Publication No. 657. Seattle Metro and Washington Department of Ecology, Olympia, WA.

USEPA 1993. *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. EPA-840-B-92-002. U.S. Environmental Protection Agency, Office of Water. Washington, DC.

Watershed Management Institute (WMI). 1997. *Operation, Maintenance, and Management of Stormwater Management Systems*. Prepared for U.S. Environmental Protection Agency, Office of Water. Washington, DC, by the Watershed Management Institute, Ingleside, MD.

SEDIMENT TRAP

Sediment Trap SE-3



Objectives

EC	Erosion Control	
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.
- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.
- Conducive to vector production.
- Should not be located in live streams.

Implementation

Design

A sediment trap is a small temporary ponding area, usually with a gravel outlet, formed by excavation or by construction of an earthen embankment. Its purpose is to collect and store sediment from sites cleared or graded during construction. It is intended for use on small drainage areas with no unusual drainage features and projected for a quick build-out time. It should help in removing coarse sediment from runoff. The trap is a temporary measure with a design life of approximately six months to one year and is to be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, refer to SE-2, Sediment Basins, or subdivide the catchment area into smaller drainage basins.

Sediment usually must be removed from the trap after each rainfall event. The SWPPP should detail how this sediment is to be disposed of, such as in fill areas onsite, or removal to an approved offsite dump. Sediment traps used as perimeter controls should be installed before any land disturbance takes place in the drainage area.

Sediment traps are usually small enough that a failure of the structure would not result in a loss of life, damage to home or buildings, or interruption in the use of public roads or utilities. However, sediment traps are attractive to children and can be dangerous. The following recommendations should be implemented to reduce risks:

- Install continuous fencing around the sediment trap or pond. Consult local ordinances regarding requirements for maintaining health and safety.
- Restrict basin side slopes to 3:1 or flatter.

Sediment trap size depends on the type of soil, size of the drainage area, and desired sediment removal efficiency (see SE-2, Sediment Basin). As a rule of thumb, the larger the basin volume the greater the sediment removal efficiency. Sizing criteria are typically established under the local grading ordinance or equivalent. The runoff volume from a 2-year storm is a common design criteria for a sediment trap. The sizing criteria below assume that this runoff volume is 0.042 acre-ft/acre (0.5 in. of runoff). While the climatic, topographic, and soil type extremes make it difficult to establish a statewide standard, the following criteria should trap moderate to high amounts of sediment in most areas of California:

- Locate sediment traps as near as practical to areas producing the sediment.
- Trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd^3/acre and 33 yd^3/acre of contributing drainage area, respectively, based on 0.5 in. of runoff volume over a 24-hour period. In many cases, the size of an individual trap is limited by available space. Multiple traps or additional volume may be required to accommodate specific rainfall, soil, and site conditions.
- Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- The outlet pipe or open spillway must be designed to convey anticipated peak flows.
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing should be provided to prevent unauthorized entry.

Installation

Sediment traps can be constructed by excavating a depression in the ground or creating an impoundment with a small embankment. Sediment traps should be installed outside the area being graded and should be built prior to the start of the grading activities or removal of vegetation. To minimize the area disturbed by them, sediment traps should be installed in natural depressions or in small swales or drainage ways. The following steps must be followed during installation:

- The area under the embankment must be cleared, grubbed, and stripped of any vegetation and root mat. The pool area should be cleared.
- The fill material for the embankment must be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment may be compacted by traversing with equipment while it is being constructed.
- All cut-and-fill slopes should be 3:1 or flatter.
- When a riser is used, all pipe joints must be watertight.
- When a riser is used, at least the top two-thirds of the riser should be perforated with 0.5 in. diameter holes spaced 8 in. vertically and 10 to 12 in. horizontally. See SE-2, Sediment Basin.
- When an earth or stone outlet is used, the outlet crest elevation should be at least 1 ft below the top of the embankment.

- When crushed stone outlet is used, the crushed stone used in the outlet should meet AASHTO M43, size No. 2 or 24, or its equivalent such as MSHA No. 2. Gravel meeting the above gradation may be used if crushed stone is not available.

Costs

Average annual cost per installation and maintenance (18 month useful life) is $0.73 per ft^3 ($1,300 per drainage acre). Maintenance costs are approximately 20% of installation costs.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect outlet area for erosion and stabilize if required.
- Inspect trap banks for seepage and structural soundness, repair as needed.
- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect fencing for damage and repair as needed.
- Inspect the sediment trap for area of standing water during every visit. Corrective measures should be taken if the BMP does not dewater completely in 72 hours or less to prevent vector production.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the trap capacity. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.
- Remove vegetation from the sediment trap when first detected to prevent pools of standing water and subsequent vector production.
- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs shall be implemented at all times during dewatering activities.

References

Brown, W., and T. Schueler. The Economics of Stormwater BMPs in the Mid-Atlantic Region. Prepared for Chesapeake Research Consortium, Edgewater, MD, by the Center for Watershed Protection, Ellicott City, MD, 1997.

Draft – Sedimentation and Erosion Control, an Inventory of Current Practices, USEPA, April 1990.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Metzger, M.E., D.F. Messer, C.L. Beitia, C.M. Myers, and V.L. Kramer, The Dark Side of Stormwater Runoff Management: Disease Vectors Associated with Structural BMPs, 2002.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

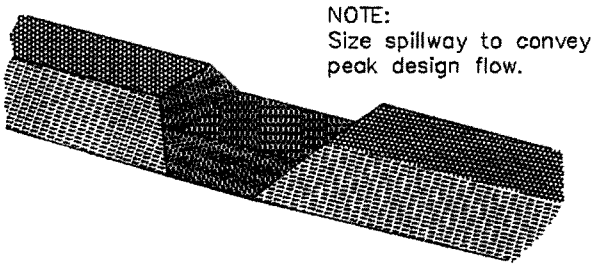
Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

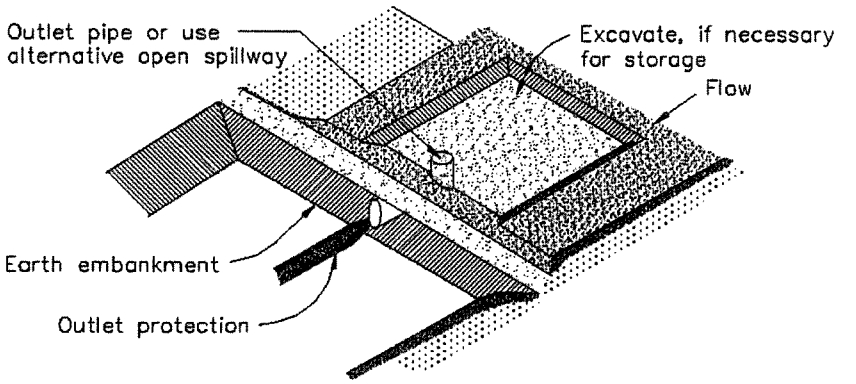
Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

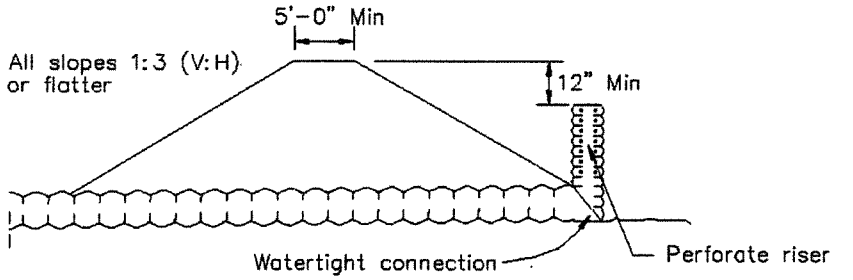
U.S. Environmental Protection Agency (USEPA). Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters. EPA 840-B-9-002. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



TYPICAL OPEN SPILLWAY





EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP
NOT TO SCALE

SLOPETAME 2

Product Data Sheet - Slopetame^2

Slopetame^2 (ST^2) is a unique solution to age old problems - soil erosion and stabilization of soil on slopes and vegetated drainage channels.

The difficulty with most erosion control products are their lack of ability to keep soils in place until root systems are mature, and their potential to be undercut by rapid flow of storm water. These products are usually thin sheets of various materials, or open web-like matrices.

Other existing products act to "contain" various depths of fill materials by cellular constructions of fabrics or plastic sheets, but offer little resistance to water undercutting, or ability to interconnect cells of vegetation.

ST^2 System Description-
Each ST^2 unit is a 3-dimensional structure designed to isolate and contain small zones of soil over the entire slope surface, while at the same time preventing water from under cutting the unit and dislodging soil and roots.

ST^2 units consist of rigid upstanding rings connected with a flexible diagonal geogrid injection molded onto a geotextile fabric. The fabric acts to contain soil or gravel fill, while rows of bars and rings act to prevent erosion channels developing between rows of rings.

ST^2 Benefits-

- True 3-dimensional containment of fill.
- Rings and bars offer small scale confinement.
- Shallow depth of fill material needed.
- Strong diagonal grid to disperse loads across slopes.
- All units can be interlocked for continuous structure across slopes.
- Geotextile fabrics to strengthen root matrix.
- Fabrics act to slow speed of water infiltration and reduce chance of undercutting.
- Fabrics under gravel fill can prevent plant penetration from below and resist root penetration from above.
- Product is lightweight and easy to assemble.
- Recycled plastics are used.
- Plastics are treated for UV resistance.
- These plastics are inert from damage from normal chemicals used in horticulture.

ST^2 Units & System-
The ST^2 system includes the unit, and duckbill anchors - 3 ft (1 meter) lengths of 1/2" (1.25 cm) rebar not included. Soil preparation, product placement, anchors, soil or gravel fill, and irrigation (if required), are provided by the contractor, and considered an essential part of the installation of the system.

ST^2 Installation Guidelines-
If undisturbed slope continues above the area designated for ST^2, cut-off drains should be installed at the top of the new slope to intercept surface water generated from above. The new slope will need only to contend with water actually falling on the ST^2 surfaced area, minimizing storm water volume build-up.

At the toe of long slopes, or at terrace levels, additional cut-off drains may be installed for the similar purposes downstream.

The units should extend from the top to toe of a slope in one continuous piece. 1 - 2.5 meter wide rolls are sold in standard lengths but can be preassembled in custom lengths.

Generally spunbonded non-woven fabrics made of either polyester or polypropylene are used, to enhance root system strength.

Units are anchored securely from the top of the slope, and periodically along the face of the slope. Types of anchors used may vary with substrata conditions.

ST^2 units are then filled with small gravel, or a lightweight soil mix, preferably, which includes Hydrogrow soil conditioner to retain adequate moisture in the primary root zone.

Gravel Fill -
For slopes that do not require vegetation cover, the ST^2 units can be filled with small gravel - which should be 3/8's inch minus in size, and sharp (crushed) rather than rounded to best lock into place.

Vegetation -
ST^2 system can be very effective in assisting new vegetative cover to establish and remain in place for years by protecting the root zone from soil removal due to water runoff.
Compatible forms of vegetation include:

- Grasses
- Groundcovers
- Vines
- Shrubs
- Trees

The selected form(s) should be matched with slope, soil types, moisture, maintenance and aesthetic requirements of the site.

Shrubs and trees, with their larger roots, will most likely be restricted to slopes with permeable soils below the units and openings cut into the unit (remove rings with pruning shears) to allow proper root development.

Groundcovers other than grasses will usually be planted from pots ranging in size from 2" to 1 gallon. Small plants may have the root system split to grow over and between rings, while larger plants may require ring removal.

Grasses and most wildflowers will be best installed by seeding, or hydroseeding techniques.

As the root systems develop, roots will penetrate and integrate with the fabric layer to establish a very strong surface.

Normal Installation Steps-
Installation of the system begins with soil preparation.

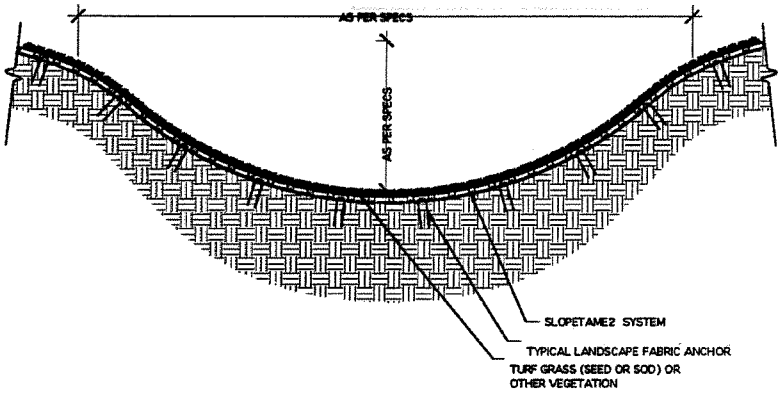
1. The soil should be tilled to a depth of 10 cm to 15 cm.
2. Pre-assemble on flat ground 1, 1.5, 2, or 2.5 meter widths, for the continuous length of the slope, deforming the top of connection pins with heat (propane torch and screwdriver) to prevent separation.
3. Start at the highest elevation and place the ST^2 mat with rings up, fabric down, and the double hole corner at the upper right position, and unroll down the slope. Make connections to adjacent units and deform pins to keep interlocked.
4. Anchor the mat with 1 pin (15 cm long x 25 mm wide x 2 mm ga. wire) placed just inside the double hole corner, every 40" on center, or closer as may be needed by local conditions.

5. Shrubs and trees may be placed by cutting away rings/grid/fabric to accommodate root ball. Place crown of plant just below the top of rings.

6. Fill the Slopetame^2 units with proper topsoil type materials in preparation for seeding.

7. Hydroseed and mulch the area for grasses and groundcovers. Mulch materials (paper, cellulose, or light fabric) will protect delicate seedlings until germination, and roots have reached the ST^2 fabric layer.

8. Provide supplemental irrigation as needed to assure germination and plant root establishment.



NOTE: GRASS/VEGETATION AND SAND/SOIL TYPES SHALL BE SPECIFIED BY A LANDSCAPE ARCHITECT OR ENGINEER

SLOPETAME2 SWALE REINFORCEMENT

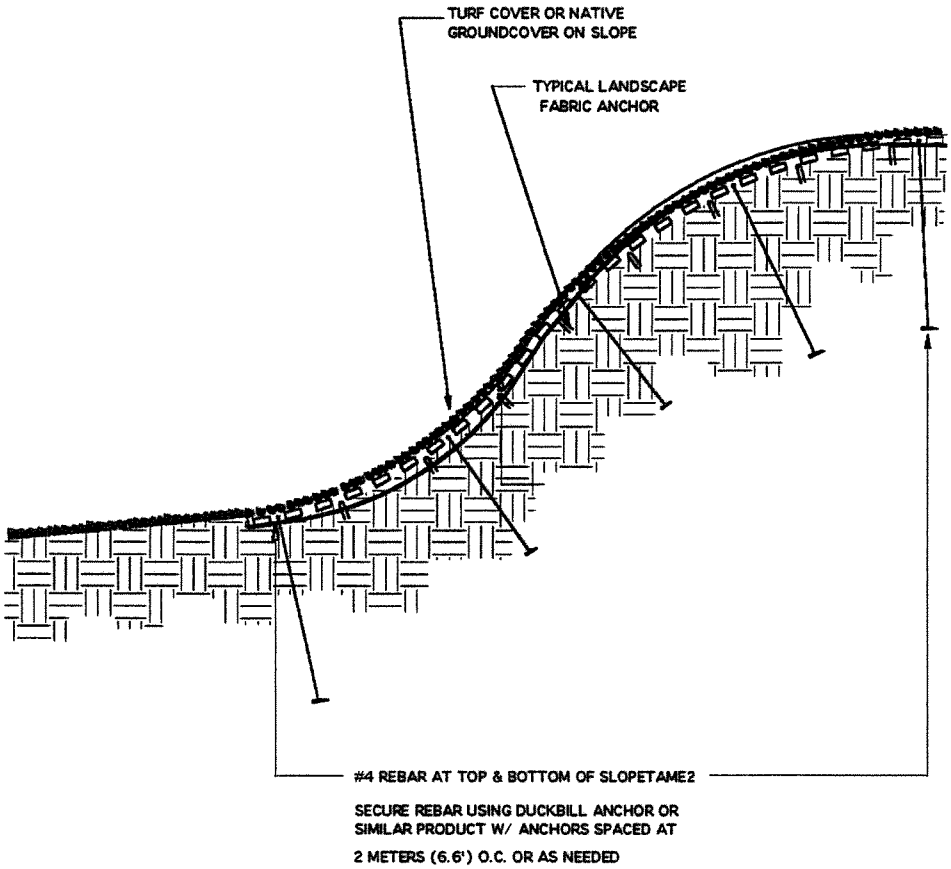
1
1OF1

NOT TO SCALE

CHOOSE THIS PRODUCT FOR EROSION AND SEDIMENT CONTROL

Invisible Structures, Inc.
ST2Swale.dwg

1600 Jackson St., SUITE 310
GOLDEN, COLORADO 80401
800-239-1510 or 303-233-6989
Fax 303-233-6262
www.invisiblestructures.com
Rev. 05/04



SLOPETAME2 CHANNEL REINFORCEMENT

1

1 OF 1

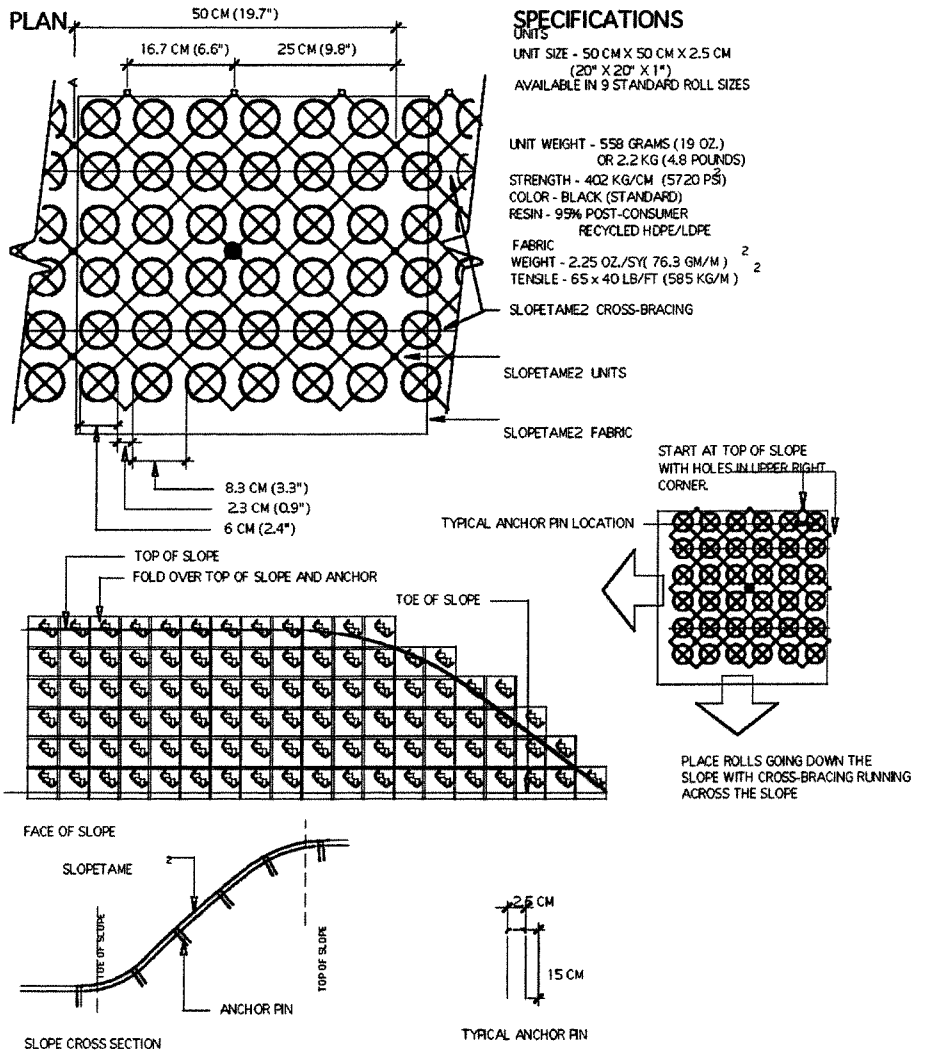
NOT TO SCALE

CHOOSE THIS PRODUCT FOR CHANNEL EROSION AND SEDIMENT CONTROL

Invisible Structures, Inc.

St2-channel.dwg

1600 Jackson St., Suite 310
Golden, CO 80401
800-233-1510 OR 303-233-8383
FAX: 303-233-8282
www.invisiblestructures.com
Rev. 08/04



TYPICAL SLOPETAME2 ASSEMBLY AND ANCHORAGE

1
1 OF 1

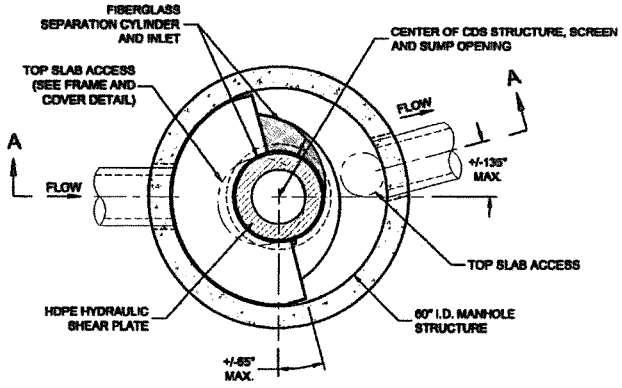
CHOOSE THIS PRODUCT FOR STABALIZING SLOPE CONDITIONS

NOT TO SCALE

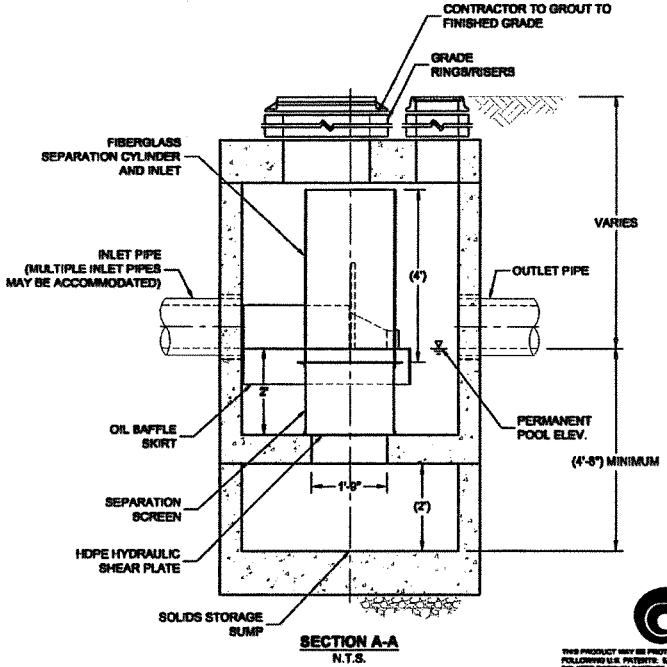
Invisible
Structures, Inc.

St2.dwg

1600 Jackson St., Suite 310
Golden, Colorado 80401
800-289-1510 OR 303-233-6369
FAX: 303-233-6262
rev. 08/04



PLAN VIEW
N.T.S.



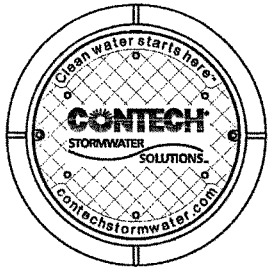
SECTION A-A
N.T.S.

