Appendix E Preliminary WQMP

Appendix

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Preliminary Water Quality Management Plan (PWQMP)

Project Name:

Oak Creek Community Park

Prepared for:

City of Irvine

Community Services Department

One Civic Center Plaza

Irvine, CA 92623

Prepared by:

Adams Streeter Civil Engineers

Engineer: Mo Abadi Registration No. 42615

16755 Von Karman Ave. Suite 150

Irvine CA, 92606

949.474.2330

Prepared on:

April 8, 2022

Template Prepared:

July 15, 2011

Project Owner's Certification

Permit/Application No.		Grading Permit No.	
Tract/Parcel Map No.		Building Permit No.	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			APN 466-022-26

This Water Quality Management Plan (WQMP) has been prepared for City of Irvine by Adams Streeter Civil Engineers. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner:			
Title			
Company			
Address			
Email			
Telephone #			
Signature		Date	

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Attachments

Section I Discretionary Permit(s) and Water Quality Conditions

Project Infomation			
Permit/Application No.		Tract/Parcel Map No.	
Additional Information/ Comments:			
Water Quality Conditions			
Water Quality Conditions (list verbatim)	N/A		
Watershed-Based Plan Conditions			
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	N/A		

Section II Project Description

II.1 Project Description

Description of Proposed Project				
Development Category (Verbatim from WQMP):	New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees. Parking lots 5,000 square feet or more including associated drive aisle, and potentially exposed to urban stormwater runoff. A parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.			
Project Area (ft^2): ____831,996___	Number of Dwelling Units ___N/A___		SIC Code: _____N/A_____	
Narrative Project Description:	The Oak Creek Community Park renovation project will consist of converting an existing baseball field to a new synthetic turf soccer field, the refurbishment of an existing soccer field, the addition of two new dog parks and the construction of a new 141 stall asphalt parking lot. In addition, new concrete and decomposed granite walkways are intended to provide access to the new amenities.			
Project Area	Pervious		Impervious	
	Area (acres)	Percentage	Area (acres)	Percentage
Pre-Project Conditions	17.10	89	2.00	11
Post-Project Conditions	15.13	79	3.97	21
Drainage Patterns/Connections	The drainage for the existing site is achieved via surface flows draining from northeast towards the southwest direction to be picked-up in an existing storm drain facility located in Valley Oak Drive. The existing site drains southwest at two locations with connections to an existing 78-inch RCP located in Valley Oak Drive, a 36" RCP pipe drains the existing community park and an 18" RCP pipe drains the existing SCE property. The existing storm drain pipe is located along the south side			

	of the community park. Currently, the site is bermed along the perimeter with drainage surface-flowing towards the parkway. The proposed drainage condition includes provisions to capture and treat runoff from the new parking lot that will be constructed on the SCE site. Storm drain improvements consisting of a trench drain and 18″ RCP pipe conveys drainage from the proposed parking lot to a water quality unit. Treated and overflow runoff from the water quality unit drains towards the westerly corner of the site and is captured by the existing 24″ CSP riser that conveys runoff to Valley Oak Drive. The existing turf / green areas located on-site will largely remain as turf or synthetic turf. Existing drainage patterns will be held for the proposed improvements as the site is already tabled to drain toward the Existing 78-inch RCP located on Valley Oak Drive.

II.2 Potential Stormwater Pollutants

Pollutants of Concern			
Pollutant	Circle One: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	(E)	N	
Nutrients	(E)	N	
Heavy Metals	(E)	N	
Pathogens (Bacteria/Virus)	(E)	N	
Pesticides	(E)	N	
Oil and Grease	(E)	N	
Toxic Organic Compounds	(E)	N	
Trash and Debris	(E)	N	

II.3 Hydrologic Conditions of Concern

☐ No – Show map

☒ Yes – Describe applicable hydrologic conditions of concern below. *Refer to Section 2.2.3 in the TGD.*

The project drains to Newport Bay that is potentially susceptible to hydromodification impacts. However, the proposed project is projected to mitigate any hydrologic conditions of concern and is not expected to cause an adverse impact on downstream receiving waters. The total increase in storm water runoff for the 2yr-24hr storm event is 3.15%.