CDS2015 DESIGN NOTES

CDS2015 RATED TREATMENT CAPACITY IS 0.7 CFS, OR PER LOCAL REGULATIONS. MAXIMUM HYDRAULIC INTERNAL BYPASS CAPACITY IS 14.0 CFS. IF THE SITE CONDITIONS EXCEED 14.0 CFS, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD CDS2015 CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

DESIGNATION (MODEL SUFFIX)	CONFIGURATION DESCRIPTION
G	GRATED INLET ONLY (NO INLET PIPE)
GP	GRATED INLET WITH INLET PIPE OR PIPES
K	CURB INLET ONLY (NO INLET PIPE)
KP	CURB INLET WITH INLET PIPE OR PIPES
B	SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
W	SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS)			*
PEAK FLOW RATE (CFS)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH STORMWATER SOLUTIONS REPRESENTATIVE. www.contechstormwater.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE AND CASTINGS SHALL MEET AASHTO HS20 LOAD RATING.
6. HDPE HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
5. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CDS®

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 5,893,326; 6,071,406; 6,261,769; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CONTECH STORMWATER SOLUTIONS
contechstormwater.com

CDS2015
PRECAST CONCRETE WATER QUALITY SYSTEM
STANDARD DETAIL

I:\STORMWATER\CRAFTING\TEMPLATES\CAD STANDARDS\SUBMITTAL WORK IN PROGRESS\CDS\CDS STD DETAIL DWG\PT\CDS2015-STD.DWG 6/27/2008 2:19 PM

ATTACHMENT F

OPERATION AND MAINTENANCE PROGRAM FOR TREATMENT BMPs

MF-1

BMP CATEGORY HOA primarily responsible for maintenance. The County needs to assure ongoing maintenance.	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
BIO-FILTER (2,310 sf) First Category	- CUT VEGETATION IN NATURAL CHANNEL TO 6" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM CHANNEL AS NECESSARY - BACKFILL BURROW HOLES AS NECESSARY	**$1,500**
CURB INLET INSERTS W/ STREAM GUARD (1 total) Second Category	- SEDIMENT REMOVAL - INSPECT FOR DEBRIS/TRASH - OIL/GREASE REMOVAL - INSPECT FOR STRUCTURAL INTEGRITY - ANNUAL RENEWAL OF MEDIUM	**$1,000**
CURB INLET W/ WATER QUALITY INTERCEPTOR/DROP OUTLET BOX (1 total) Second Category	- INSPECT STRUCTURAL INTEGRITY - REMOVE TRASH AND DEBRIS FROM GRATE	**$1,000**
	TOTAL	**$3,500**

MF-2

BMP CATEGORY HOA primarily responsible for maintenance. The County needs to assure ongoing maintenance.	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
BIO-FILTER (1,188 sf) First Category	- CUT VEGETATION IN NATURAL CHANNEL TO 6" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM CHANNEL AS NECESSARY - BACKFILL BURROW HOLES AS NECESSARY	**$1,500**
CURB INLET W/ WATER QUALITY INTERCEPTOR/DROP OUTLET BOX (1 total) Second Category	- INSPECT STRUCTURAL INTEGRITY - REMOVE TRASH AND DEBRIS FROM GRATE	**$1,000**
~~LOW FLOW DETENTION BASIN~~	~~- CUT VEGETATION IN NATURAL CHANNEL TO MAX. 12" HEIGHT~~ ~~- RESEED/VEGETATE BARE SPOTS AS NECESSARY~~ ~~- REMOVE SEDIMENT FROM TRAPS AS NECESSARY~~ ~~- BACKFILL BURROW HOLES AS NECESSARY~~	~~**$5000**~~
	TOTAL	**$ 2,500**

MF-3

BMP CATEGORY HOA primarily responsible for maintenance. The County needs to assure ongoing maintenance.	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
BIO-FILTER (4,278 sf) First Category	- CUT VEGETATION IN NATURAL CHANNEL TO 6" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM CHANNEL AS NECESSARY - BACKFILL BURROW HOLES AS NECESSARY	**$3,000**
CURB INLET INSERTS W/ STREAM GUARD (4 total) Second Category	- SEDIMENT REMOVAL - INSPECT FOR DEBRIS/TRASH - OIL/GREASE REMOVAL - INSPECT FOR STRUCTURAL INTEGRITY - ANNUAL RENEWAL OF MEDIUM	**$4,000**
CURB INLET/CLEANOUT W/ WATER QUALITY INTERCEPTOR/DROP OUTLET BOX (3 total) Second Category	- INSPECT STRUCTURAL INTEGRITY - REMOVE TRASH AND DEBRIS FROM GRATE	**$3,000**
	TOTAL	**$ 10,000**

MF-4

BMP CATEGORY HOA primarily responsible for maintenance. The County needs to assure ongoing maintenance.	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
BIO-FILTER (3,036 sf) First Category	- CUT VEGETATION IN NATURAL CHANNEL TO 6" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM CHANNEL AS NECESSARY - BACKFILL BURROW HOLES AS NECESSARY	**$3,000**
CURB INLET INSERTS W/ STREAM GUARD (1 total) Second Category	- SEDIMENT REMOVAL - INSPECT FOR DEBRIS/TRASH - OIL/GREASE REMOVAL - INSPECT FOR STRUCTURAL INTEGRITY - ANNUAL RENEWAL OF MEDIUM	**$1,000**
CURB INLET W/ WATER QUALITY INTERCEPTOR/DROP OUTLET BOX (3 total) Second Category	- INSPECT STRUCTURAL INTEGRITY - REMOVE TRASH AND DEBRIS FROM GRATE	**$3,000**
	TOTAL	**$7,000**

PUMP STATION AND STAGING AREA

BMP CATEGORY Master HOA primarily responsible for maintenance. The County needs to assure ongoing maintenance.	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
BIO-FILTER (174 sf) First Category	- CUT VEGETATION IN NATURAL CHANNEL TO 6" OR 8" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM CHANNEL AS NECESSARY - BACKFILL BURROW HOLES AS NECESSARY	**$1,500**
CURB INLET W/ WATER QUALITY INTERCEPTOR/DROP OUTLET BOX (1 total) Second Category	- INSPECT STRUCTURAL INTEGRITY - REMOVE TRASH AND DEBRIS FROM GRATE	**$1,000**
	TOTAL	**$2,500**

Professional Office, PO1 & PO2

BMP CATEGORY Tenants Association primarily responsible for maintenance. The County needs to assure ongoing maintenance.	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
BIO-FILTER (2,664 sf) First Category	- CUT VEGETATION IN NATURAL CHANNEL TO 6" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM CHANNEL AS NECESSARY - BACKFILL BURROW HOLES AS NECESSARY	**$4,500**
CURB INLET INSERTS W/ STREAM GUARD (5 total) Second Category	- SEDIMENT REMOVAL - INSPECT FOR DEBRIS/TRASH - OIL/GREASE REMOVAL - INSPECT FOR STRUCTURAL INTEGRITY - ANNUAL RENEWAL OF MEDIUM	**$5,000**
CURB INLET W/ WATER QUALITY INTERCEPTOR/DROP OUTLET BOX (5 total) Second Category	- INSPECT STRUCTURAL INTEGRITY - REMOVE TRASH AND DEBRIS FROM GRATE	**$5,000**
	TOTAL	**$12,500**

SPORTS COMPLEX AND PARKS

BMP CATEGORY Master HOA primarily responsible for maintenance. The County needs to assure ongoing maintenance.	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
BIO-FILTER (354 sf) First Category	- CUT VEGETATION IN NATURAL CHANNEL TO MAX. 12" HEIGHT - RESEED/VEGETATE BARE SPOTS AS NECESSARY - REMOVE SEDIMENT FROM CHANNEL AS NECESSARY - BACKFILL BURROW HOLES AS NECESSARY	**$1,500**
CURB INLET W/ WATER QUALITY INTERCEPTOR/DROP OUTLET BOX (2 total) Second Category	- INSPECT STRUCTURAL INTEGRITY - REMOVE TRASH AND DEBRIS FROM GRATE	**$2,000**
	TOTAL	**$ 3,500**

TOWN CENTER

BMP CATEGORY Tenant Association primarily responsible for maintenance. The County needs to assure ongoing maintenance.	**MAINTENANCE ACTIVITIES**	**ANNUAL COST**
OIL/WATER SEPARATORS (2 total) Third Category	- REMOVE SEDIMENT IN PRE-SEPARATOR AND SEPARATOR CHAMBERS - REMOVED OIL IN OIL CHAMBER - REMOVE DEBRIS AND GUMMY DEPOSITS FROM COALESCER - INSPECT WATER LEVEL IN TANK - INSPECT GENERAL MECHANICAL INTEGRITY	**$6,000**
CURB INLET INSERTS W/ STREAM GUARD (8 total) Second Category	- SEDIMENT REMOVAL - INSPECT FOR DEBRIS/TRASH - OIL/GREASE REMOVAL - INSPECT FOR STRUCTURAL INTEGRITY - ANNUAL RENEWAL OF MEDIUM	**$8,000**
	TOTAL	**$14,000**

Note: There are a total of 19 storm drain curb inlet inserts proposed with the "B" Designator site plans.

TOTAL ANNUAL MAINTENANCE COST SUMMARY

CATEGORY	**FIRST**	**SECOND**	**THIRD**	**FOURTH**
TOTAL ANNUAL COST	$16,500	$35,000	$6,000	N/A

GRAND TOTAL FOR "B" DESIGNATOR SITE PLANS: **$57,500**

ATTACHMENT G

FISCAL RESOURCES

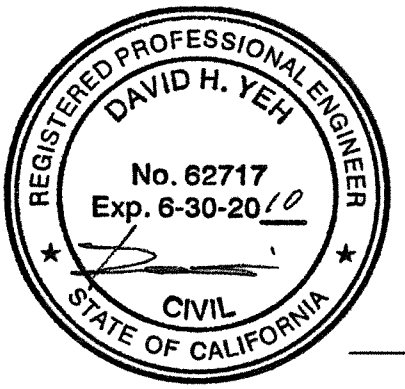
The individual homeowners will be responsible for the BMP devices on their individual residential lots. The master Home Owners' Associations (HOA) will be responsible for the BMP devices in the public right of way and adjoining slopes, the Sports Complex, the Pool Site, the detention basin and the Staging Area/Pump Station lot. The developer will be responsible for the maintenance of interim BMP devices (i.e. sediment traps) on the mass-graded multi-family and commercial lots before they are developed into their ultimate use. Ultimately, after the "B" Designator site plan areas are developed, the individual site HOAs will be responsible for the permanent BMP devices in the multi-family neighborhoods and neighbor recreation facilities and the Tenants' Association will be responsible for the maintenance of permanent BMP devices on the commercial lots.

ATTACHMENT H

CERTIFICATION SHEET

This Stormwater Management Plan has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

The combination of proposed construction and post-construction BMPs will reduce, to the maximum extent practicable, the expected pollutants and will not adversely impact the beneficial uses or water quality of the receiving waters.



Date:

ATTACHMENT I

ADDENDUM

PRELIMINARY HYDROMODIFICATION MANAGEMENT PLAN

PRELIMINARY HYDROMODIFICATION MANAGEMENT PLAN (HMP) FOR:

CAMPUS PARK TM5338 RPL6

San Diego, California

Prepared for:

Passerelle, LLC
402 W. Broadway, Suite 1320
San Diego, Ca 92101

Prepared by:

Landmark Consulting
9555 Genesee Ave, Suite 200
San Diego, Ca 92121
Ph: 858-587-8070
Jn 6-14
Rev. Date: 8-17-09

David Yeh, RCE 62717, Exp. 6-30-10

TABLE OF CONTENTS: PAGE:

VICINITY MAP	**5**
INTRODUCTION	**7**
PROJECT DESCRIPTION	**9-10**
METHOD OF ANALYSIS	**11-12**
HYDROMODIFICATION CALCULATIONS	**13-38**
SUMMARY	**39**
PROPOSED MITIGATION MEASURE	**40**
PERVIOUS/IMPERVIOUS LAND PARAMETERS SUMMARY	**41**
BASIN OUTLET STRUCTURE DETAIL	**42**
APPENDIX:	**43**

LAND USE EXHIBIT

PRE & POST-DEVELOPMENT SLOPE ANALYSIS EXHIBITS

RAINFALL ISOPLUVIAL MAPS

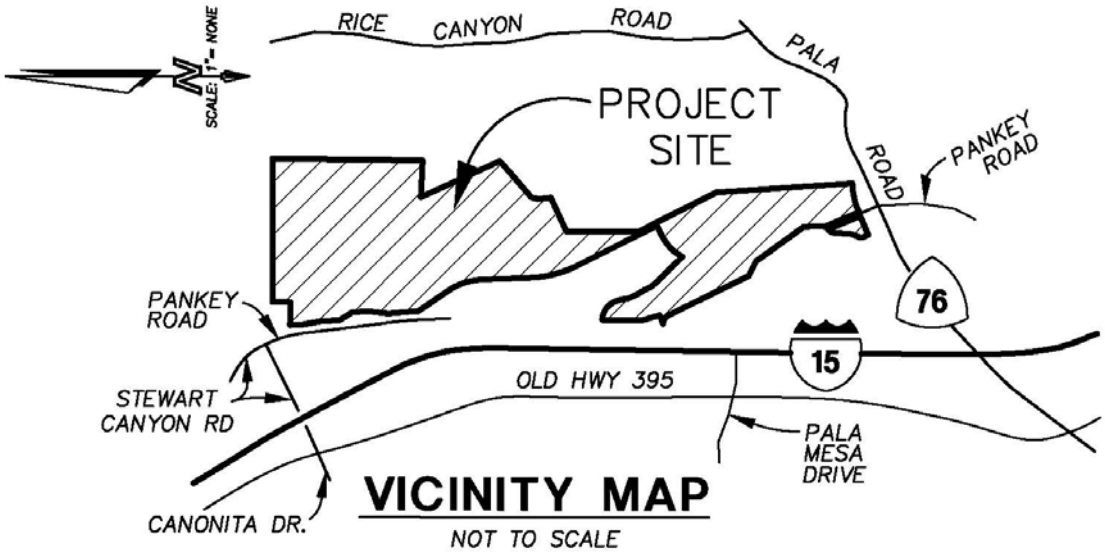
POINTS OF COMPLIANCE LOCATION AND BASIN EXHIBITS

RAIN GAUGE STATION SELECTION MAP

SOIL GROUPS MAPS

DRAINAGE MAP – SEE "A CEQA LEVEL PRELIMINARY HYDROLOGY & HYDRAULICS STUDY FOR CAMPUS PARK" (ATTACHED)

GEOTECHNICAL INPUT


SCALE: 1" = NONE
RICE CANYON ROAD
PALA ROAD
PROJECT SITE
PANKEY ROAD
PANKEY ROAD
76
15
OLD HWY 395
STEWART CANYON RD
PALA MESA DRIVE
CANONITA DR.
VICINITY MAP
NOT TO SCALE

INTRODUCTION

Hydromodification is due to the changes in the natural flow pattern of surface and ground water as a result of development such as increases in impervious areas, decreases in natural vegetation, grading and compacting of soil and construction of drainage facilities.

Hydromodification impacts downstream facilities due to less infiltration as a result of increases in impervious areas such as roads, roof areas, driveways and hardscaped areas. This results in increases in peak flow and volume and the likelihood of newly constructed drainage system discharging runoff directly into downstream creeks and water bodies.

The impact to the receiving water can include stream bank erosion due to increased flow velocity and volume, sediment transport and deposition further downstream.

Hydromodification mitigation measures must be employed in this proposed development to reduce and eliminate additional impact to downstream facilities.

A discussion of the geotechnical conditions at the site is included in a soils report included in the Appendix of this report. A discussion of the pre and post-development drainage analysis is included in the preliminary drainage report prepared for this project in the Appendix of this report.

PROJECT DESCRIPTION

The project is located on the northerly side of Pala Road, east of Interstate 15, west of Rice Canyon Road and south of Stewart Canyon Road, in the County of San Diego, State of California.

A vicinity map, showing the general property location, is located on page 5. The site is located on a north to south sloping topography. The terrains along the northerly and easterly boundaries are steep sloping, the mid-portion of the project is moderately sloping and southerly end of the project is very gently sloping.

The project consists of approximately 416 acres of mixed-use development including 113.8 acres of single family dwelling units, 45.4 acres of multi-family dwelling units, 11.5 acres of professional office development, 8.1 acres of town center, 215.4 acres of parks and open space, 0.2 acres of pump station area as well as 21.7 acres of major circulation roads. The acreages indicated are of the lot size not the actual imperious area used in the calculations. The actual impervious areas were measured and calculated based on the most current TM and Site Plans. The 416-acre site area is within an approximately 964-acre sub-area basin that contributes to the overall 7,500-acre Horse Ranch Creek watershed at the lower end of the project site.

There are four Points of Compliance (POC) designated for this project where discharge from the project site leave the project boundary. They are identified as POC 1, POC 3, POC 4 & POC 5. There was previous discussion of a fifth POC (i.e. POC 2), however, that point of compliance was combined with POC 1. See the Pre and Post-development POC Exhibits in the Appendix of this report.

POC 1:

POC 1 is located at the existing Caltrans' rock-lined drainage channel along the westerly project boundary, just easterly of I-15, approximately 600 down stream of the existing 5'x8' box culvert. Under the predevelopment conditions, the runoff from the northerly portion of the project and the easterly upstream tributary area flows into a series of natural channels that convey the flow to an existing 5'x8' culvert located at the easterly side of I-15. The culvert discharges the runoff into the existing rock-lined drainage channel along the easterly side of I-15 and flows southerly to the point of compliance.

Under the proposed conditions, the tributary area has two components: one is routed through the on-site development via a proposed storm drain system that confluences with the on-site, post-development runoff and the other is a bypass system that convey the easterly upstream runoff from the undisturbed areas through the northerly neighborhood, without picking up any on-site post-development runoff, and discharges directly into the existing rock-lined drainage channel at POC 1 and confluences with the flow from the existing 5'x8' culvert.

POC 3:

POC 3 is located on the westerly side of the proposed Horse Ranch Creek Road, approximately 4,300 feet northerly of the intersection with the existing SR 76. The tributary area to POC 3 is the easterly off-site basin.

Under the pre-development conditions, the runoff from the easterly off-site basin drains into a natural drainage channel that crosses the project site and discharges the runoff onto the Horse Ranch Creek floodplain.

Under the post-development conditions, the runoff from the easterly off-site basin drains into the same natural channel and into a proposed culvert crossing the proposed Horse Ranch Creek Road and discharges onto the Horse Ranch Creek floodplain. No on-site, post-development runoff will enter this culvert.

POC 4:

Point of Compliance 4 (POC 4) is located at just upstream of the existing Pankey Road bridge. The tributary area is the drainage basin between the tributary areas of POCs 1 and 3 as well as the tributary area northerly and easterly of the bridge.

Under the existing conditions, the runoff from this tributary area sheet flows onto the Horse Ranch Creek floodplain and flows southerly to the bridge.

Under the proposed conditions, the tributary area has two components. One is northerly and upstream of the proposed detention basin located on the westerly side of the proposed Horse Rand Creek Road, approximately 2,100 feet northerly of the intersection with SR 76. The runoff from this area drains into a storm drain system that conveys the runoff into the detention basin. As the runoff exits the detention basin via an outlet structure, it is discharged onto the existing Horse Ranch Creek floodplain and concentrates at the upstream of the existing Pankey Road bridge. The discharge point of POC 4 is within the Horse Ranch Creek flow limits thus, no overland flows are anticipated.

POC 5:

Point of Compliance 5 (POC 5) is located at approximately 260 feet downstream of the existing Pankey Road bridge.

Under the existing conditions, the runoff from the tributary area to POC 5 sheet flows into Horse Ranch Creek and flows southerly to the existing SR 76 bridge.

Under the post-development conditions, the discharge from proposed multi-family site 4 (MF4), the pump station and portions of the proposed Pankey Place roadway enters the creek and confluences with the main flow in Horse Ranch Creek via an underground storm drain system. The detention/hydromodification mitigation basin will be maintained by the HOA. An outlet structure in the detention/hydromodification mitigation basin will regulate discharge from the basin such that both the duration and peak flow will not exceed those under the pre-development conditions as set forth in the San Diego Draft HMP.
The existing channel is capable of handling the anticipated 100-year peak discharge from the site, POC 4 and 5 specifically, the low intensity storm events analyzed in this report will not negatively affect down stream facilities, and the proposed rip rap energy dissipaters at the outlet points will reduce and eliminate the potential of erosion to down stream banks and streams.

METHOD OF ANALYSIS

Per County of San Diego requirements, hydrograph modification analysis is required for any project disturbing more than 50 acres. Hydrograph modification is caused by the increases in the frequency and duration of runoff as a result of watershed development. An increase in runoff is caused by additional imperious areas and more hydraulically efficient drainage facilities in developed watersheds. The increase can cause or accelerate erosion of existing downstream streambeds and/or banks.

San Diego Hydrology Model (SDHM) published by Clear Creek Solutions, Inc. was used in this hydro-modification analysis. The version of the software is V1.0, published 3-6-2009.

The purpose of the hydrograph modification analysis is to certify that the post-construction hydrologic characteristics of the project simulates the pre-development hydrologic characteristics at the identified points of compliance (POCs). For this project, the POCs were established at four confluence points where the runoff leaves the site.

Under the pre-development conditions, the entire project is vacant and covered with vegetation with a sole exception of a paved access road cut across the northerly portion of the site from existing Pankey Road to the easterly project boundary. The project site is at the lower end of the large Horse Ranch Creek watershed. The entire project site drains into existing Horse Ranch Creek that eventually discharges into San Luis Rey River south of the project via the existing Pankey Road bridge overpass and the SR 76 bridge overpass further south.

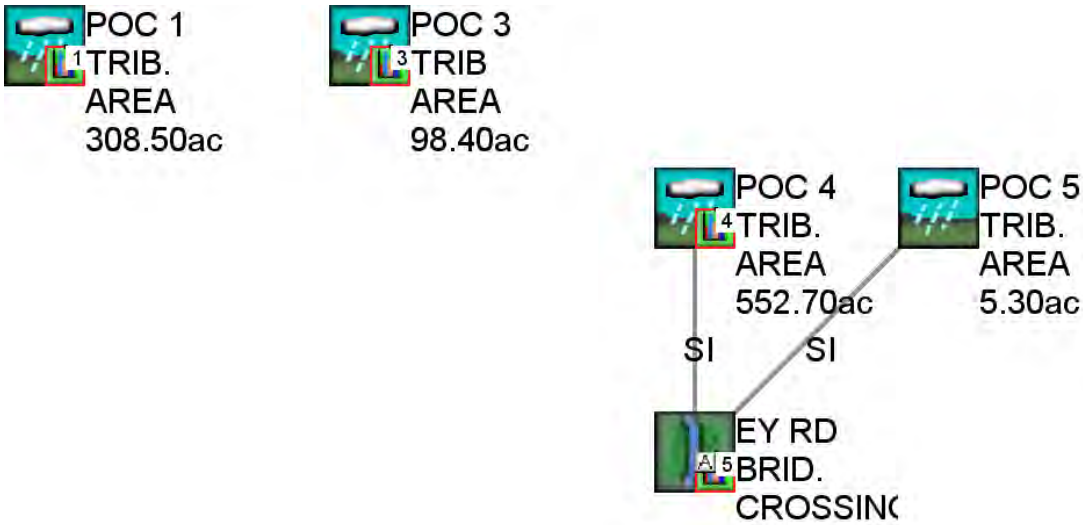
Under the post-development conditions, the disturbance area of the project site is approximately 257 acres, of which approximately 107 acres will be impervious areas such as roadways, roof areas, driveways and parking lots and sidewalks, the remaining will be landscaped pervious areas such as planted slopes, parkways, parks and ball fields. The impervious areas are calculated based on the proposed building and roadway footprint according to the most current Tentative Map and B-Designator Site Plans being processed with the DPLU as TM 5338.

The bulk of the project site and its immediate easterly upstream areas drain into a proposed detention basin located approximately 2,500 feet north of the intersection of Pala Drive (SR 76) and the proposed Horse Ranch Creek Road. The basin has a uniform 2 to 1 side slope and irregular bottom and top. The basin is simulated with a rectangular trapezoidal basin with equivalent depth and volume in the SDHM model. The total storage volume of the detention basin is approximately 15.8 ac-ft. The outlet structure is a riser with small orifices at various depths and a notched overflow inlet at the top – an exhibit of the proposed outlet structure is included on page 42 of this report.

The rainfall data used in the hydrograph modification analysis is based on the annual gauge data at the Lake Wohlford Station. The rainfall data was obtained from the www.projectcleanwater.org web site. The Lake Wohford Station data was used, based on the County of San Diego's average annual precipitation Isopluvial Maps in the San Diego County Hydrology Manual. The project site and the Lake Wohford Station are on the same rain curve - instead of the nearby Fallbrook Station, which is at a lower rain curve.

The infiltration rate of 0.05in/hr is obtained from the San Diego Draft HMP, Appendix C – Technical Memorandum. The soil type of the site ranges from Type “A” to Type “D” per the current Soil Hydrologic Groups map in the County of San Diego Hydrology Manual.

HYDROMODIFICATION CALCULATIONS
PRE-DEVELOPMENT WATERSHED SCHEMATICS:



and Use Report For 614-6-11-09 Predeveloped

Pervious Land Areas

	POC 1 TRIB	POC 3 TRIB	POC 4 TRIB	POC 5 TRIB
B-Shrub-Flat(0-5%)	1.9	3.6	139.9	
B-Shrub-Mod(5-10%)	13.6	5.3	87.2	
B-Shrub-Stee(10-20%)	35.4	4.7	54	
B-Shrub-Very S(>20%)	28.6	4.2	21.4	
C D-Shrub-Flat(0-5%)	2.7	2.2	23.7	3
C D-Shrub-Mod(5-10%)	13.2	2.8	9.4	.4
C D-Shrub-St(10-20%)	35.3	19.7	30.9	.1
C D-Shrub-Very(>20%)	176.6	55.9	186.2	.1

Impervious Land Areas

	POC 1 TRIB	POC 5 TRIB
Roads-Flat(0-5%)		1.7
Roads-Mod(5-10%)	1.2	

POST-DEVELOPMENT WATERSHED SCHEMATICS:

Land Use Report For 614-6-11-09 Developed Mitigated

Pervious Land Areas

	POC 1 TRIB	POC 3 TRIB	POC 4 TRIB	POC 4 TRIB	POC 5 TRIB
B-Shrub-Flat(0-5%)	.28	2.4	8.5	84.3	
B-Shrub-Mod(5-10%)	1	3.4	21.8	4	
B-Shrub-Stee(10-20%)	6.9	3.5	24.1	2.8	
B-Shrub-Very S(>20%)	16.7	4	13.4	3.6	
B-Grass-Flat(0-5%)	4.2		67.1		
B-Grass-Very S(>20%)	8.4		22.3	3	
C D-Shrub-Flat(0-5%)	1.74	2.4	3.7	2.8	14.2
C D-Shrub-Mod(5-10%)	2.55	2.8	2.9	2.6	3.4
C D-Shrub-St(10-20%)	20.1	19.8	22.5	2.9	3.7
C D-Shrub-Very(>20%)	160.9	55.9	153.6	24.5	15.2
C D-Grass-Flat(0-5%)	11.6		4		9.2
C D-Grass-Very(>20%)	1		5.5		

Impervious Land Areas

	POC 1 TRIB	POC 4 TRIB	POC 5 TRIB
Roads-Flat(0-5%)	1.5	25.3	5.2
Roads-Mod(5-10%)	3.6	12.8	1.9
Roads-Steep(10-20%)	1	.7	
Roof Area	5.8	21.3	2.7
Driveways-Flat(0-5%)	2.5	1.8	2.8
Driveways-Mod(5-10%)	1.5	1.8	
Sidewalks-Flat(0-5%)	3	4.6	
Sidewalks-Mod(5-10%)		2	

SAN DIEGO HYDROLOGY MODEL

San Diego Hydrology Model
PROJECT REPORT

Project Name: 614-6-11-09
Site Address:
City : BONSAL
Report Date : 7/2/2009
Gage : LAKE WOHLFORD
Data Start : 1959/10/01 00:00
Data End : 2004/10/31 23:00
Precip Scale: 1.00
SDHM Version:

Element Flows To:
Surface **Interflow** **Groundwater**
DETENTION BASIN, DETENTION BASIN,

Name : DETENTION BASIN
Bottom Length: 320ft.
Bottom Width: 205ft.
Depth : 10ft.
Volume at riser head : 15.8146ft.
Infiltration On
Infiltration rate : 0.05
Infiltration saftey factor : 0.25
Wetted surface area On
Side slope 1: 2 To 1
Side slope 2: 2 To 1
Side slope 3: 2 To 1
Side slope 4: 2 To 1
Discharge Structure
Riser Height: 9 ft.
Riser Diameter: 84 in.
NotchType : Rectangular
Notch Width : 4.000 ft.
Notch Height: 2.000 ft.
Orifice 1 Diameter: 18 in. **Elevation:** 0 ft.
Orifice 1 Diameter: 27 in. **Elevation:** 5 ft.

Element Flows To:
Outlet 1 **Outlet 2**
PANKEY RD BRID CROSSING,

Pond Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	1.506	0.000	0.000	0.000
0.111	1.511	0.168	2.837	0.019
0.222	1.517	0.336	4.011	0.019
0.333	1.522	0.505	4.913	0.019

0.444	1.527	0.674	5.673	0.019
0.556	1.533	0.844	6.343	0.019
0.667	1.538	1.015	6.948	0.019
0.778	1.544	1.186	7.505	0.020
0.889	1.549	1.358	8.023	0.020
1.000	1.555	1.530	8.510	0.020
1.111	1.560	1.703	8.970	0.020
1.222	1.565	1.877	9.408	0.020
1.333	1.571	2.051	9.826	0.020
1.444	1.576	2.226	10.23	0.020
1.556	1.582	2.401	10.61	0.020
1.667	1.587	2.577	10.99	0.020
1.778	1.593	2.754	11.35	0.020
1.889	1.598	2.931	11.70	0.020
2.000	1.604	3.109	12.03	0.020
2.111	1.609	3.288	12.36	0.020
2.222	1.615	3.467	12.69	0.021
2.333	1.620	3.647	13.00	0.021
2.444	1.626	3.827	13.30	0.021
2.556	1.632	4.008	13.60	0.021
2.667	1.637	4.190	13.90	0.021
2.778	1.643	4.372	14.18	0.021
2.889	1.648	4.555	14.46	0.021
3.000	1.654	4.738	14.74	0.021
3.111	1.660	4.922	15.01	0.021
3.222	1.665	5.107	15.28	0.021
3.333	1.671	5.292	15.54	0.021
3.444	1.676	5.478	15.79	0.021
3.556	1.682	5.665	16.05	0.021
3.667	1.688	5.852	16.29	0.022
3.778	1.693	6.040	16.54	0.022
3.889	1.699	6.228	16.78	0.022
4.000	1.705	6.417	17.02	0.022
4.111	1.710	6.607	17.25	0.022
4.222	1.716	6.797	17.49	0.022
4.333	1.722	6.988	17.71	0.022
4.444	1.727	7.180	17.94	0.022
4.556	1.733	7.372	18.16	0.022
4.667	1.739	7.565	18.38	0.022
4.778	1.745	7.759	18.60	0.022
4.889	1.750	7.953	18.82	0.022
5.000	1.756	8.148	19.03	0.023
5.111	1.762	8.343	25.62	0.023
5.222	1.768	8.539	28.47	0.023
5.333	1.774	8.736	30.71	0.023
5.444	1.779	8.933	32.62	0.023
5.556	1.785	9.131	34.33	0.023
5.667	1.791	9.330	35.89	0.023
5.778	1.797	9.529	37.34	0.023
5.889	1.803	9.729	38.70	0.023
6.000	1.808	9.930	39.99	0.023
6.111	1.814	10.13	41.22	0.023
6.222	1.820	10.33	42.39	0.023
6.333	1.826	10.54	43.52	0.023
6.444	1.832	10.74	44.61	0.024
6.556	1.838	10.94	45.67	0.024
6.667	1.844	11.15	46.69	0.024

6.778	1.850	11.35	47.68	0.024
6.889	1.856	11.56	48.65	0.024
7.000	1.861	11.76	49.59	0.024
7.111	1.867	11.97	50.99	0.024
7.222	1.873	12.18	52.74	0.024
7.333	1.879	12.39	54.68	0.024
7.444	1.885	12.60	56.75	0.024
7.556	1.891	12.81	58.90	0.024
7.667	1.897	13.02	61.11	0.024
7.778	1.903	13.23	63.36	0.025
7.889	1.909	13.44	65.62	0.025
8.000	1.915	13.65	67.89	0.025
8.111	1.921	13.87	70.49	0.025
8.222	1.927	14.08	73.17	0.025
8.333	1.933	14.29	75.93	0.025
8.444	1.939	14.51	78.76	0.025
8.556	1.945	14.73	81.67	0.025
8.667	1.951	14.94	84.64	0.025
8.778	1.957	15.16	87.68	0.025
8.889	1.964	15.38	90.79	0.025
9.000	1.970	15.60	93.96	0.026
9.111	1.976	15.81	97.17	0.026
9.222	1.982	16.03	102.5	0.026
9.333	1.988	16.26	109.1	0.026
9.444	1.994	16.48	116.9	0.026
9.556	2.000	16.70	125.5	0.026
9.667	2.006	16.92	135.1	0.026
9.778	2.012	17.14	145.4	0.026
9.889	2.019	17.37	156.4	0.026
10.00	2.025	17.59	168.0	0.026
10.11	2.031	17.82	180.3	0.026

Name : PANKEY RD BRID. CROSSING
Bottom Length: 220ft.
Bottom Width : 20ft.
Manning's n : 0.06
Channel bottom slope 1: 1 To 1
Channel Left side slope 0: 2 To 1
Channel right side slope 2: 2 To 1
Infiltration On
Infiltration rate : 0.05
Infiltration saftey factor : 0.25
Discharge Structure
Riser Height: 0 ft.
Riser Diameter: 0 in.

Element Flows To:
Outlet 1 **Outlet 2**

Channel Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	0.101	0.000	0.000	0.000
0.111	0.103	0.011	12.78	0.001
0.222	0.106	0.023	40.67	0.001
0.333	0.108	0.035	80.13	0.001
0.444	0.110	0.047	129.8	0.001
0.556	0.113	0.059	188.7	0.001
0.667	0.115	0.072	256.5	0.001
0.778	0.118	0.085	332.6	0.001
0.889	0.120	0.098	416.8	0.001
1.000	0.122	0.112	508.9	0.001
1.111	0.125	0.125	608.6	0.001
1.222	0.127	0.139	715.9	0.001
1.333	0.129	0.154	830.5	0.001
1.444	0.132	0.168	952.5	0.001
1.556	0.134	0.183	1081.	0.001
1.667	0.137	0.198	1218.	0.001
1.778	0.139	0.213	1361.	0.001
1.889	0.142	0.229	1512.	0.001
2.000	0.144	0.245	1670.	0.001
2.111	0.146	0.261	1834.	0.001
2.222	0.149	0.277	2006.	0.001
2.333	0.151	0.294	2185.	0.001
2.444	0.154	0.311	2371.	0.001
2.556	0.156	0.328	2564.	0.001
2.667	0.159	0.346	2765.	0.001
2.778	0.161	0.363	2972.	0.001
2.889	0.164	0.381	3186.	0.001
3.000	0.166	0.400	3408.	0.001
3.111	0.168	0.418	3637.	0.001
3.222	0.171	0.437	3873.	0.001
3.333	0.173	0.456	4116.	0.001
3.444	0.176	0.476	4366.	0.001
3.556	0.178	0.495	4624.	0.001
3.667	0.181	0.515	4889.	0.001
3.778	0.183	0.536	5161.	0.001
3.889	0.186	0.556	5441.	0.001
4.000	0.188	0.577	5728.	0.001
4.111	0.191	0.598	6023.	0.001
4.222	0.193	0.619	6325.	0.001
4.333	0.196	0.641	6635.	0.001
4.444	0.199	0.663	6952.	0.001
4.556	0.201	0.685	7277.	0.001
4.667	0.204	0.708	7609.	0.001
4.778	0.206	0.730	7950.	0.001
4.889	0.209	0.753	8298.	0.001
5.000	0.211	0.777	8653.	0.001
5.111	0.214	0.800	9017.	0.001
5.222	0.216	0.824	9388.	0.001
5.333	0.219	0.848	9768.	0.001
5.444	0.221	0.873	10155	0.001
5.556	0.224	0.898	10551	0.001
5.667	0.227	0.923	10954	0.001
5.778	0.229	0.948	11365	0.001
5.889	0.232	0.974	11785	0.001
6.000	0.234	0.999	12213	0.001
6.111	0.237	1.026	12649	0.001

6.222	0.240	1.052	13093	0.001
6.333	0.242	1.079	13546	0.001
6.444	0.245	1.106	14007	0.001
6.556	0.247	1.133	14476	0.001
6.667	0.250	1.161	14954	0.001
6.778	0.253	1.189	15441	0.001
6.889	0.255	1.217	15936	0.001
7.000	0.258	1.246	16439	0.001
7.111	0.260	1.274	16951	0.001
7.222	0.263	1.303	17472	0.001
7.333	0.266	1.333	18002	0.001
7.444	0.268	1.362	18540	0.001
7.556	0.271	1.392	19087	0.001
7.667	0.274	1.423	19643	0.001
7.778	0.276	1.453	20208	0.001
7.889	0.279	1.484	20782	0.001
8.000	0.282	1.515	21365	0.001
8.111	0.284	1.547	21957	0.001
8.222	0.287	1.578	22558	0.001
8.333	0.290	1.611	23169	0.001
8.444	0.292	1.643	23788	0.001
8.556	0.295	1.676	24417	0.001
8.667	0.298	1.708	25055	0.001
8.778	0.301	1.742	25702	0.001
8.889	0.303	1.775	26359	0.001
9.000	0.306	1.809	27025	0.001
9.111	0.309	1.843	27701	0.001
9.222	0.311	1.878	28386	0.001
9.333	0.314	1.912	29081	0.001
9.444	0.317	1.947	29785	0.001
9.556	0.320	1.983	30499	0.001
9.667	0.322	2.019	31223	0.001
9.778	0.325	2.054	31956	0.001
9.889	0.328	2.091	32700	0.001
10.00	0.331	2.127	33453	0.001
10.11	0.333	2.164	34216	0.001

ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	33.3243
5 year	112.871391
10 year	177.275217
25 year	210.86713

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	32.1021
5 year	97.767161
10 year	151.816696
25 year	178.414304

Yearly Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1961	53.134	50.532
1962	1.246	10.245
1963	55.530	55.062
1964	47.082	44.297
1965	0.914	8.998
1966	26.364	26.950
1967	92.908	81.239
1968	165.839	138.472
1969	17.041	18.279
1970	136.975	115.916
1971	39.834	40.036
1972	29.552	29.248
1973	32.648	30.986
1974	41.218	39.680
1975	36.304	34.014
1976	21.078	24.122
1977	33.324	31.345
1978	3.314	12.877
1979	210.879	178.187
1980	100.723	86.122
1981	196.666	164.988
1982	23.353	24.088
1983	128.508	111.800
1984	95.409	89.230
1985	1.187	7.944
1986	82.308	76.141
1987	114.799	99.451
1988	9.466	10.999
1989	1.506	22.240
1990	0.460	6.631
1991	0.101	1.517
1992	105.932	91.704
1993	75.861	67.999
1994	192.495	172.018
1995	48.715	48.991
1996	210.866	180.801
1997	15.343	20.966
1998	9.547	12.706

1999	169.158	144.792
2000	0.489	4.871
2001	0.403	5.894
2002	0.321	4.532
2003	0.466	7.107
2004	30.014	32.102
2005	7.056	11.510

Ranked Yearly Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	210.8790	180.8010
2	210.8660	178.1870
3	196.6660	172.0180
4	192.4950	164.9880
5	169.1580	144.7920
6	165.8390	138.4720
7	136.9750	115.9160
8	128.5080	111.8000
9	114.7990	99.4514
10	105.9320	91.7039
11	100.7230	89.2297
12	95.4092	86.1218
13	92.9075	81.2385
14	82.3084	76.1411
15	75.8611	67.9989
16	55.5296	55.0618
17	53.1340	50.5319
18	48.7154	48.9909
19	47.0819	44.2971
20	41.2179	40.0358
21	39.8342	39.6803
22	36.3043	34.0135
23	33.3243	32.1021
24	32.6482	31.3451
25	30.0141	30.9864
26	29.5523	29.2479
27	26.3644	26.9504
28	23.3532	24.1219
29	21.0782	24.0877
30	17.0408	22.2399
31	15.3430	20.9662
32	9.5467	18.2790
33	9.4662	12.8765
34	7.0558	12.7057
35	3.3142	11.5100
36	1.5060	10.9991
37	1.2456	10.2450
38	1.1870	8.9978
39	0.9138	7.9435
40	0.4888	7.1071
41	0.4664	6.6310
42	0.4599	5.8935
43	0.4031	4.8709
44	0.3206	4.5315
45	0.1009	1.5172

POC #1
The Facility PASSED

The Facility PASSED.

Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
22.5743	485	453	93	Pass
24.1369	451	416	92	Pass
25.6995	415	389	93	Pass
27.2622	389	359	92	Pass
28.8248	362	335	92	Pass
30.3875	337	318	94	Pass
31.9501	318	288	90	Pass
33.5127	295	269	91	Pass
35.0754	281	253	90	Pass
36.6380	264	237	89	Pass
38.2006	252	226	89	Pass
39.7633	240	206	85	Pass
41.3259	228	187	82	Pass
42.8885	218	174	79	Pass
44.4512	209	163	77	Pass
46.0138	189	150	79	Pass
47.5765	174	144	82	Pass
49.1391	164	135	82	Pass
50.7017	158	128	81	Pass
52.2644	151	120	79	Pass
53.8270	140	116	82	Pass
55.3896	131	106	80	Pass
56.9523	126	97	76	Pass
58.5149	123	91	73	Pass
60.0775	118	86	72	Pass
61.6402	110	81	73	Pass
63.2028	101	75	74	Pass
64.7654	95	72	75	Pass
66.3281	90	67	74	Pass
67.8907	86	66	76	Pass
69.4534	81	63	77	Pass
71.0160	77	60	77	Pass
72.5786	73	55	75	Pass
74.1413	70	53	75	Pass
75.7039	67	47	70	Pass
77.2665	65	45	69	Pass
78.8292	61	45	73	Pass
80.3918	60	44	73	Pass
81.9544	57	41	71	Pass
83.5171	52	38	73	Pass
85.0797	50	37	74	Pass
86.6423	49	35	71	Pass
88.2050	46	33	71	Pass
89.7676	45	31	68	Pass
91.3303	45	29	64	Pass
92.8929	44	27	61	Pass
94.4555	41	25	60	Pass
96.0182	39	22	56	Pass
97.5808	37	22	59	Pass
99.1434	36	21	58	Pass

100.7061	35	19	54	Pass
102.2687	32	18	56	Pass
103.8313	30	18	60	Pass
105.3940	30	17	56	Pass
106.9566	26	17	65	Pass
108.5192	24	17	70	Pass
110.0819	23	15	65	Pass
111.6445	21	13	61	Pass
113.2072	20	12	60	Pass
114.7698	19	12	63	Pass
116.3324	18	11	61	Pass
117.8951	18	10	55	Pass
119.4577	18	10	55	Pass
121.0203	18	10	55	Pass
122.5830	18	9	50	Pass
124.1456	16	9	56	Pass
125.7082	16	9	56	Pass
127.2709	16	9	56	Pass
128.8335	14	9	64	Pass
130.3961	13	8	61	Pass
131.9588	12	7	58	Pass
133.5214	12	7	58	Pass
135.0841	11	6	54	Pass
136.6467	11	6	54	Pass
138.2093	10	6	60	Pass
139.7720	10	5	50	Pass
141.3346	10	5	50	Pass
142.8972	9	5	55	Pass
144.4599	9	5	55	Pass
146.0225	9	4	44	Pass
147.5851	9	4	44	Pass
149.1478	9	4	44	Pass
150.7104	9	4	44	Pass
152.2730	8	4	50	Pass
153.8357	8	4	50	Pass
155.3983	7	4	57	Pass
156.9610	7	4	57	Pass
158.5236	6	4	66	Pass
160.0862	6	4	66	Pass
161.6489	6	4	66	Pass
163.2115	6	4	66	Pass
164.7741	6	4	66	Pass
166.3368	5	3	60	Pass
167.8994	5	3	60	Pass
169.4620	4	3	75	Pass
171.0247	4	3	75	Pass
172.5873	4	2	50	Pass
174.1499	4	2	50	Pass
175.7126	4	2	50	Pass
177.2752	4	2	50	Pass

Drawdown Time Results
Pond: Trapezoidal Pond 1

Days	Stage(feet)	Percent of Total Run Time
1	10.00	0.0022

2	**10.00**	**0.0022**
3	**10.00**	**0.0022**
4	**10.00**	**0.0022**
5	**10.00**	**0.0022**

Maximum Stage: 10.87
Drawdown Time: 00 09:38:40

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	10.444
5 year	34.950291
10 year	55.11723
25 year	65.632013

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	10.3653
5 year	34.257717
10 year	53.669291
25 year	63.7806

Yearly Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1961	16.458	16.330
1962	0.174	0.171
1963	16.973	16.850
1964	14.615	14.492
1965	0.105	0.103
1966	7.956	7.919
1967	28.613	28.187
1968	51.737	50.212
1969	5.056	5.032
1970	42.850	41.795
1971	11.858	11.773
1972	9.093	9.047
1973	10.194	10.126
1974	12.817	12.706
1975	11.342	11.259
1976	6.501	6.460
1977	10.444	10.365
1978	0.725	0.717
1979	66.141	64.180
1980	31.427	30.681
1981	61.645	59.816
1982	7.022	6.988
1983	39.683	38.902
1984	28.813	28.511
1985	0.240	0.238
1986	25.197	24.937
1987	35.518	34.814
1988	2.787	2.775
1989	0.015	0.014
1990	0.053	0.052
1991	0.000	0.000
1992	32.907	32.257
1993	23.444	23.128
1994	59.769	58.167
1995	14.798	14.698
1996	65.584	63.743
1997	4.428	4.405
1998	2.770	2.757
1999	52.637	51.270
2000	0.065	0.065
2001	0.021	0.020
2002	0.014	0.014
2003	0.002	0.002
2004	9.118	9.078

2005	1.915	1.902

Ranked Yearly Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	66.1414	64.1796
2	65.5835	63.7426
3	61.6453	59.8163
4	59.7686	58.1674
5	52.6365	51.2703
6	51.7365	50.2120
7	42.8503	41.7948
8	39.6832	38.9020
9	35.5179	34.8135
10	32.9069	32.2569
11	31.4267	30.6813
12	28.8127	28.5114
13	28.6130	28.1872
14	25.1973	24.9372
15	23.4443	23.1277
16	16.9729	16.8499
17	16.4582	16.3301
18	14.7980	14.6981
19	14.6154	14.4921
20	12.8171	12.7056
21	11.8576	11.7733
22	11.3422	11.2591
23	10.4440	10.3653
24	10.1936	10.1263
25	9.1184	9.0781
26	9.0935	9.0470
27	7.9564	7.9189
28	7.0221	6.9878
29	6.5005	6.4597
30	5.0558	5.0317
31	4.4277	4.4052
32	2.7870	2.7754
33	2.7704	2.7572
34	1.9147	1.9024
35	0.7252	0.7170
36	0.2398	0.2385
37	0.1740	0.1715
38	0.1049	0.1035
39	0.0653	0.0647
40	0.0532	0.0516
41	0.0208	0.0205
42	0.0152	0.0144
43	0.0139	0.0136
44	0.0017	0.0015
45	0.0000	0.0000

POC #3

The Facility PASSED

The Facility PASSED.

Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
6.9901	492	486	98	Pass
7.4762	457	450	98	Pass
7.9623	420	412	98	Pass
8.4485	393	388	98	Pass
8.9346	366	355	96	Pass
9.4207	333	332	99	Pass
9.9069	319	314	98	Pass
10.3930	298	293	98	Pass
10.8791	283	276	97	Pass

11.3653	268	264	98	Pass
11.8514	252	245	97	Pass
12.3375	242	237	97	Pass
12.8237	228	226	99	Pass
13.3098	220	215	97	Pass
13.7959	208	205	98	Pass
14.2821	191	182	95	Pass
14.7682	176	171	97	Pass
15.2543	165	161	97	Pass
15.7405	160	156	97	Pass
16.2266	151	149	98	Pass
16.7127	142	137	96	Pass
17.1989	131	128	97	Pass
17.6850	126	125	99	Pass
18.1711	122	120	98	Pass
18.6573	119	115	96	Pass
19.1434	112	104	92	Pass
19.6295	101	96	95	Pass
20.1157	94	91	96	Pass
20.6018	91	87	95	Pass
21.0879	87	82	94	Pass
21.5740	82	79	96	Pass
22.0602	77	74	96	Pass
22.5463	73	70	95	Pass
23.0324	70	67	95	Pass
23.5186	66	65	98	Pass
24.0047	65	62	95	Pass
24.4908	62	60	96	Pass
24.9770	60	56	93	Pass
25.4631	55	52	94	Pass
25.9492	51	50	98	Pass
26.4354	50	48	96	Pass
26.9215	49	46	93	Pass
27.4076	46	45	97	Pass
27.8938	45	45	100	Pass
28.3799	45	43	95	Pass
28.8660	42	40	95	Pass
29.3522	39	37	94	Pass
29.8383	38	36	94	Pass
30.3244	37	35	94	Pass
30.8106	36	33	91	Pass
31.2967	35	31	88	Pass
31.7828	31	29	93	Pass
32.2690	29	26	89	Pass
32.7551	27	25	92	Pass
33.2412	26	23	88	Pass
33.7274	24	23	95	Pass
34.2135	23	20	86	Pass
34.6996	22	19	86	Pass
35.1858	20	18	90	Pass
35.6719	18	18	100	Pass
36.1580	18	18	100	Pass
36.6442	18	18	100	Pass
37.1303	18	18	100	Pass
37.6164	18	17	94	Pass
38.1026	18	16	88	Pass
38.5887	16	16	100	Pass

39.0748	16	15	93	Pass
39.5610	16	13	81	Pass
40.0471	14	12	85	Pass
40.5332	12	11	91	Pass
41.0194	12	11	91	Pass
41.5055	11	11	100	Pass
41.9916	11	10	90	Pass
42.4778	11	10	90	Pass
42.9639	10	9	90	Pass
43.4500	10	9	90	Pass
43.9362	10	9	90	Pass
44.4223	9	9	100	Pass
44.9084	9	9	100	Pass
45.3946	9	9	100	Pass
45.8807	9	8	88	Pass
46.3668	9	8	88	Pass
46.8530	8	8	100	Pass
47.3391	8	7	87	Pass
47.8252	8	7	87	Pass
48.3114	7	6	85	Pass
48.7975	7	6	85	Pass
49.2836	7	6	85	Pass
49.7698	6	6	100	Pass
50.2559	6	5	83	Pass
50.7420	6	5	83	Pass
51.2282	6	5	83	Pass
51.7143	6	4	66	Pass
52.2004	5	4	80	Pass
52.6866	4	4	100	Pass
53.1727	4	4	100	Pass
53.6588	4	4	100	Pass
54.1450	4	4	100	Pass
54.6311	4	4	100	Pass
55.1172	4	4	100	Pass

Drawdown Time Results
Pond: Trapezoidal Pond 1

Days	Stage(feet)	Percent of Total Run Time
1	10.00	0.0022
2	10.00	0.0022
3	10.00	0.0022
4	10.00	0.0022
5	10.00	0.0022

Maximum Stage: 10.87
Drawdown Time: 00 09:38:40

Flow Frequency Return Periods for Predeveloped. POC #4

Return Period	Flow(cfs)
2 year	34.2587
5 year	136.767348
10 year	245.496826
25 year	294.405783

Flow Frequency Return Periods for Mitigated. POC #4

Return Period	Flow(cfs)
2 year	22.0492

5 year	108.627717
10 year	178.761565
25 year	230.44213

Yearly Peaks for Predeveloped and Mitigated. POC #4

Year	Predeveloped	Mitigated
1961	54.478	42.673
1962	0.652	12.727
1963	56.802	22.049
1964	48.584	39.197
1965	0.388	11.847
1966	26.563	18.689
1967	100.712	98.939
1968	235.229	225.223
1969	17.141	15.782
1970	181.526	191.852
1971	40.390	36.903
1972	29.855	17.973
1973	33.314	24.806
1974	43.656	20.233
1975	37.187	35.927
1976	21.449	19.103
1977	34.259	36.157
1978	2.669	13.695
1979	306.573	207.137
1980	131.869	111.319
1981	283.593	285.243
1982	23.531	17.357
1983	152.751	90.346
1984	98.841	65.358
1985	0.847	10.144
1986	85.418	32.788
1987	138.128	144.463
1988	9.543	13.250
1989	0.082	16.071
1990	0.236	12.124
1991	0.000	3.121
1992	128.998	92.143
1993	83.554	60.795
1994	264.749	171.780
1995	49.598	22.078
1996	293.247	158.786
1997	15.145	13.510
1998	9.498	15.661
1999	228.086	143.704
2000	0.233	7.694
2001	0.079	10.722
2002	0.063	10.434
2003	0.012	8.696
2004	30.394	14.347
2005	6.764	14.456

Ranked Yearly Peaks for Predeveloped and Mitigated. POC #4

Rank	Predeveloped	Mitigated
1	306.5730	285.2430
2	293.2470	225.2230
3	283.5930	207.1370
4	264.7490	191.8520
5	235.2290	171.7800
6	228.0860	158.7860
7	181.5260	144.4630
8	152.7510	143.7040
9	138.1280	111.3190
10	131.8690	98.9391
11	128.9980	92.1432
12	100.7120	90.3459
13	98.8413	65.3582
14	85.4180	60.7951
15	83.5536	42.6730

16	56.8021	39.1966
17	54.4775	36.9031
18	49.5982	36.1568
19	48.5844	35.9271
20	43.6560	32.7882
21	40.3902	24.8063
22	37.1870	22.0784
23	34.2587	22.0492
24	33.3136	20.2333
25	30.3939	19.1032
26	29.8553	18.6892
27	26.5631	17.9728
28	23.5313	17.3574
29	21.4494	16.0705
30	17.1410	15.7822
31	15.1451	15.6606
32	9.5432	14.4558
33	9.4977	14.3469
34	6.7636	13.6950
35	2.6693	13.5102
36	0.8468	13.2495
37	0.6517	12.7269
38	0.3882	12.1239
39	0.2359	11.8466
40	0.2326	10.7221
41	0.0817	10.4337
42	0.0790	10.1442
43	0.0632	8.6960
44	0.0121	7.6940
45	0.0000	3.1208

POC #4

The Facility PASSED

The Facility PASSED.

Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
27.3535	452	424	93	Pass
29.5569	407	389	95	Pass
31.7604	361	362	100	Pass
33.9639	335	334	99	Pass
36.1673	306	315	102	Pass
38.3708	286	292	102	Pass
40.5743	268	266	99	Pass
42.7777	262	240	91	Pass
44.9812	247	228	92	Pass
47.1847	230	215	93	Pass
49.3882	217	202	93	Pass
51.5916	204	186	91	Pass
53.7951	185	171	92	Pass
55.9986	170	159	93	Pass
58.2020	160	148	92	Pass
60.4055	153	132	86	Pass
62.6090	144	121	84	Pass
64.8124	136	117	86	Pass
67.0159	126	108	85	Pass
69.2194	120	102	85	Pass
71.4228	112	93	83	Pass
73.6263	106	89	83	Pass
75.8298	98	78	79	Pass
78.0332	94	74	78	Pass
80.2367	91	72	79	Pass

82.4402	84	69	82	Pass
84.6436	78	66	84	Pass
86.8471	73	63	86	Pass
89.0506	72	63	87	Pass
91.2540	68	57	83	Pass
93.4575	61	55	90	Pass
95.6610	59	52	88	Pass
97.8645	58	50	86	Pass
100.0679	54	46	85	Pass
102.2714	50	43	86	Pass
104.4749	46	40	86	Pass
106.6783	45	40	88	Pass
108.8818	44	39	88	Pass
111.0853	41	38	92	Pass
113.2887	41	37	90	Pass
115.4922	40	35	87	Pass
117.6957	38	34	89	Pass
119.8991	37	33	89	Pass
122.1026	36	31	86	Pass
124.3061	36	27	75	Pass
126.5095	36	25	69	Pass
128.7130	36	23	63	Pass
130.9165	33	23	69	Pass
133.1199	29	23	79	Pass
135.3234	28	23	82	Pass
137.5269	27	20	74	Pass
139.7304	26	20	76	Pass
141.9338	25	19	76	Pass
144.1373	23	17	73	Pass
146.3408	22	16	72	Pass
148.5442	21	16	76	Pass
150.7477	19	16	84	Pass
152.9512	16	15	93	Pass
155.1546	16	15	93	Pass
157.3581	15	14	93	Pass
159.5616	13	13	100	Pass
161.7650	13	13	100	Pass
163.9685	12	13	108	Pass
166.1720	11	12	109	Pass
168.3754	11	11	100	Pass
170.5789	11	10	90	Pass
172.7824	11	9	81	Pass
174.9858	11	8	72	Pass
177.1893	11	7	63	Pass
179.3928	11	7	63	Pass
181.5962	10	7	70	Pass
183.7997	9	7	77	Pass
186.0032	8	7	87	Pass
188.2067	8	7	87	Pass
190.4101	8	6	75	Pass
192.6136	8	5	62	Pass
194.8171	8	4	50	Pass
197.0205	8	4	50	Pass
199.2240	8	4	50	Pass
201.4275	8	4	50	Pass
203.6309	8	4	50	Pass
205.8344	7	4	57	Pass

208.0379	7	3	42	Pass
210.2413	7	2	28	Pass
212.4448	7	2	28	Pass
214.6483	7	2	28	Pass
216.8517	7	2	28	Pass
219.0552	7	2	28	Pass
221.2587	7	2	28	Pass
223.4621	7	2	28	Pass
225.6656	6	1	16	Pass
227.8691	6	1	16	Pass
230.0725	5	1	20	Pass
232.2760	5	1	20	Pass
234.4795	5	1	20	Pass
236.6830	4	1	25	Pass
238.8864	4	1	25	Pass
241.0899	4	1	25	Pass
243.2934	4	1	25	Pass
245.4968	4	1	25	Pass

Drawdown Time Results
Pond: Trapezoidal Pond 1

Days	Stage(feet)	Percent of Total Run Time
1	10.00	0.0022
2	10.00	0.0022
3	10.00	0.0022
4	10.00	0.0022
5	10.00	0.0022

Maximum Stage: 10.87
Drawdown Time: 00 09:38:40

Flow Frequency Return Periods for Predeveloped. POC #5

Return Period	Flow(cfs)
2 year	34.5535
5 year	138.159696
10 year	247.860087
25 year	296.148087

Flow Frequency Return Periods for Mitigated. POC #5

Return Period	Flow(cfs)
2 year	22.838
5 year	105.588957
10 year	166.838043
25 year	216.37987

Yearly Peaks for Predeveloped and Mitigated. POC #5

Year	Predeveloped	Mitigated
1961	55.095	42.784
1962	1.490	17.486
1963	57.036	22.838
1964	49.012	39.641
1965	1.151	15.996
1966	26.897	19.190
1967	101.631	98.097
1968	237.906	211.533
1969	17.199	17.473
1970	183.245	185.708
1971	40.850	38.007
1972	30.274	18.313
1973	33.475	24.825

1974	43.894	20.414
1975	37.443	36.286
1976	21.475	21.046
1977	34.554	36.737
1978	3.419	17.079
1979	309.085	183.130
1980	133.493	107.670
1981	286.916	267.272
1982	23.904	18.280
1983	153.823	91.351
1984	99.271	65.980
1985	1.338	11.981
1986	85.666	32.945
1987	139.456	142.501
1988	9.771	15.084
1989	2.014	21.806
1990	0.640	15.206
1991	0.130	3.464
1992	130.300	91.689
1993	84.183	60.627
1994	266.524	158.149
1995	50.101	23.318
1996	294.916	152.607
1997	15.541	14.873
1998	9.799	18.381
1999	229.739	131.677
2000	0.603	9.671
2001	0.552	13.187
2002	0.450	12.368
2003	0.632	9.713
2004	30.589	17.335
2005	7.161	16.781

Ranked Yearly Peaks for Predeveloped and Mitigated. POC #5

Rank	Predeveloped	Mitigated
1	309.0850	267.2720
2	294.9160	211.5330
3	286.9160	185.7080
4	266.5240	183.1300
5	237.9060	158.1490
6	229.7390	152.6070
7	183.2450	142.5010
8	153.8230	131.6770
9	139.4560	107.6700
10	133.4930	98.0972
11	130.3000	91.6891
12	101.6310	91.3505
13	99.2705	65.9796
14	85.6659	60.6268
15	84.1830	42.7841
16	57.0360	39.6411
17	55.0946	38.0070
18	50.1006	36.7372
19	49.0117	36.2855
20	43.8943	32.9448
21	40.8504	24.8248
22	37.4432	23.3180
23	34.5535	22.8380
24	33.4745	21.8058
25	30.5886	21.0461
26	30.2737	20.4140
27	26.8970	19.1900
28	23.9035	18.3807
29	21.4754	18.3125
30	17.1993	18.2795
31	15.5414	17.4863
32	9.7995	17.4729
33	9.7709	17.3352
34	7.1612	17.0788
35	3.4195	16.7811

36	2.0145	15.9961
37	1.4901	15.2062
38	1.3385	15.0836
39	1.1510	14.8725
40	0.6405	13.1868
41	0.6317	12.3679
42	0.6027	11.9814
43	0.5519	9.7128
44	0.4504	9.6711
45	0.1303	3.4643

POC #5

The Facility PASSED

The Facility PASSED.

Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
27.6319	454	413	90	Pass
29.8565	408	379	92	Pass
32.0810	362	348	96	Pass
34.3055	334	328	98	Pass
36.5300	305	303	99	Pass
38.7546	287	281	97	Pass
40.9791	269	245	91	Pass
43.2036	261	231	88	Pass
45.4282	247	221	89	Pass
47.6527	230	208	90	Pass
49.8772	217	188	86	Pass
52.1017	205	176	85	Pass
54.3263	185	157	84	Pass
56.5508	170	149	87	Pass
58.7753	160	135	84	Pass
60.9998	154	125	81	Pass
63.2244	143	117	81	Pass
65.4489	137	110	80	Pass
67.6734	127	103	81	Pass
69.8979	122	94	77	Pass
72.1225	111	88	79	Pass
74.3470	107	81	75	Pass
76.5715	97	73	75	Pass
78.7961	94	72	76	Pass
81.0206	90	72	80	Pass
83.2451	85	67	78	Pass
85.4696	79	63	79	Pass
87.6942	74	61	82	Pass
89.9187	72	58	80	Pass
92.1432	68	54	79	Pass
94.3677	62	53	85	Pass
96.5923	60	51	85	Pass
98.8168	58	46	79	Pass
101.0413	54	41	75	Pass
103.2658	49	39	79	Pass
105.4904	46	38	82	Pass
107.7149	44	36	81	Pass
109.9394	43	35	81	Pass
112.1640	41	35	85	Pass
114.3885	41	31	75	Pass
116.6130	41	31	75	Pass

118.8375	38	28	73	Pass
121.0621	37	27	72	Pass
123.2866	36	25	69	Pass
125.5111	36	24	66	Pass
127.7356	36	24	66	Pass
129.9602	36	23	63	Pass
132.1847	33	21	63	Pass
134.4092	31	21	67	Pass
136.6337	28	20	71	Pass
138.8583	27	19	70	Pass
141.0828	26	17	65	Pass
143.3073	24	16	66	Pass
145.5319	23	16	69	Pass
147.7564	22	15	68	Pass
149.9809	21	15	71	Pass
152.2054	19	15	78	Pass
154.4300	16	13	81	Pass
156.6545	16	13	81	Pass
158.8790	15	12	80	Pass
161.1035	13	12	92	Pass
163.3281	13	11	84	Pass
165.5526	12	10	83	Pass
167.7771	11	9	81	Pass
170.0017	11	8	72	Pass
172.2262	11	8	72	Pass
174.4507	11	7	63	Pass
176.6752	11	7	63	Pass
178.8998	11	7	63	Pass
181.1243	11	7	63	Pass
183.3488	10	6	60	Pass
185.5733	9	6	66	Pass
187.7979	8	4	50	Pass
190.0224	8	4	50	Pass
192.2469	8	3	37	Pass
194.4714	8	3	37	Pass
196.6960	8	3	37	Pass
198.9205	8	3	37	Pass
201.1450	8	3	37	Pass
203.3696	8	3	37	Pass
205.5941	8	2	25	Pass
207.8186	7	2	28	Pass
210.0431	7	2	28	Pass
212.2677	7	1	14	Pass
214.4922	7	1	14	Pass
216.7167	7	1	14	Pass
218.9412	7	1	14	Pass
221.1658	7	1	14	Pass
223.3903	7	1	14	Pass
225.6148	7	1	14	Pass
227.8393	6	1	16	Pass
230.0639	5	1	20	Pass
232.2884	5	1	20	Pass
234.5129	5	1	20	Pass
236.7375	5	1	20	Pass
238.9620	4	1	25	Pass
241.1865	4	1	25	Pass
243.4110	4	1	25	Pass

245.6356	4	1	25	Pass
247.8601	4	1	25	Pass

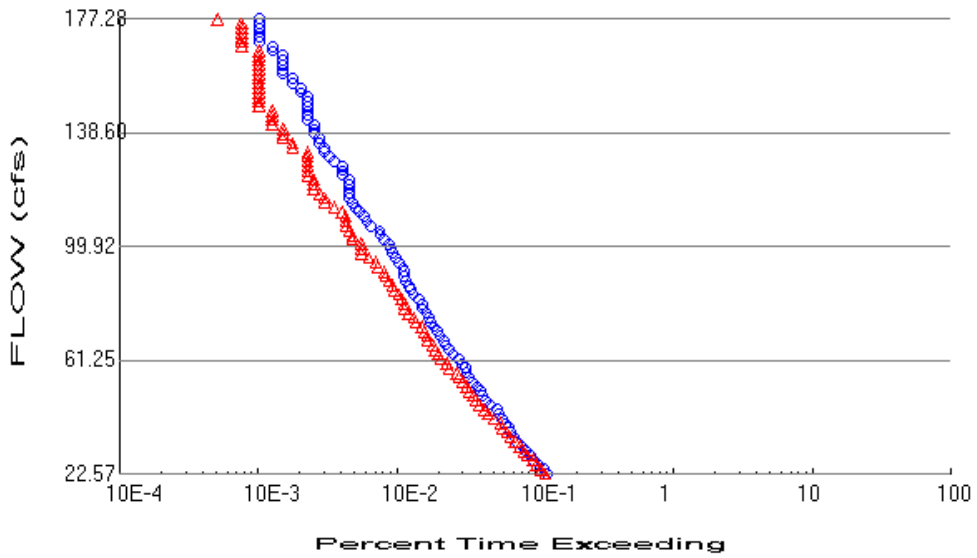
Drawdown Time Results
Pond: Trapezoidal Pond 1

Days	Stage(feet)	Percent of Total Run Time
1	10.00	0.0022
2	10.00	0.0022
3	10.00	0.0022
4	10.00	0.0022
5	10.00	0.0022

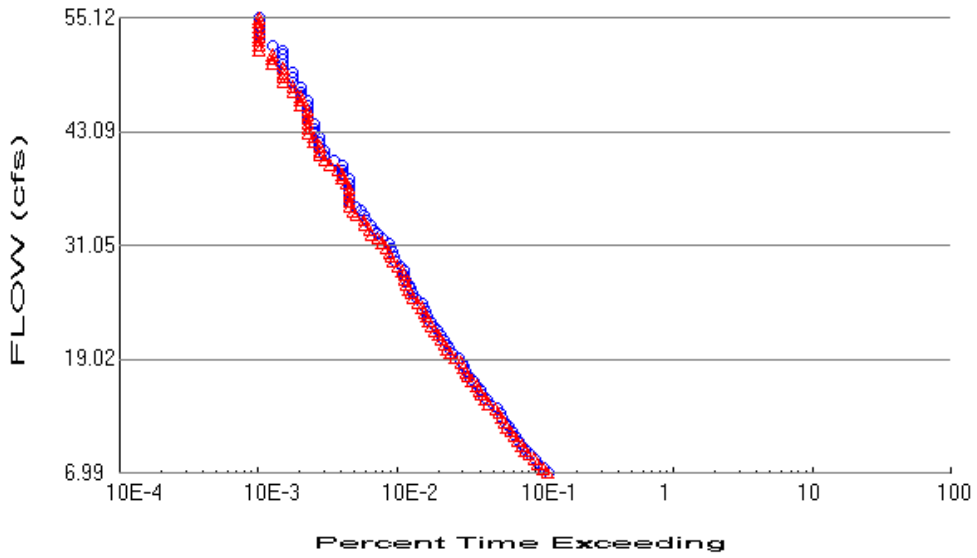
Maximum Stage: 10.87
Drawdown Time: 00 09:38:40

This program and accompanying documentation are provided 'as-is' without warranty of any kind. The entire risk regarding the performance and results of this program is assumed by End User. Clear Creek Solutions Inc. and the governmental licensee or sublicensees disclaim all warranties, either expressed or implied, including but not limited to implied warranties of program and accompanying documentation. In no event shall Clear Creek Solutions Inc. be liable for any damages whatsoever (including without limitation to damages for loss of business profits, loss of business information, business interruption, and the like) arising out of the use of, or inability to use this program even if Clear Creek Solutions Inc. or their authorized representatives have been advised of the possibility of such damages. Software Copyright © by Clear Creek Solutions, Inc. 2005-2007; All Rights Reserved.

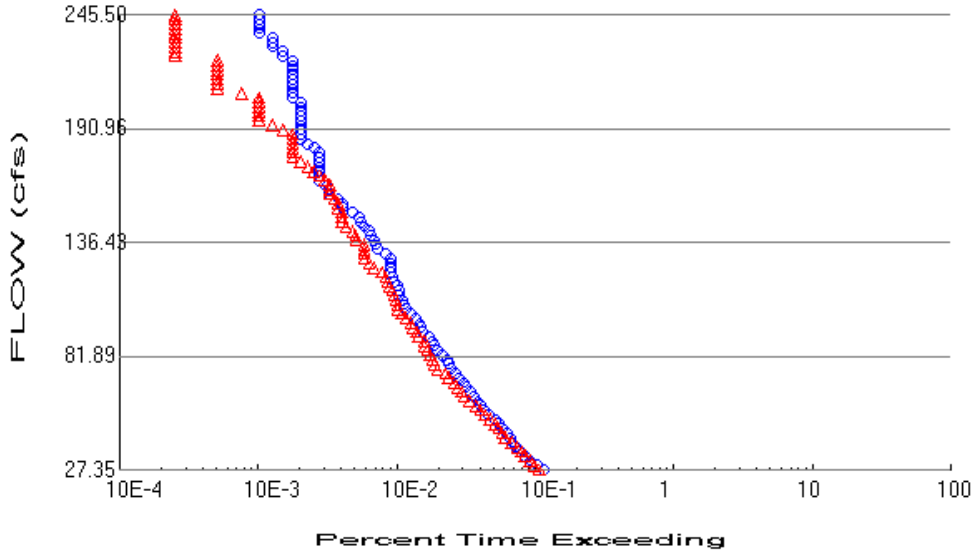
POC 1 DURATION



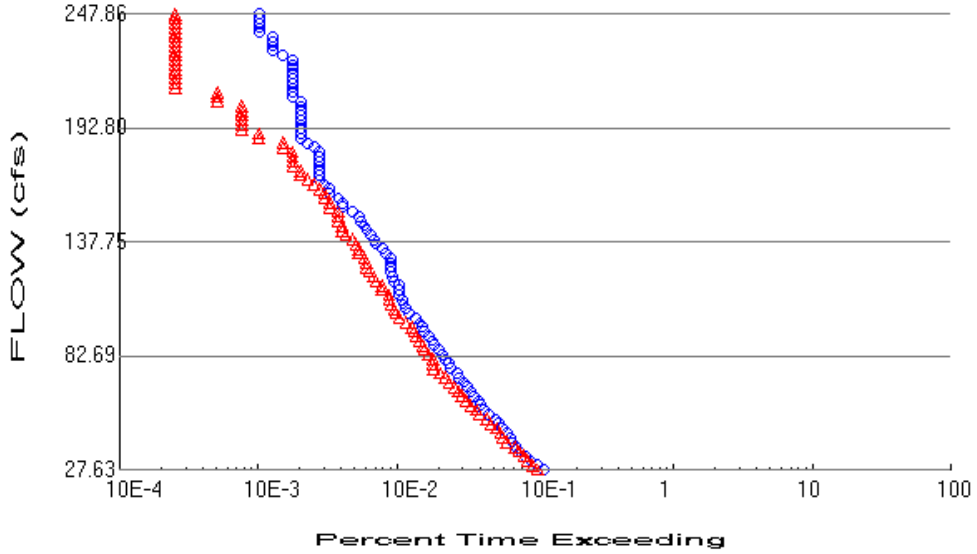
POC3 DURATION



POC4 DURATION



POC5 DURATION



Drawdown Time Results
Pond: Trapezoidal Pond 1

Days	Stage(feet)	Percent of Total Run Time
1	10.00	0.0022
2	10.00	0.0022
3	10.00	0.0022
4	10.00	0.0022
5	10.00	0.0022

Maximum Stage: 10.87
Drawdown Time: 00 09:38:40

SUMMARY

FLOW DATA AT POINTS OF COMPLIANCE (POC)

POC1

	PRE-DEVELOPMENT	POST-DEVELOPMENT
5-YEAR FLOW RATE Q5 (CFS)	112.9	98.6
10-YEAR FLOW RATE Q10 (CFS)	177.3	153.9
20% 5-YEAR FLOW RATE 0.2Q5 (CFS)	22.6	19.6

POC3

	PRE-DEVELOPMENT	POST-DEVELOPMENT
5-YEAR FLOW RATE Q5 (CFS)	34.9	34.2
10-YEAR FLOW RATE Q10 (CFS)	55.1	53.7
20% 5-YEAR FLOW RATE 0.2Q5 (CFS)	7.0	6.8

POC4

	PRE-DEVELOPMENT	POST-DEVELOPMENT
5-YEAR FLOW RATE Q5 (CFS)	136.8	108.6
10-YEAR FLOW RATE Q10 (CFS)	245.5	178.8
20% 5-YEAR FLOW RATE 0.2Q5 (CFS)	27.4	21.7

POC5

	PRE-DEVELOPMENT	POST-DEVELOPMENT
5-YEAR FLOW RATE Q5 (CFS)	112.9	99.6
10-YEAR FLOW RATE Q10 (CFS)	177.3	153.9
20% 5-YEAR FLOW RATE 0.2Q5 (CFS)	22.6	19.2

Based on the calculations presented in this report, The post-development discharge rates and durations do not exceed those of the pre-development conditions by more than 10% over more than 10% of the length of the flow duration curve. See pages 22 to 23 for POC1, pages 25-27 for POC 3, pages 29-31 for POC 4 and pages 33 – 35 for POC 5 for more detailed results.