2 year existing storm flow rate: 17.47 cfs

2 year proposed storm flow rate: 18.02 cfs

Please see hydrologic calculations located in Attachment D for further details

II.4 Post Development Drainage Characteristics

Generally, the runoff from the new parking area will sheet flow to the southwest into a concrete curb and gutters. Drainage from the gutters will be diverted into a proposed Modular Wetlands Biofiltration System. A small portion of runoff will be diverted to the north where a trench drain spanning the width of the parking lot entrance will intercept the runoff and redirect the runoff to the MWS unit.

The MWS will be located in a landscape buffer on the southwest corner of the parking lot. Qdesign flows will be treated by the MWS unit and the remaining bypass flows drain towards the westerly corner of the site and are captured by the existing 24" CSP riser that conveys runoff to Valley Oak Drive.

Once the Qdesign flow cycles through the MWS unit, the treated runoff will be diverted back into the existing SD system terminating into the San Diego Creek and then into the Newport Bay.

In addition to the parking lot improvements, concrete walkways are proposed along the east perimeter of the new soccer field, south and west perimeter of the proposed dog parks as well as along the south side of the existing parking lot. The walkways are 5' wide paths designed to provide access to the new amenities and have landscaping on both sides. The minimal runoff generated from the walkways will discharge onto the adjacent landscaping where it will be absorbed by the soil.

II.5 Property Ownership/Management

The property will be owned and operated by The City of Irvine.

Section III Site Description

III.1 Physical Setting

Planning Area/ Community Name	Planning Area 12 – Oakcreek
Location/Address	15616 Valley Oak Drive, Irvine CA, 92606
Land Use	Recreation
Zoning	1.5
Acreage	19.10
Predominant Soil Type	Soil type B Per Figure XVI-2a of the North County TGD.

III.2 Site Characteristics

Precipitation Zone	*Design capture storm depth = 0.75 inches*
Topography	*The project has no large variations in grade and generally slopes to the southwest.*
Drainage Patterns/Connections	*See section II.2 for details*
Soil Type, Geology, and Infiltration Properties	*Soil Type B Per Figure XVI-2a of the North County TGD.*

Site Characteristics (continued)	
Hydrogeologic (Groundwater) Conditions	
Geotechnical Conditions (relevant to infiltration)	*The percolation rate on this site is infeasible for infiltration*
Off-Site Drainage	*No offsite drainage will be directed onto the site*
Utility and Infrastructure Information	*The project site discharges into an existing 78" RCP located in Valley Oak Drive.*

III.3 Watershed Description

Receiving Waters	San Diego Creek Reach 1, Upper Newport Bay, and Lower Newport Bay
303(d) Listed Impairments	San Diego Creek Reach 1 –Fecal Cloriform, Nutrients, Pesticides, Sedimentation/Siltation, Selenium, Toxaphene Newport Bay (Upper) Chlordane, Copper, DDT, indicator Bacteria, metals, nutrients, PCBs, sediment toxicity, Sedimentation/Siltation Newport Bay (Lower) Chlordane, Copper, DDT, indicator Bacteria, nutrients, PCBs, pesticides, sediment toxicity
Applicable TMDLs	San Diego Creek Reach 1 –Metals, Nutrients, Pesticides, Siltation Newport Bay (Upper) Metals, Nutrients, Pathogens, Pesticides, Siltation Newport Bay (Lower) Metals, Nutrients, Pathogens, Pesticides, Priority Organics, Siltation
Pollutants of Concern for the Project	The pollutants of concern for this project are Suspended Solids/Sediments, Nutrients, Heavy Metals, Pathogens, Pesticides, Toxic Organic Compounds, and Trash.

Environmentally Sensitive and Special Biological Significant Areas	N/A

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?		YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.			