In accordance with the San Diego Draft HMP Sections 5.0 and 7.0, and Minimum Criteria for Evaluation of Storm Water Controls to Meet Interim Hydromodification Criteria (IHC) prepared by Brown and Caldwell, dated 8-11-2008, the post-development flow rates from 20% of pre-development 5-year flow, 0.2Q5, to the pre-development 5-year flow, Q5, range do not exceed the pre-development conditions. And the post-development flow rates from the pre-development 5-year flow, Q5, to the pre-development 10-year flow, Q10, range do not exceed the pre-development conditions. See page 21 for POC1, page 25 for POC 3, pages 28-29 for POC 4 and pages 32-33 for POC 5 for more detailed results.

According to the drawdown analysis on page 38, the drawdown time is 9 hours and 39 minutes. The runoff will completely discharge from the basin in less than 3 days or 72 hours such that no vector control scenarios will occur.

PROPOSED MITIGATION MEASURE:

The proposed mitigation measure is the detention/hydromodification mitigation basin - it is a trapezoidal basin with a uniform 2 to 1 side slopes and irregular bottom and top. The maximum depth of the basin is 10 feet and the maximum volume is 15.8 ac-ft. The outlet structure is a 84-inch diameter riser pipe. An 18-inch diameter orifice will be installed in the riser at the bottom of the basin and a 27-inch diameter orifice will be installed 5' from the bottom of the basin. A rectangular notch will be cut into the riser, the bottom of the notch is 2' from the bottom of the basin and the width of the notch is 4'. See Basin Outlet Structure Detail on page 41 for more details.

Based on the post-development SDHM analysis from page 11 to 38, the proposed detention basin is adequate to mitigate the anticipated post-development runoff to satisfy the criteria set forth in Sections 5.0 and 7.0 of the San Diego Draft HMP. No damage to downstream facilities is anticipated due to hydromodification concerns.

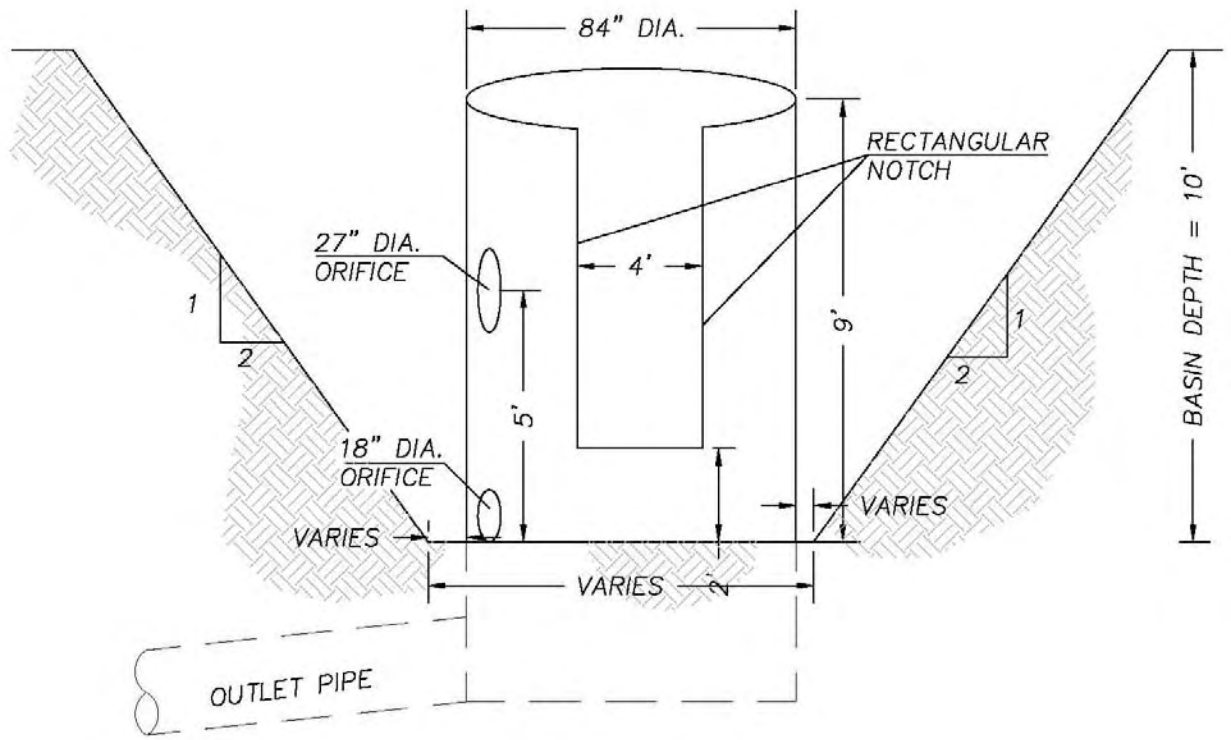
PERVIOUS/IMPERVIOUS LAND PARAMETERS SUMMARY

	TOTAL ROOF AREA[1]	DRIVEWAY/ HARDSCAPE AREA	STREET AREA	SIDEWALK AREA	2:1 SLOPE AREA	LANDSCAPE AREA	UNDISTURBED AREA	TOTAL AREA
	(AC)	(AC)	(AC)	(AC)	(AC)	(AC)	(AC)	(AC)
POC1:								
PRE-DEV	0	0	1.2	0	0	0	307.3	308.5
POST-DEV	5.8	4.0	6.1	3.0	8.4	4.2	222.8	254.3
POC3:								
PRE-DEV	0	0	0	0	0	0	98.4	98.4
POST-DEV	0	0	0	0	0	0	94.2	94.2
POC4:								
PRE-DEV	0	0	0	0	0	0	552.7	552.7
POST-DEV	21.3	6.6	38.8	6.6	25.3	67.1	384.5	550.2
POC5:								
PRE-DEV	0	0	1.7	0	0	0	3.6	5.3
POST-DEV	2.7	2.8	7.1	0	0	9.2	36.5	58.3

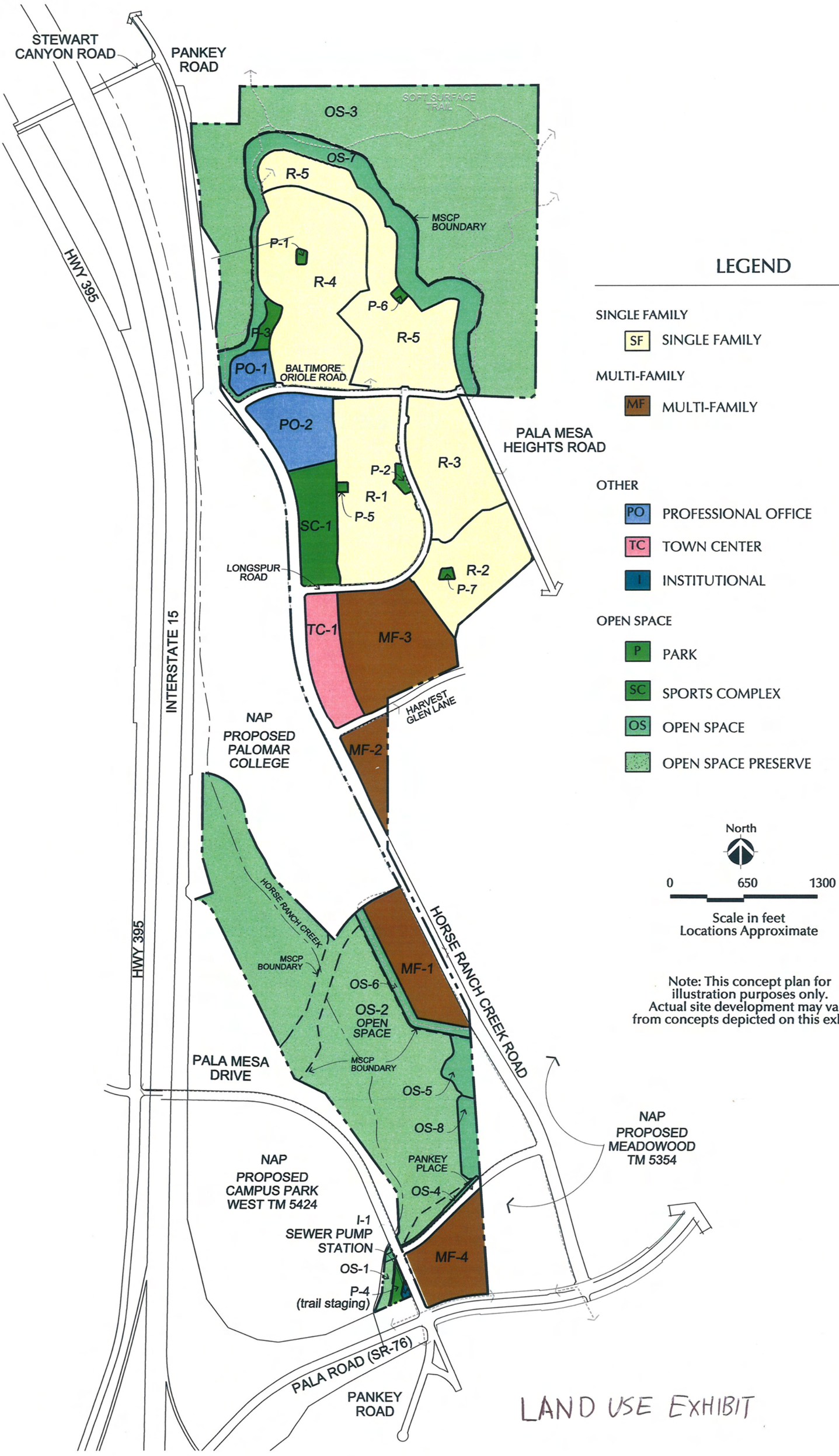
Footnotes:

[1] Roof Areas in POC1: SFR=5.8, MFR=0, Comm/Office=0; Roof Areas in POC3: SFR=0, MFR=0, Comm/Office=0; Roof Areas in POC4: SFR=8.3, MFR=9.7, Comm/Office=3.3; Roof Areas in POC5: SFR=0, MFR=2.7, Comm/Office=0

DETENTION/HYDROMODIFICATION MITIGATION BASIN OUTLET STRUCTURE DETAIL (NOT TO SCALE):

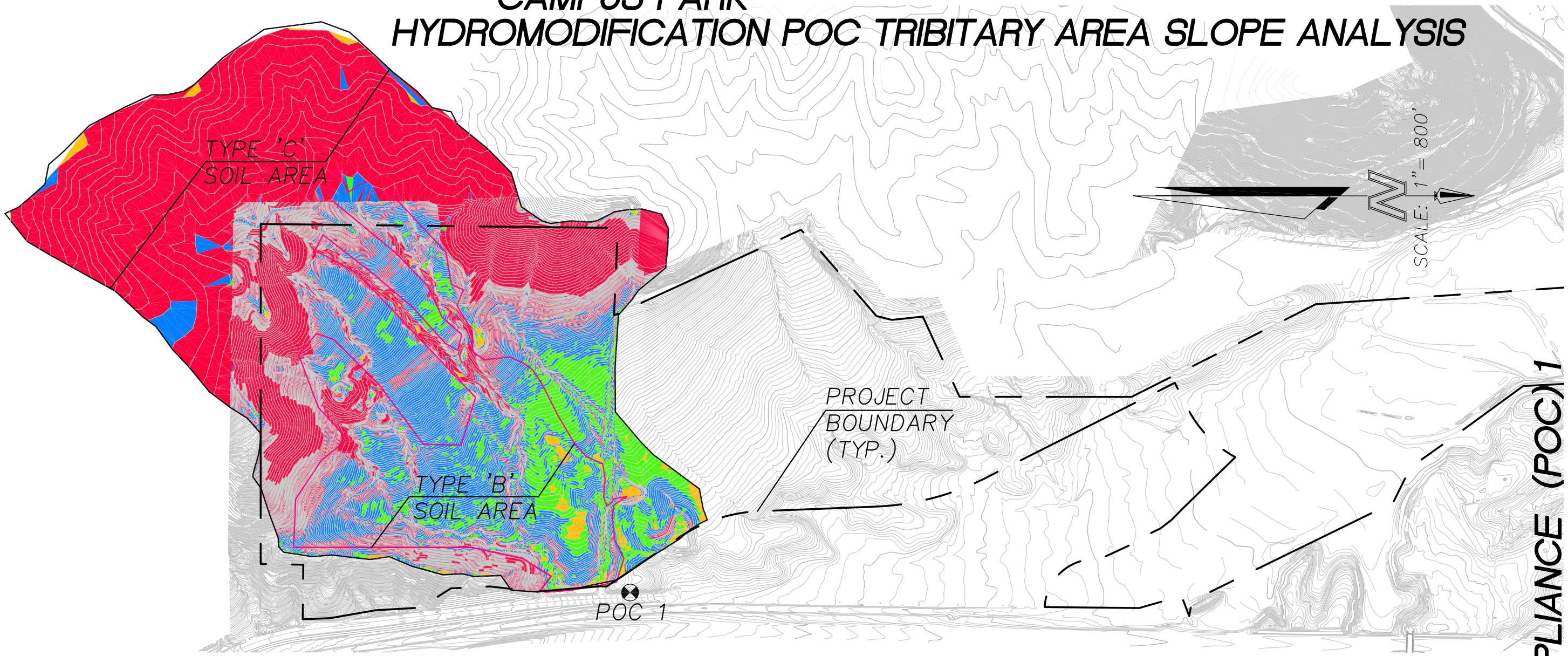


APPENDIX



LAND USE EXHIBIT

CAMPUS PARK
HYDROMODIFICATION POC TRIBITARY AREA SLOPE ANALYSIS



POC 1 OVERALL PRE DEV

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	4.6
	5.00	10.00	26.8
	10.00	20.00	70.7
	20.00	10000.00	205.2

POC 1 SOIL B

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	1.9
	5.00	10.00	13.6
	10.00	20.00	35.4
	20.00	10000.00	28.6

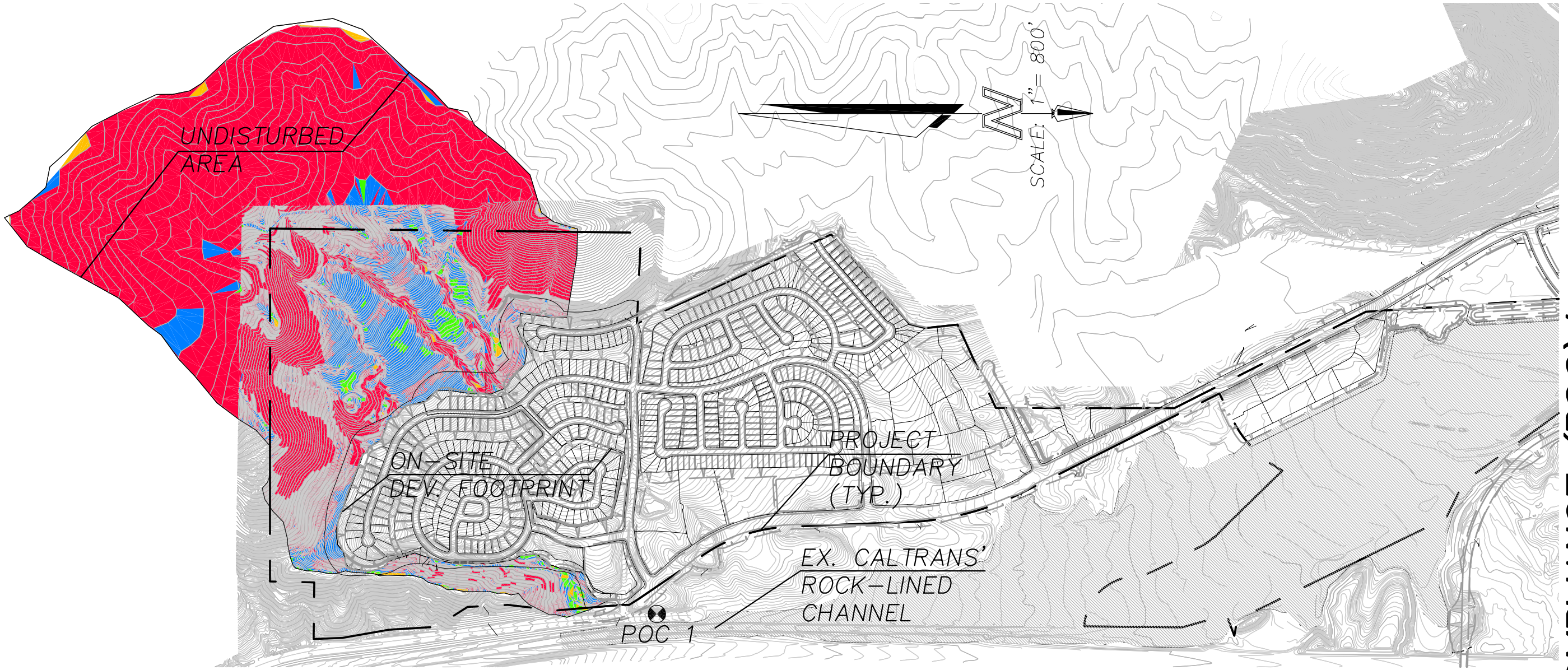
POC 1 SOIL C

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	2.7
	5.00	10.00	13.2
	10.00	20.00	35.3
	20.00	10000.00	176.6

POINT OF COMPLIANCE (POC) 1
PRE DEVELOPMENT

J.N.:

CAMPUS PARK
HYDROMODIFICATION POC TRIBITARY AREA SLOPE ANALYSIS



POC 1 POST UNDISTURBED

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	2.02
	5.00	10.00	3.57
	10.00	20.00	27.04
	20.00	10000.00	177.62

POC 1 POST UNDISTURBED SOIL B AREA

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	0.28
	5.00	10.00	1.02
	10.00	20.00	6.94
	20.00	10000.00	16.67

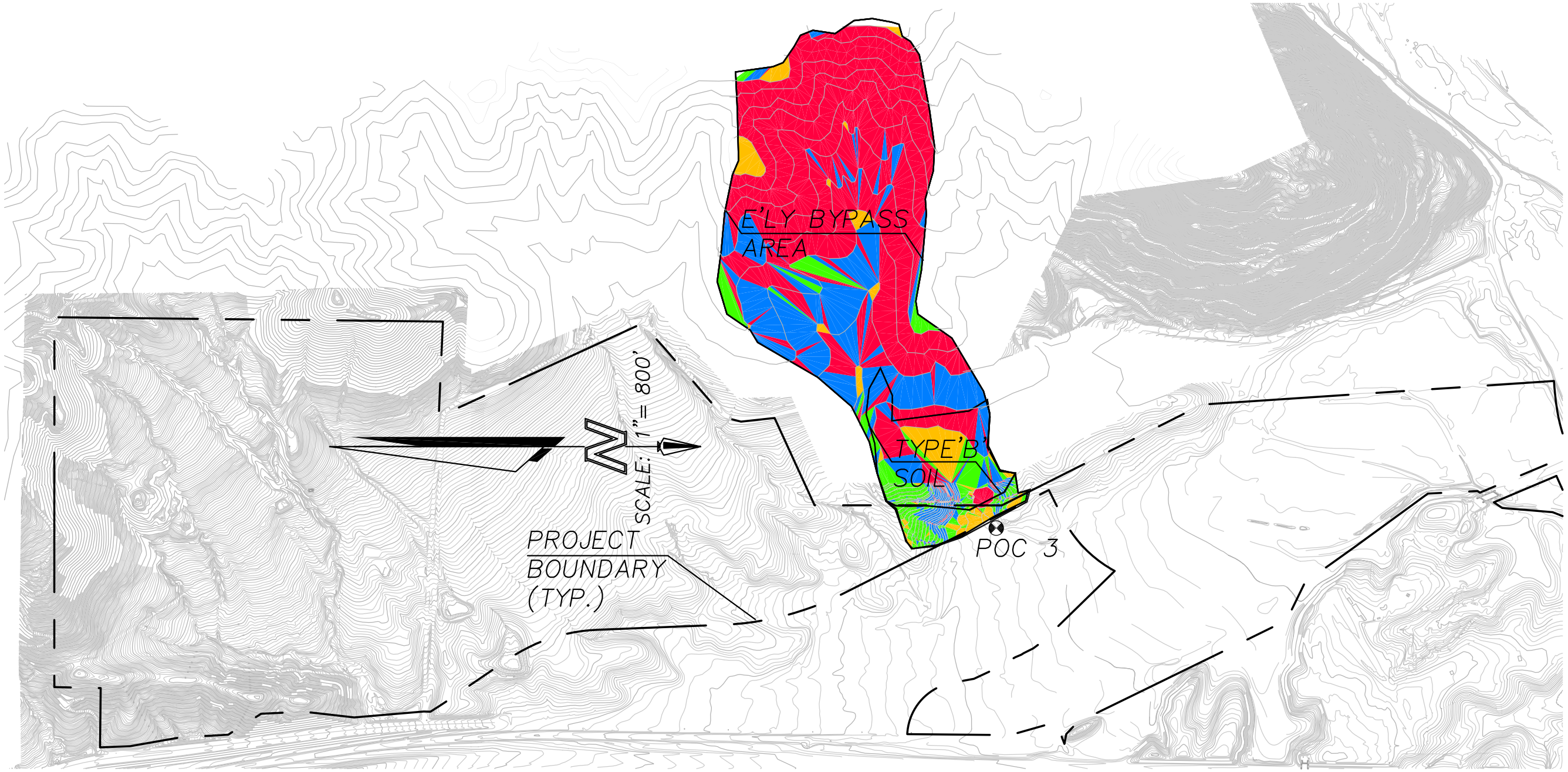
POC 1 POST UNDISTURBED SOIL C AREA

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	1.74
	5.00	10.00	2.55
	10.00	20.00	20.10
	20.00	10000.00	160.92

POINT OF COMPLIANCE (POC) 1
POST DEVELOPMENT

J.N.:

CAMPUS PARK
HYDROMODIFICATION POC TRIBITARY AREA SLOPE ANALYSIS



POC 3 OVERALL EX

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	5.80
	5.00	10.00	8.0
	10.00	20.00	24.4
	20.00	10000.00	60.1

POC 3 C SOIL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	2.2
	5.00	10.00	2.7
	10.00	20.00	19.7
	20.00	10000.00	55.9

POC 3 B SOIL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	3.6
	5.00	10.00	5.3
	10.00	20.00	4.7
	20.00	10000.00	4.2

POINT OF COMPLIANCE (POC) 3
PRE DEVELOPMENT

J.N.:

CAMPUS PARK
HYDROMODIFICATION POC TRIBITARY AREA SLOPE ANALYSIS

POC 3 POST OVERALL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	4.8
	5.00	10.00	6.2
	10.00	20.00	23.3
	20.00	10000.00	59.9

POC 3 POST C SOIL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	2.4
	5.00	10.00	2.8
	10.00	20.00	19.8
	20.00	10000.00	55.9

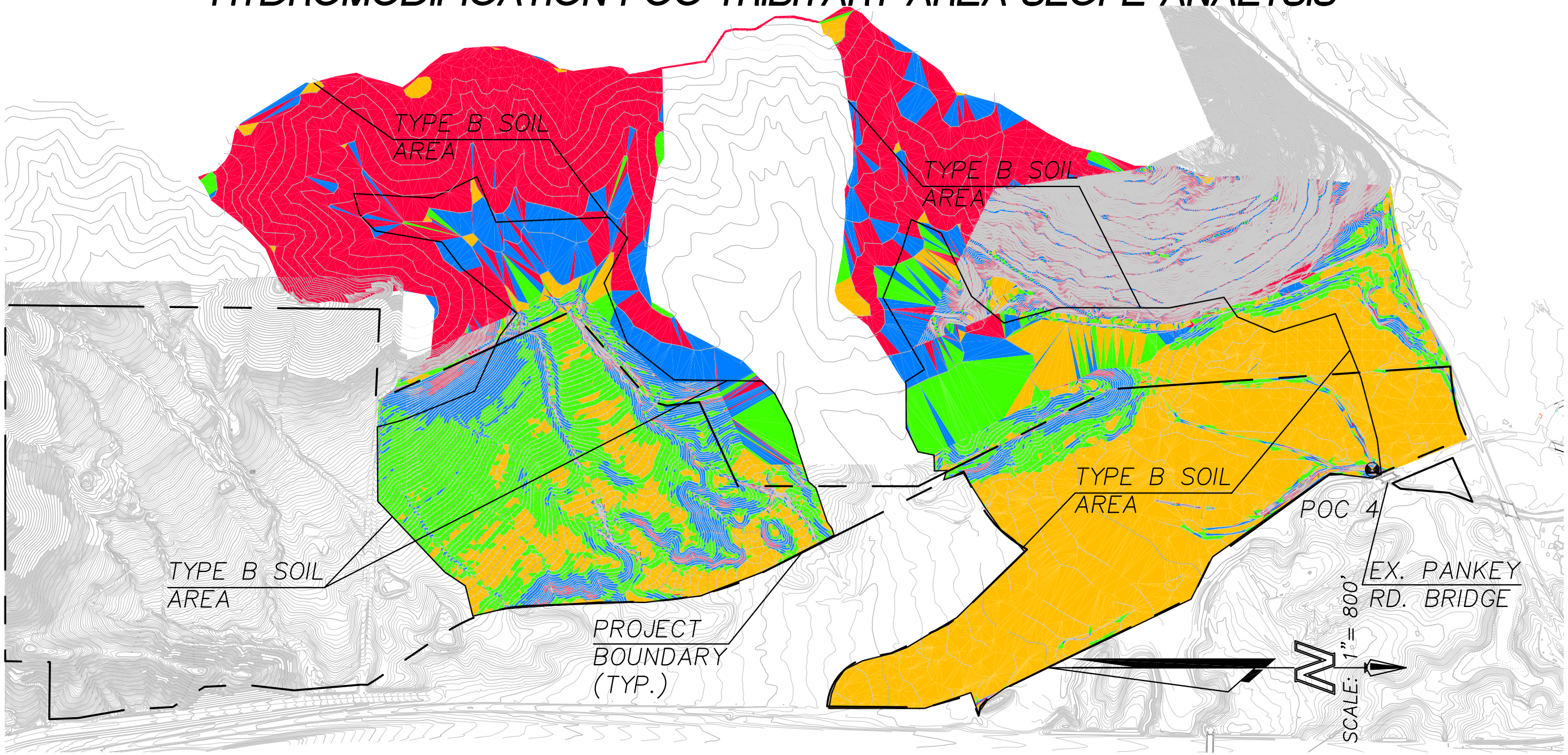
POC 3 POST B SOIL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	2.4
	5.00	10.00	3.4
	10.00	20.00	3.5
	20.00	10000.00	4.0

POINT OF COMPLIANCE (POC) 3
POST DEVELOPMENT

J.N.:

CAMPUS PARK
HYDROMODIFICATION POC TRIBITARY AREA SLOPE ANALYSIS



POC 4 PRE DEV. OVERALL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	163.6
	5.00	10.00	96.7
	10.00	20.00	85.0
	20.00	10000.00	207.4

POC 4 PRE DEV TYPE C SOIL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	23.7
	5.00	10.00	9.5
	10.00	20.00	30.9
	20.00	10000.00	186.2

POC 4 PRE DEV TYPE B SOIL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	139.9
	5.00	10.00	87.2
	10.00	20.00	54.1
	20.00	10000.00	21.1

POINT OF COMPLIANCE (POC) 4
PRE DEVELOPMENT

J.N.:

CAMPUS PARK
HYDROMODIFICATION POC TRIBITARY AREA SLOPE ANALYSIS

POC 4 POST UNDISTRUBED AREA OVERALL

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	87.5
	5.00	10.00	4.2
	10.00	20.00	4.1
	20.00	10000.00	25.7

POC 4 POST TPYE C SOIL (IN UNDISTURBED AREA)

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	0.1
	5.00	10.00	0.1
	10.00	20.00	1.3
	20.00	10000.00	22.1

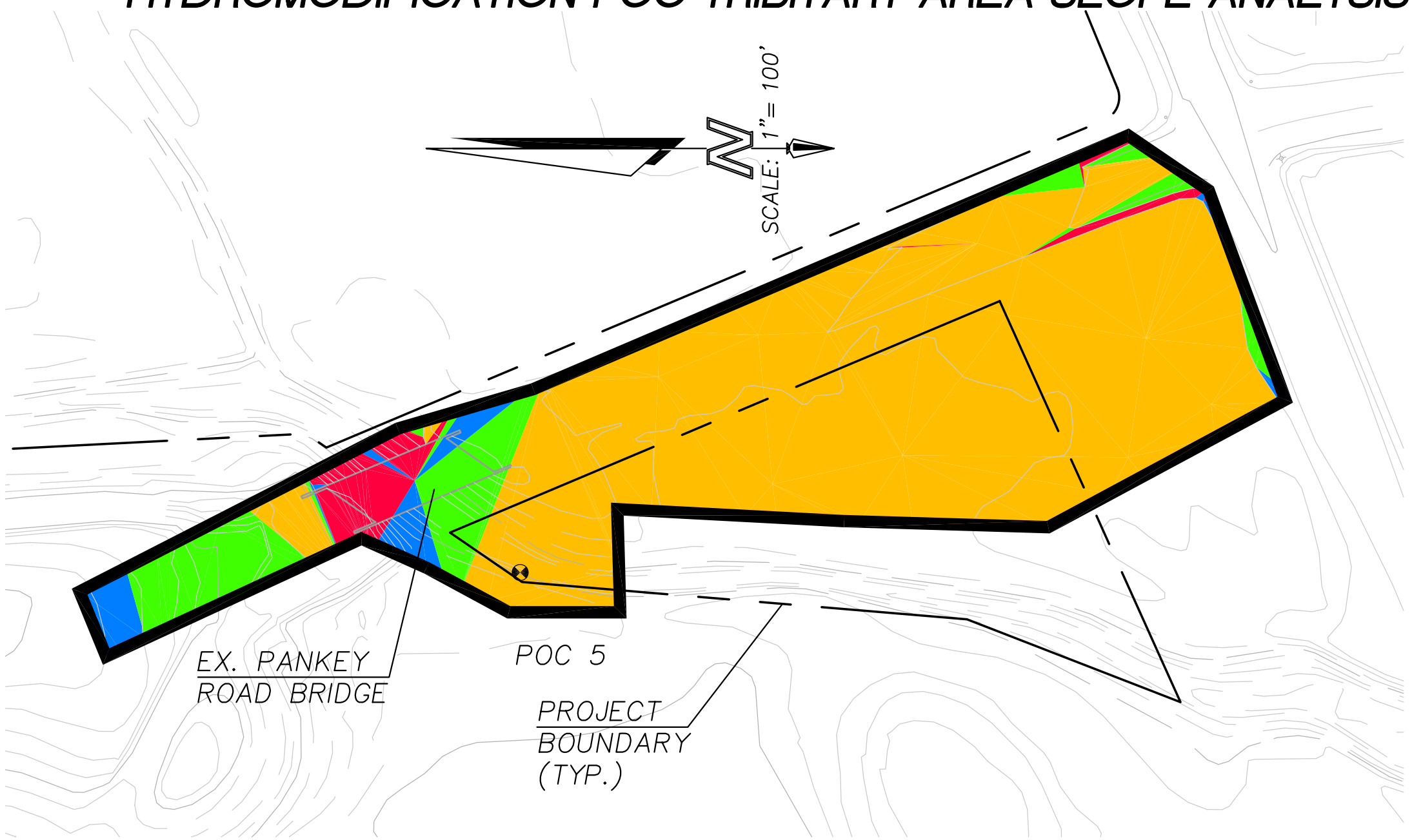
POC 4 POST TYPE B SOIL (N UNDISTURBED AREA)

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	87.4
	5.00	10.00	4.1
	10.00	20.00	2.8
	20.00	10000.00	3.7

POINT OF COMPLIANCE (POC) 4
POST DEVELOPMENT

J.N.:

CAMPUS PARK
HYDROMODIFICATION POC TRIBITARY AREA SLOPE ANALYSIS



POC 5 PRE DEVELOPMENT

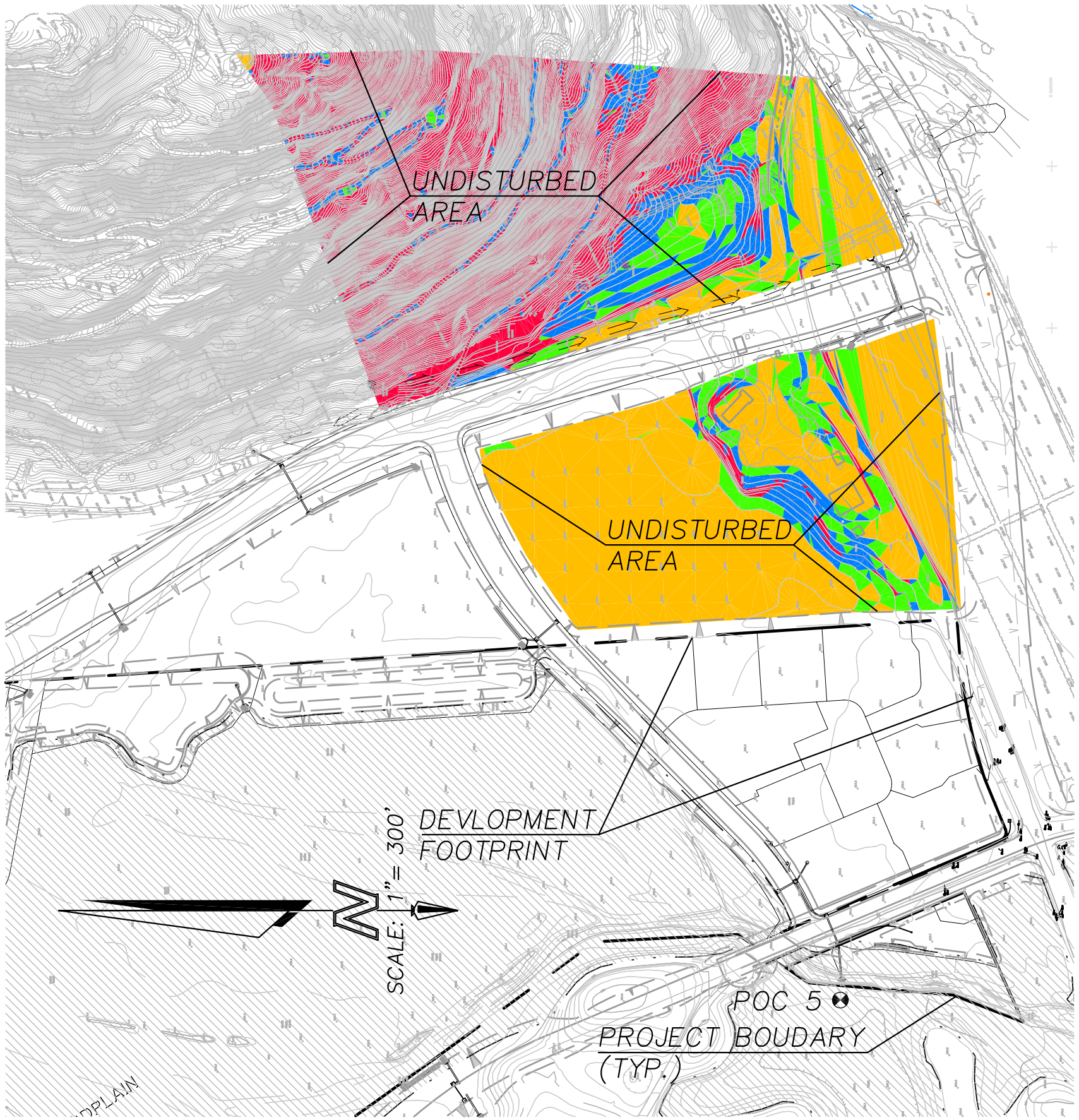
Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	3.0
	5.00	10.00	0.4
	10.00	20.00	0.1
	20.00	10000.00	0.1

ALL IN TYPE 'C' SOIL

POINT OF COMPLIANCE (POC) 5
PRE DEVELOPMENT

J.N.:

CAMPUS PARK
HYDROMODIFICATION POC TRIBITARY AREA SLOPE ANALYSIS



POC 5 POST (IN UNDISTURBED AREAS)

Color	BEG. %	END %	SLOPE AREA
	0.00	5.00	14.2
	5.00	10.00	3.4
	10.00	20.00	3.7
	20.00	10000.00	15.2

POINT OF COMPLIANCE (POC) 5
POST DEVELOPMENT

J.N.:

County of San Diego Hydrology Manual

Rainfall Isopluvials

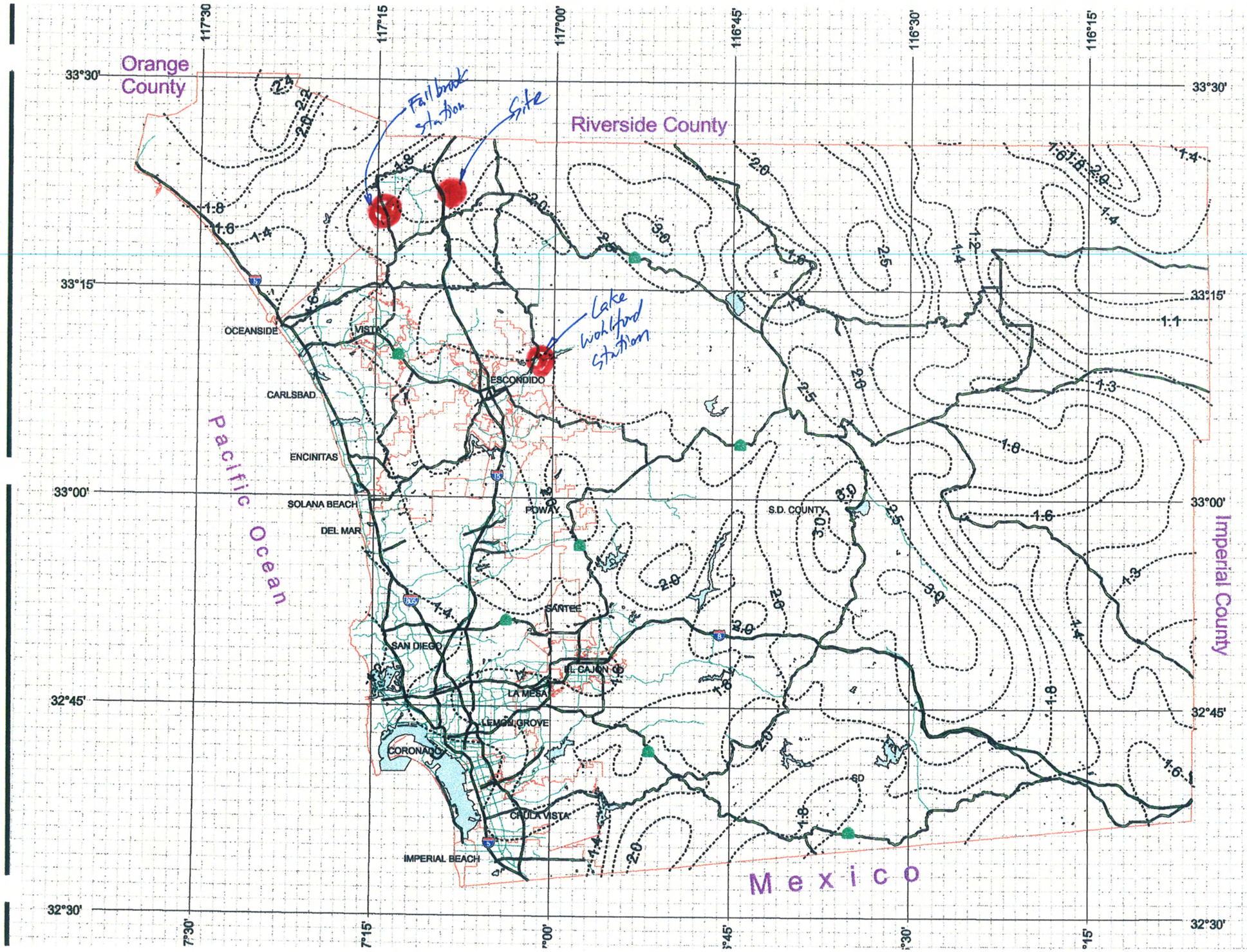
5 Year Rainfall Event - 6 Hours

Isopluvial (inches)

I_6 @ Fallbrook = 1.9 in

I_6 @ Site = 2.0 in

I_6 @ Lake Wohlford = 2.0 in



DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

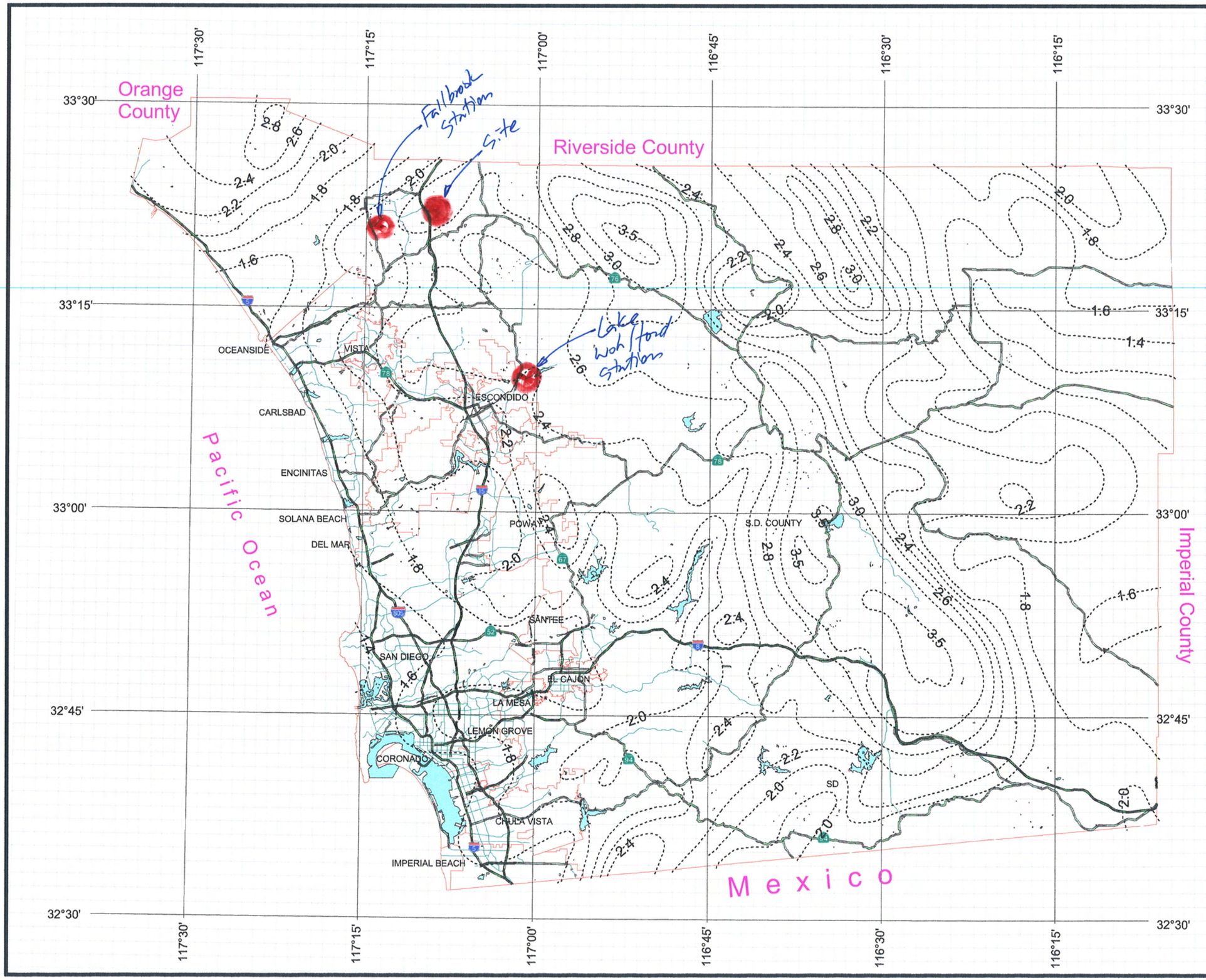
This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials



10 Year Rainfall Event - 6 Hours

Isopluvial (inches)

I_6 @ Fallbrook = 2.2 in

I_6 @ Site = 2.4 in

I_6 @ Lake Wohlford = 2.4 in

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

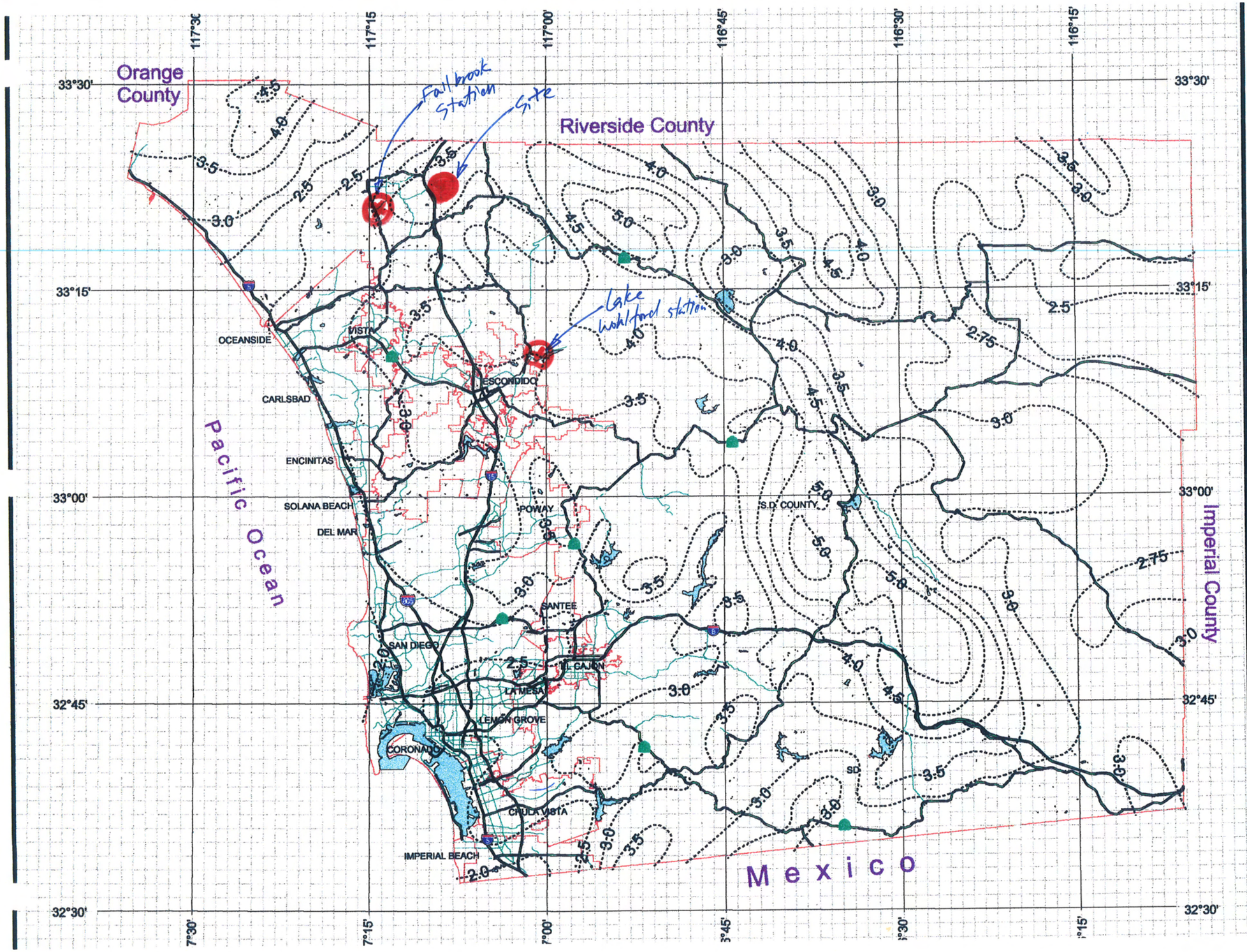
100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

I_6 @ Fallbrook = 3.0 in

I_{site} = 3.5 in

$I_{Lake\ Wohlford}$ = 3.5 in



DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

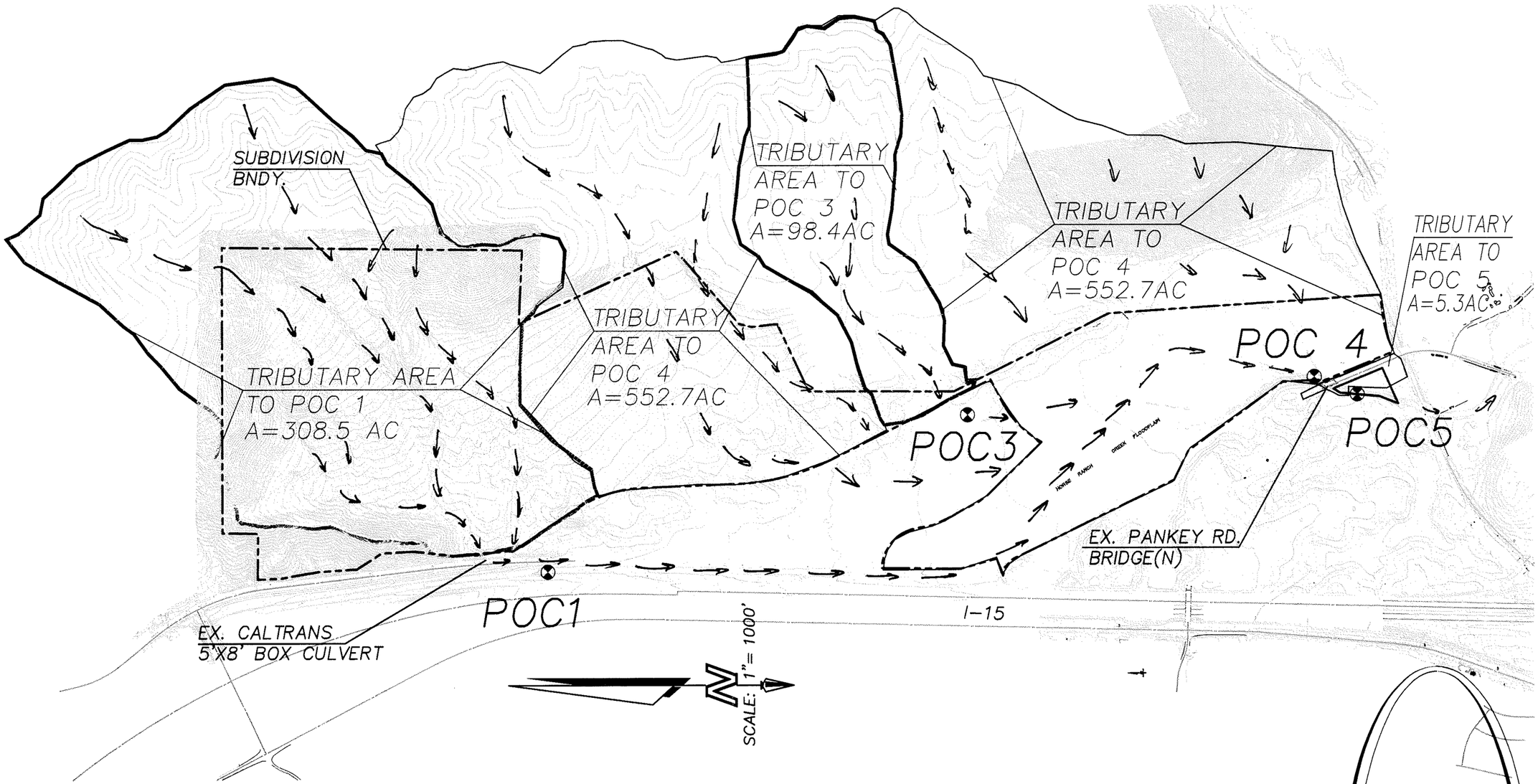
THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

POINTS OF COMPLIANCE LOCATION EXHIBIT

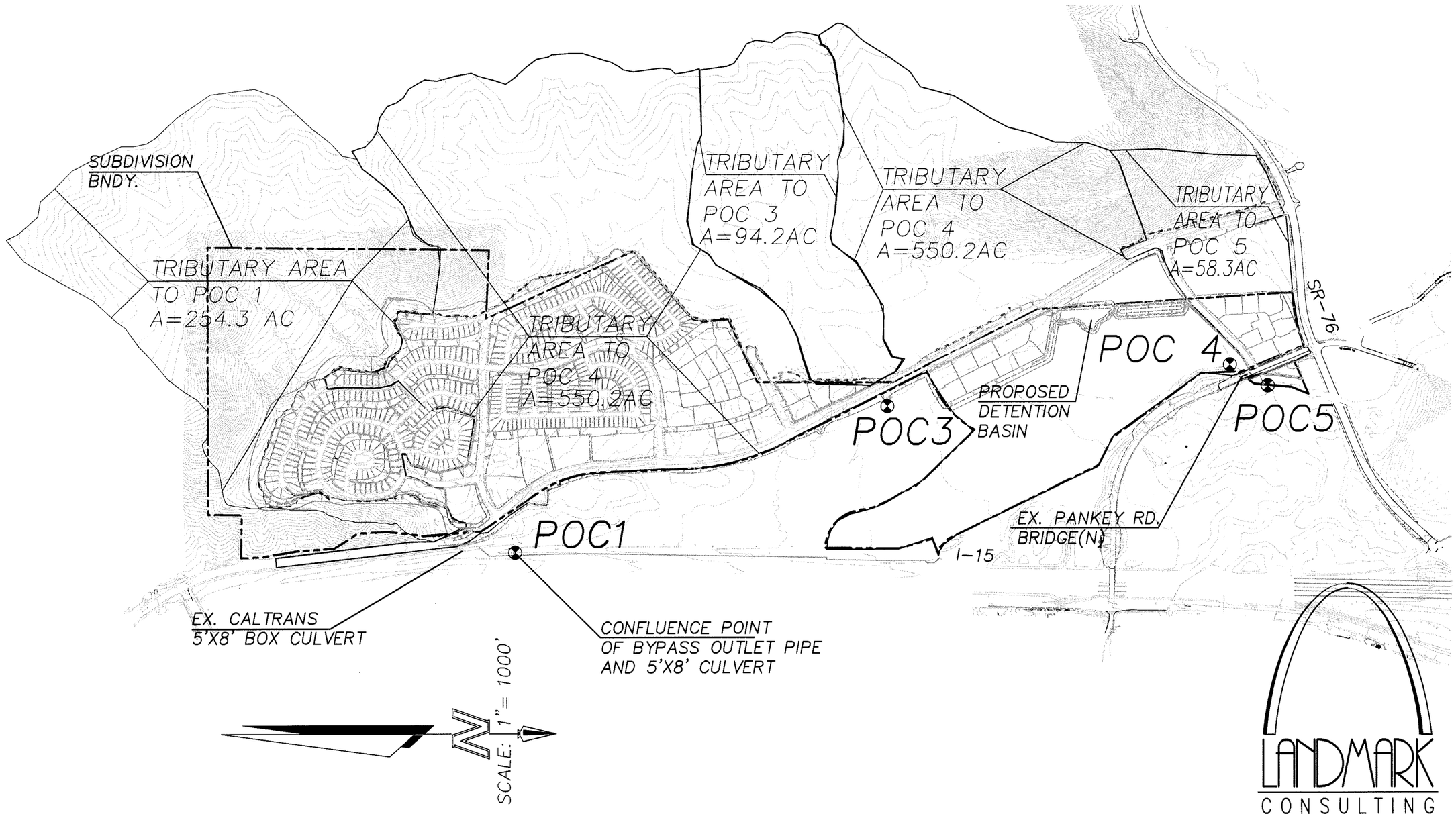


LANDMARK
CONSULTING
PLANNING•ENGINEERING•SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

PRE-DEVELOPMENT CONDITIONS

J.N.:

POINTS OF COMPLIANCE LOCATION EXHIBIT
CAMPUS PARK



POST-DEVELOPMENT CONDITIONS

LANDMARK CONSULTING
PLANNING•ENGINEERING•SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

J.N.:

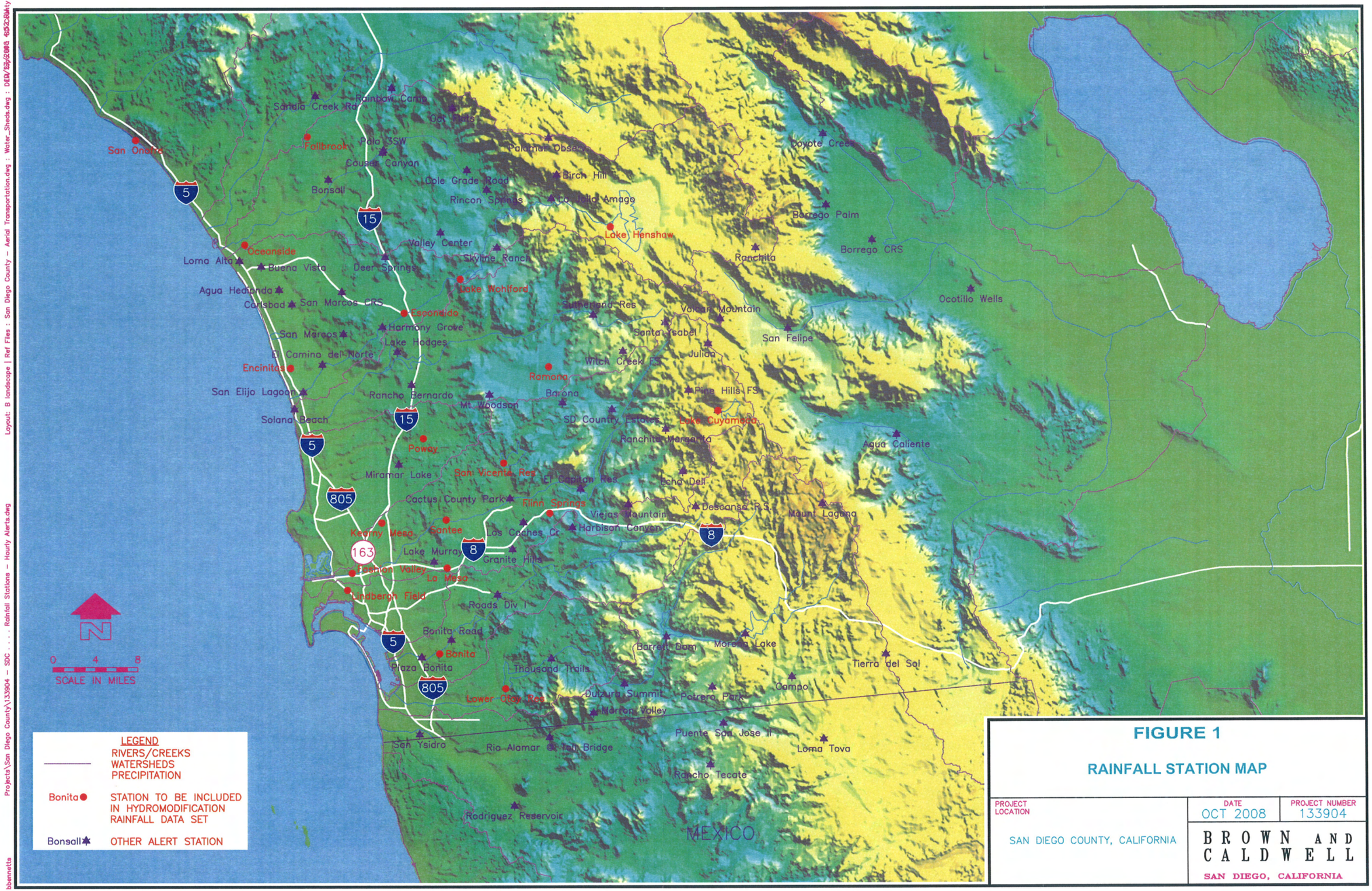


FIGURE 1

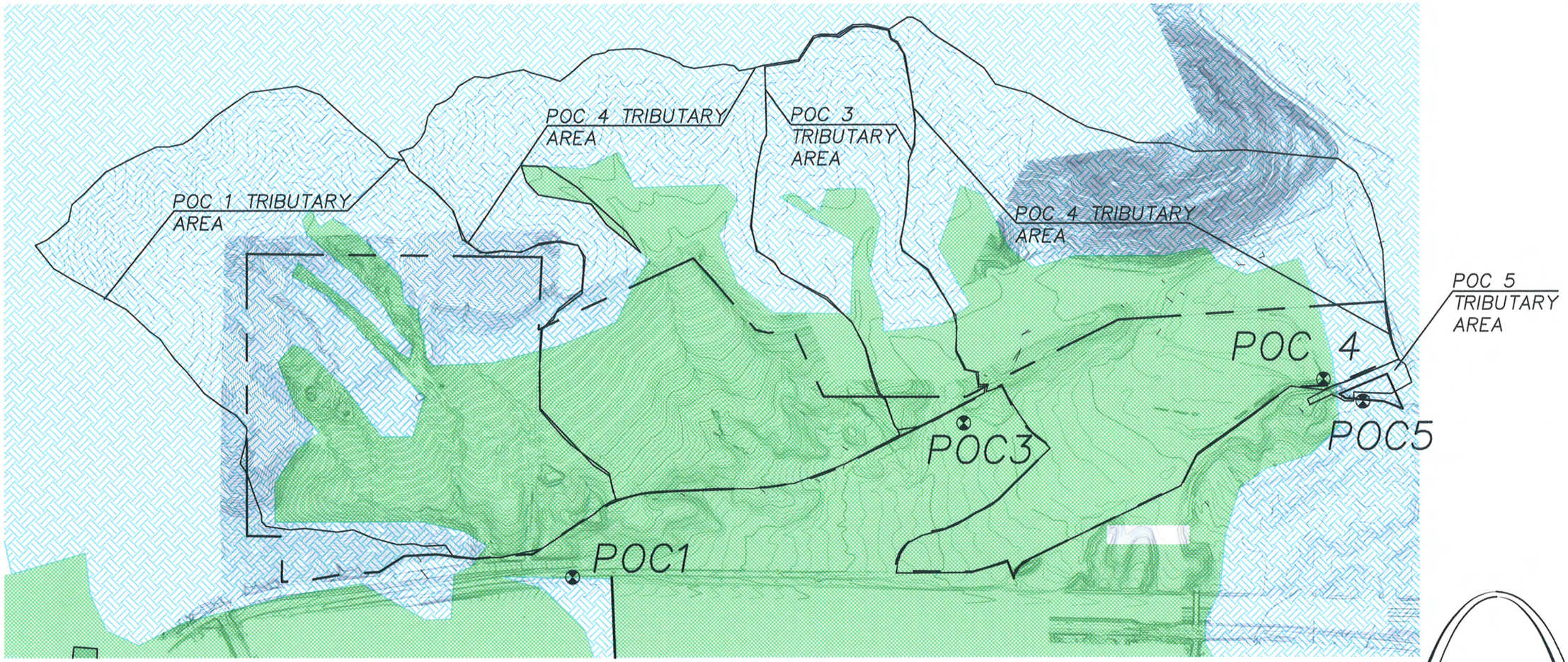
RAINFALL STATION MAP

PROJECT LOCATION	DATE	PROJECT NUMBER
SAN DIEGO COUNTY, CALIFORNIA	OCT 2008	133904

BROWN AND CALDWELL
SAN DIEGO, CALIFORNIA

Projects\San Diego County\133904 – SDC . . . Rainfall Stations – Hourly Alerts.dwg Layout: B landscape | Ref Files : San Diego County – Aerial Transportation.dwg : Water_Sheds.dwg : DEW/23/2008 9:52:20AM by Aeri
bbennetts

SOIL GROUP EXHIBIT
CAMPUS PARK



LEGEND

TYPE B SOIL

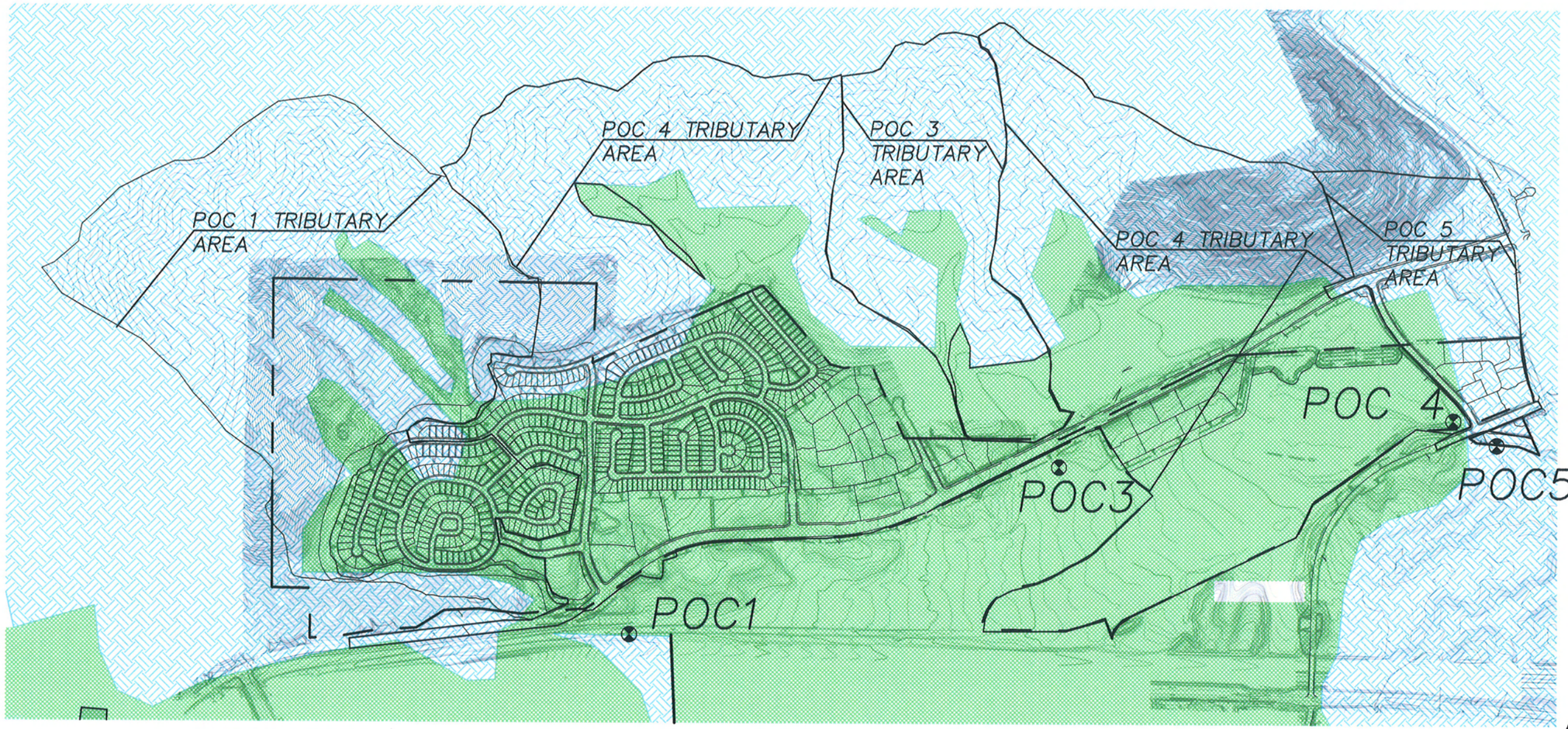
TYPE C SOIL

SCALE: 1" = 1000'

LANDMARK CONSULTING
PLANNING•ENGINEERING•SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

PRE-DEVELOPMENT CONDITIONS

SOIL GROUP EXHIBIT
CAMPUS PARK



LEGEND

TYPE B SOIL

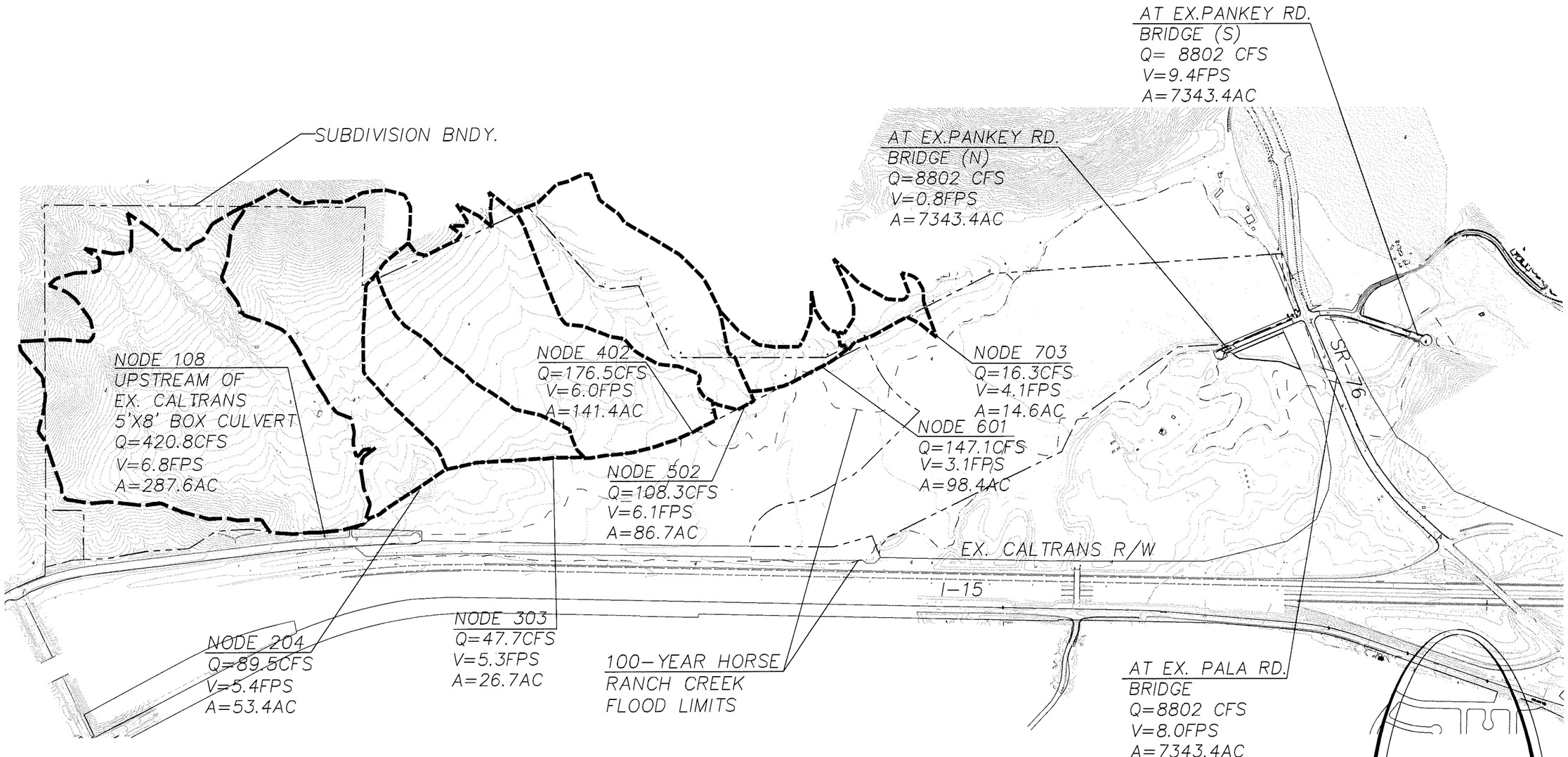
TYPE C SOIL

SCALE: 1" = 1000'

LANDMARK CONSULTING
PLANNING•ENGINEERING•SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

POST-DEVELOPMENT CONDITIONS

PROJECT DISCHARGE POINT SUMMARY EXHIBIT
CAMPUS PARK

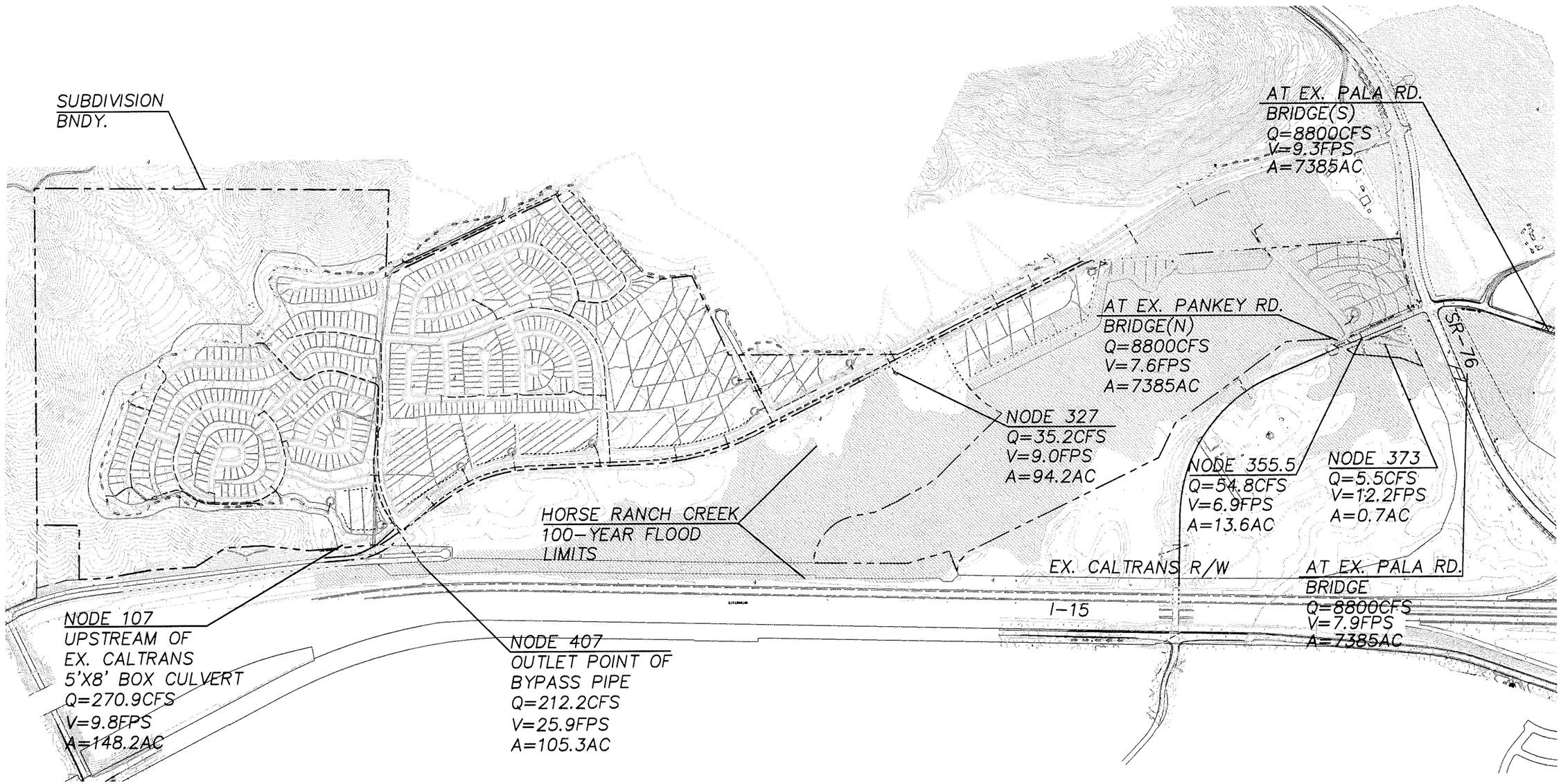


PRE-DEVELOPMENT CONDITIONS

LANDMARK
CONSULTING
PLANNING•ENGINEERING•SURVEYING
9555 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

J.N.:

PROJECT DISCHARGE POINT SUMMARY
CAMPUS PARK



POST-DEVELOPMENT CONDITIONS

J.N.:

SHEPARDSON
ENGINEERING ASSOCIATES INC.

Geotechnical Consultants:
Engineers-Geologists

10035 Prospect Ave., Suite 101
Santee, CA 92071-4398
619 / 449-9830 FAX 619 / 449-5824

July 9, 2009

S.E.A. 201171-04

Passerelle, LLC
402 W. Broadway, Suite 1320
San Diego, CA 92101-3542

ATTENTION: Mr. David Davis

Landmark Consulting
9555 Genessee Ave., Suite 200
San Diego, CA 92121

ATTENTION: Mr. David Yeh

SUBJECT: Geotechnical Input for Hydro-Modification Management Study

Dear Mr. Davis:

In accordance with the request of David Yeh of Landmark Consulting, we have prepared this letter to address the items required for the preliminary design of the hydro-modification management study.

We have reviewed the location of the preliminary detention basin, prepared by Landmark, as shown on their Points of Compliance location exhibit for Campus Park. We have also reviewed a detail of their preliminary detention basin design, which shows the bottom of the basin having elevations from approximately 268 to 264 msl, which appear to be very close to the elevations of the existing ground in this area, based on topographic maps for the project.

Information regarding the subsurface soils is available from a test boring placed by Woodward-Clyde & Associates very near, or within, the area of the proposed basin. We have attached a copy of this boring log for your review. Essentially, the upper approximately one foot of soil consists of a silty, fine sand which, in turn, is underlain by approximately 4 feet of clayey fine sand to sandy clay to a depth of approximately 5 feet, where sandy to clayey silt was encountered to a depth of 10 feet. These are all alluvial materials and, in our opinion, will be the controlling soils for the infiltration rate within the bottom of the detention basin. It is our understanding that Landmark Consulting has used an infiltration rate of .05 inches per hour for the bottom of the detention basin. This rate would seem to be appropriate for such low permeability soils. Based

on our experience and review of prior geotechnical investigations within the project area, we are of the opinion that generally, the low lying areas within the project will be underlain by similar soil conditions so, to our knowledge, there would not be other areas of similar elevation that would be more suitable for infiltration.

The test boring performed in this area by Woodward-Clyde, in 1982, encountered groundwater at a depth of approximately 7 ft. Based on our experience, we would estimate that the depth to groundwater in this area may be as shallow as 5 feet below the existing ground surface.

We do not know of any infiltration testing that has been performed within the project area, or near the proposed detention basin.

If you have any questions regarding the information in this letter, please do not hesitate to contact the undersigned.

Respectfully submitted,

SHEPARDSON ENGINEERING ASSOCIATES, INC.

Kendall L. Sherrod, CEG
Senior Engineering Geologist/Vice President

cc: (1) Addressees

Enclosure

Boring 1

Approximate El. 264'

DEPTH IN FEET	TEST DATA *MC	*DD	*BC	*OTHER TESTS	SAMPLE NUMBER	SOIL DESCRIPTION
			5		1-1	Loose, moist, gray brown, silty fine sand (SM) VALLEY ALLUVIUM
					1-2	Loose to soft, wet, dark gray brown to black, clayey fine sand (SC) to sandy clay (CL) VALLEY ALLUVIUM
5	43	80	3	GS,PI	1-3	Soft, wet, dark gray brown, sandy to clayey silt (ML) VALLEY ALLUVIUM
10			4		1-4	Loose to soft, wet, dark gray brown, silty to clayey medium to fine sand (SM) with some sandy clay (CL) VALLEY ALLUVIUM
15	26	101	5	GS,PI	1-5	
20			29		1-6	
25	14	117	10		1-7	Loose to medium dense, wet, brown, silty medium sand (SM) with some clay OLDER ALLUVIUM
30			17		1-8	
35			56		1-9	Medium dense to dense, saturated, brown, clayey coarse sand (SM) with scattered gravels OLDER ALLUVIUM
40	32	92	18		1-10	Stiff, wet, gray brown, fine sandy clay (CL) OLDER ALLUVIUM

Bottom of Hole

* description of symbols, see Figure A-1

LOG OF TEST BORING 1
HEWLETT PACKARD PALA MESA SITE

DRAWN BY CR	CHECKED BY: RSD	PROJECT NO: 52231W-SI01	DATE: 10-8-82	FIGURE NO: A-2

WOODWARD-CLYDE CONSULTANTS

NITRATE REPORT

NITRATE LABORATORY TEST RESULTS FOR WATER OUTLET FLOW FROM IRON PIPE CAMPUS PARK PROJECT FALLBROOK, SAN DIEGO COUNTY, CALIFORNIA 92028

FOR

PASSERELLE, LLC
402 WEST BROADWAY, SUITE 1320
SAN DIEGO, CALIFORNIA 92101-3542

W.O. E3176.2-SC FEBRUARY 18, 2009

GeoSoils, Inc.

Geotechnical • Geologic • Coastal • Environmental

5741 Palmer Way • Carlsbad, California 92010 • (760) 438-3155 • FAX (760) 931-0915

February 18, 2009

W.O. E3176.2-SC

Passerelle, LLC
402 West Broadway, Suite 1320
San Diego, California 92101-3542

Attention: Mr. David Davis

Subject: Nitrate Laboratory Test Results of Water Outlet Flow from Iron Pipe, Campus Park Project, Fallbrook, San Diego County, California 92028

Reference: "Phase I Environmental Site Assessment and Limited Chemical Residue Survey, Hewlett Packard Property, 500-Acre Property Northeast of Highway 76 and Interstate 15, Pala Mesa Area of San Diego County, California 92028," W.O. E3176-SC, dated January 7, 2002, by GeoSoils, Inc.

Dear Mr. Davis:

In accordance with your request, GeoSoils, Inc. (GSI), is providing this summary report of nitrate laboratory test results for sampling of water discharge from an offsite outlet pipe into an onsite creek. A water sample was previously collected and analyzed for nitrates from the iron pipe during our Phase 1 Environmental Site Assessment performed in 2002 (see Reference). The scope of services for this evaluation have included water sampling/testing, analyses of data, preparation of this summary report presenting the laboratory test results for the water seepage, and our conclusions.

LABORATORY TEST RESULTS

A water sample was collected from the iron outlet pipe located on the east side of the property during the middle of a heavy rainstorm. The outlet pipe discharges surface runoff water from offsite citrus orchards located east of the subject property into an onsite creek. The water sample was collected in a laboratory provided container on February 9, 2009, then delivered to the laboratory within eight (8) hours of collection in an ice cooled chest. Analysis for nitrate as (N), utilizing EPA Test Method 300.0, was performed. Laboratory results are presented in the following table and the laboratory report is provided in the Appendix. Laboratory results for the previous water sample collected from the pipe (see Reference) are also provided in the following table.

SAMPLE DATE	NITRATE as (N)
December 11, 2001	43.0 mg/L
February 9, 2009	9.5 mg/L

The nitrate as (N) concentration is just below the drinking water standards and just below the Basin Plan regulatory level for nitrate as (N), during this sampling event. The Maximum Contaminant Level (MCL) relative to drinking water standards for nitrate (as N) concentration is 10 milligrams per liter (mg/L). The Regional Water Quality Control Board-San Diego numerical objective for nitrate (as N) is also 10 mg/L.

CONCLUSIONS

The nitrate concentration is immediately below regulatory levels for this particular sampling event. Thus, our prior conclusions and recommendations remain pertinent and applicable in this regard. We point out that it is the responsibility of the property owner to disclose information of conditions that may represent a potential risk of harm to public health or the environment, to the appropriate governmental agency(s).

LIMITATIONS

The conclusions and recommendations are professional opinions. These opinions have been derived in accordance with current standards of practice and no warranty is express or implied. Standards of practice are subject to change with time. GSI assumes no responsibility for work, testing or recommendations performed or provided by others.

The opportunity to be of service is greatly appreciated. If you have any questions, please do not hesitate to call our office.

Respectfully submitted,

GeoSoils, Inc.

John P. Franklin
President, Environmental Assessor
CEG 1340, REA-1 1675

DG/JPF/jh

Attachment: Appendix - Chemical Laboratory Test Results

Distribution: (4) Addressee

APPENDIX

CHEMICAL LABORATORY TEST RESULTS

Calscience Environmental Laboratories, Inc.

February 16, 2009

Donna Gooley
GeoSoils, Inc.
5741 Palmer Way
Carlsbad, CA 92010-7248

Subject: **Calscience Work Order No.: 09-02-0904**
Client Reference: Campus Park / E3176.2

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 2/9/2009 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Systems Manual, applicable standard operating procedures, and other related documentation. The original report of subcontracted analysis, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Sincerely,

Richard Villafania

Calscience Environmental
Laboratories, Inc.
Richard Villafania
Project Manager

Calscience Environmental Laboratories, Inc.

Analytical Report

GeoSoils, Inc.		Date Received:	02/09/09
5741 Palmer Way		Work Order No:	09-02-0904
Carlsbad, CA 92010-7248		Preparation:	N/A
		Method:	EPA 300.0

Project: Campus Park / E3176.2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WS-1	**09-02-0904-1-A**	**02/09/09 00:00**	**Aqueous**	**IC 7**	**N/A**	**02/10/09 08:34**	**090209L02**

Parameter	Result	RL	DF	Qual	Units
Nitrate (as N)	9.5	0.50	5		mg/L

Method Blank	**099-05-118-5,079**	**N/A**	**Aqueous**	**IC 7**	**N/A**	**02/10/09 04:13**	**090209L02**

Parameter	Result	RL	DF	Qual	Units
Nitrate (as N)	ND	0.10	1		mg/L

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

GeoSoils, Inc.		Date Received:	02/09/09
5741 Palmer Way		Work Order No:	09-02-0904
Carlsbad, CA 92010-7248		Preparation:	N/A
		Method:	EPA 300.0

Project Campus Park / E3176.2

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-02-0845-17	**Aqueous**	**IC 7**	**N/A**	**02/10/09**	**090209S02**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrate (as N)	106	108	58-142	1	0-6	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

GeoSoils, Inc.		Date Received:	N/A
5741 Palmer Way		Work Order No:	09-02-0904
Carlsbad, CA 92010-7248		Preparation:	N/A
		Method:	EPA 300.0

Project: Campus Park / E3176.2

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-05-118-5,079	Aqueous	IC 7	N/A	02/10/09	090209L02

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrate (as N)	102	102	87-111	0	0-12	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 09-02-0904

Qualifier	Definition
*	See applicable analysis comment.
1	Surrogate compound recovery was out of control due to a required sample dilution, therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported with no further corrective action required.
A	Result is the average of all dilutions, as defined by the method.
B	Analyte was present in the associated method blank.
C	Analyte presence was not confirmed on primary column.
E	Concentration exceeds the calibration range.
H	Sample received and/or analyzed past the recommended holding time.
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
ME	LCS Recovery Percentage is within LCS ME Control Limit range.
N	Nontarget Analyte.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
U	Undetected at the laboratory method detection limit.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Calscience Environmental Laboratories, Inc.

☐ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

CHAIN OF CUSTODY RECORD

Date 2-9-09

Page 1 of 1

LABORATORY CLIENT: GeoSoils Inc.
ADDRESS: 5741 Palmer Way
CITY: Carlsbad STATE: CA ZIP: 92010
TEL: 760 438 3155 E-MAIL: bross@geosoilsinc.com
TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ 10 DAYS
SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY): ☐ RWQCB REPORTING FORMS ☐ COELT EDF ☐
SPECIAL INSTRUCTIONS:

CLIENT PROJECT NAME / NUMBER: Campus Park / E3176.2
P.O. NO.:
PROJECT CONTACT: Donna Gooley
LAB USE ONLY: 02-0904
SAMPLER(S): (PRINT) Donna Gooley
COELT LOG CODE
COOLER RECEIPT TEMP= °C

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	FIELD POINT NAME (FOR COELT EDF)	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (g)	TPH (d) or (C7-C36) or (C7-C44)	TPH ( )	BTEX / MTBE (8260B)	VOCs (8260B)	VOCs+Oxys (8260B)	Encore Prep (5035)	SVOCs (8270C)	Pesticides (8181A)	PCBs (8082)	PNAs (8310) or (8270C)	T22 Metals (6010B/747X)	Cr(VI)[7196A or 7199 or 218.6]	VOCs (TO-14A) or (TO-15)	TPH (g)[TO-3]+	Nitrate as N		
	WS-1		2/9/09		water	1																✓		

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Donna Gooley	CEL	2/9/9	1100
	CEL	2/9/09	1600

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the green and Yellow copies respectively.

05/01/07 Revision

Q&Q Graphic 760-898-9702

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 09-02-0904

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: Geosoils

DATE: 2/9/9

TEMPERATURE: (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 2.8 °C - 0.2 °C (CF) = 2.6 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by:_____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter ☐ Metals Only ☐ PCBs Only **Initial:** [illegible]

CUSTODY SEALS INTACT:

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A **Initial:** [illegible]

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present **Initial:** DL

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples.....	☑	☐	☐
COC document(s) received complete.....	☑	☐	☐
Sampler's name indicated on COC.....	☑	☐	☐
Sample container label(s) consistent with COC.....	☑	☐	☐
Sample container(s) intact and good condition.....	☑	☐	☐
Correct containers and volume for analyses requested.....	☑	☐	☐
Analyses received within holding time.....	☑	☐	☐
Proper preservation noted on COC or sample container.....	☑	☐	☐
Volatile analysis container(s) free of headspace.....	☐	☐	☑
Tedlar bag(s) free of condensation.....	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve ☐EnCores® ☐TerraCores® ☐_____

Water: ☐VOA ☐VOAh ☐VOAna_2 ☐125AGB ☐125AGBh ☐125AGBpo_4 ☐1AGB ☐1AGBna_2 ☐1AGBs ☐500AGB ☐500AGBs ☐250CGB ☐250CGBs ☐1PB ☐500PB ☐500PBna ☐250PB ☐250PBn ☐125PB ☐125PBznna ☐100PBsterile ☐100PBna_2 ☑250PBJ ☐_____ ☐_____

Air: ☐Tedlar® ☐Summa® ☐_____

Checked/Labeled by: DL

Reviewed by: YL

Scanned by: DL

Container: C:Clear A:Amber P:Poly/Plastic G:Glass J:Jar B:Bottle

Preservative: h:HCL n:HNO_3 na_2:$Na_2S_2O_3$ na:NaOH po_4:H_3PO_4 s:H_2SO_4 znna:$ZnAc_2$+NaOH

Calscience Environmental Laboratories, Inc.

INVOICE

Date: 2/16/2009
Invoice Number: 1170570

Accounts Payable
GeoSoils, Inc.
5741 Palmer Way
Carlsbad, CA 92010-7248

Report Sent To: Donna Gooley
Calscience Work Order No 09-02-0904
Project Name/No : Campus Park / E3176.2
Terms: Net 30

Total Amount Due : $ 70.00

Matrix	Test	TAT	Qty	Unit Cost	Subtotal	Rush Surcharge	Total
Water	EPA 300.0 Anions	5	1	$70.00	$70.00	$0.00	$70.00

Total Amount Due : $70.00

Amounts not paid within terms are subject to a 1.5% per month service charge.
Please include invoice number with your remittance.

PLEASE REMIT TO: **19433 E. WALNUT DRIVE SOUTH**
CITY OF INDUSTRY, CA 91748-2316

7440 Lincoln Way, Garden Grove, CA 92841-1427 • TEL:(714) 895-5494 • FAX: (714) 894-7501

Calscience Environmental Laboratories, Inc.

☐ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

CHAIN OF CUSTODY RECORD

Date 2-9-09

Page 1 of 1

LABORATORY CLIENT: GeoSoils Inc.

ADDRESS: 5741 Palmer Way

CITY: Carlsbad STATE: CA ZIP: 92010

TEL: 760 438 3155 E-MAIL: bross@geosoilsinc.com

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY): ☐ RWQCB REPORTING FORMS ☐ COELT EDF ☐ _____

SPECIAL INSTRUCTIONS:

CLIENT PROJECT NAME / NUMBER: Campus Park / E3176.2

P.O. NO.:

PROJECT CONTACT: Donna Gooley

LAB USE ONLY: 02-0904

SAMPLER(S): (PRINT) DonnaGooley

COELT LOG CODE ☐☐☐☐

COOLER RECEIPT TEMP= °C

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	FIELD POINT NAME (FOR COELT EDF)	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (g)	TPH (d) or (C7-C36) or (C7-C44)	TPH ( )	BTEX / MTBE (8260B)	VOCs (8260B)	VOCs+Oxys (8260B)	Encore Prep (5035)	SVOCs (8270C)	Pesticides (8181A)	PCBs (8082)	PNAs (8310) or (8270C)	T22 Metals (6010B/747X)	Cr(VI)[7196A or 7199 or 218.6]	VOCs (TO-14A) or (TO-15)	TPH (g)[TO-3]+	Nitrate as N		
	WS-1		2/9/09		water	1																✓		

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Donna Gooley	CEL	2/9/9	1100
	CEL	2/9/09	1600

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the green and Yellow copies respectively.

05/01/07 Revision

Q&Q Graphic 714-898-9702

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 09-02-0906

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: Geosoils

DATE: 2/9/9

TEMPERATURE: (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 2.8 °C - 0.2 °C (CF) = 2.6 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by:_____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter ☐ Metals Only ☐ PCBs Only Initial:

CUSTODY SEALS INTACT:

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A Initial:

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Initial: DL

SAMPLE CONDITION:

	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples.....	☑	☐	☐
COC document(s) received complete.....	☑	☐	☐
Sampler's name indicated on COC.....	☑	☐	☐
Sample container label(s) consistent with COC.....	☑	☐	☐
Sample container(s) intact and good condition.....	☑	☐	☐
Correct containers and volume for analyses requested.....	☑	☐	☐
Analyses received within holding time.....	☑	☐	☐
Proper preservation noted on COC or sample container.....	☑	☐	☐
Volatile analysis container(s) free of headspace.....	☐	☐	☑
Tedlar bag(s) free of condensation.....	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve ☐EnCores® ☐TerraCores® ☐_____

Water: ☐VOA ☐VOAh ☐VOAna_2 ☐125AGB ☐125AGBh ☐125AGBpo_4 ☐1AGB ☐1AGBna_2 ☐1AGBs ☐500AGB ☐500AGBs ☐250CGB ☐250CGBs ☐1PB ☐500PB ☐500PBna ☐250PB ☐250PBn ☐125PB ☐125PBznna ☐100PBsterile ☐100PBna_2 ☑ 250 PBJ ☐_____ ☐_____

Air: ☐Tedlar® ☐Summa® ☐_____

Checked/Labeled by: DL

Reviewed by: YL

Scanned by: DL

Container: C:Clear A:Amber P:Poly/Plastic G:Glass J:Jar B:Bottle

Preservative: h:HCL n:HNO_3 na_2:$Na_2S_2O_3$ na:NaOH po_4:H_3PO_4 s:H_2SO_4 znna:$ZnAc_2$+NaOH