Project Performance Criteria (continued)	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	N/A
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	The project will be designed to treat the 85th percentile, 24-hour storm event (Design Flow) of 0.31 cfs.
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Modular Wetlands Systems: The treatment capacity (cfs) for the single MWS unit that will treat the flow from drainage A is 0.34 CFS
Calculate LID design storm capture volume for Project.	Capture Volume: 1,163.87 cf (Worksheet B) Treatment Capacity= 0.34 cfs > Design Flow = 0.31 cfs

IV.2. SITE DESIGN AND DRAINAGE PLAN

The following section describes the site design BMPs used in this project and the methods used to incorporate them. Careful consideration of site design is a critical first step in storm water pollution prevention from new developments and redevelopments.

SITE DESIGN BMPs

Minimize Impervious Area

Impervious surfaces have been minimized by incorporating landscaped areas throughout the site surrounding the proposed hardscape areas.

Maximize Natural Infiltration Capacity

Under the existing conditions, infiltration capacity is low due to soils. Under the proposed condition, infiltration capacity will remain limited.

Disconnect Impervious Areas

Landscaping will be provided throughout the site, adjacent to walkways to disconnect impervious areas.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

Landscaping will be replaced as appropriate in disturbed areas.

Xeriscape Landscaping

Proposed Landscaping will comprise of native draught tolerant material with efficient irrigation

DRAINAGE MANAGEMENT AREAS

In accordance with the MS4 permit and the Model WQMP, the project site has been divided into 1 Drainage Management Area (DMA) to be utilized for defining drainage areas and sizing LID and other treatment control BMPs. The DMA has been delineated based on the proposed site grading patterns, drainage patterns, storm drain and catch basin locations.

The design capture volume (DCV) and treatment flow rate (QDesign) for the DMA is summarized in the table below. It have been derived utilizing the "Simple Method" in accordance with the TGD Section III.1.1. Actual BMP sizing requirements, including 80 percent capture design volumes, flow rates, depths, and other design details for the specific BMPs proposed are provided in Section IV.3.4 below. Location of DMA and associated

LID and treatment BMP are identified on the exhibits in Section VI. Additional calculations and TGD Worksheets are provided in Attachment B.

DMA/ Drainage Area ID [1]	BMP	Drainage Area (ac)	% Imp.	Design Storm Depth[2] (in)	Estimated Tc (min.)	Rainfall Intensity[3] (in/hr)	Q_{Design}[4] (cfs)
A	Modular Wetlands System	1.71	90%	0.75	10	0.22	0.31

Notes:
1. Refer to exhibits in Section VI for location each DMA.
2. Per Figure XVI-1 of the Model WQMP Technical Guidance Document
3. Per Figure III.4 of the Model WQMP Technical Guidance Document
4. Per Section III.3.3 and Worksheet D of the Model WQMP Technical Guidance Document.

V.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

IV.3.1 Hydrologic Source Controls

Name	Included?
Localized on-lot infiltration	☐
Impervious area dispersion (e.g. roof top disconnection)	☐
Street trees (canopy interception)	☐
Residential rain barrels (not actively managed)	☐
Green roofs/Brown roofs	☐
Blue roofs	☐
Impervious area reduction (e.g. permeable pavers, site design)	☐
Other:	☐
Other:	☐

IV.3.2 Infiltration BMPs

Name	Included?
Bioretention without underdrains	☐
Rain gardens	☐
Porous landscaping	☐
Infiltration planters	☐
Retention swales	☐
Infiltration trenches	☐
Infiltration basins	☐
Drywells	☐
Subsurface infiltration galleries	☐
French drains	☐
Permeable asphalt	☐
Permeable concrete	☐
Permeable concrete pavers	☐
Other:	☐
Other:	☐

Infiltration on the site is the most desirable BMP and must be used as much as possible however, is infeasible at this site due to existing soil conditions. In light of this, the next tier of the hierarchy was considered

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Name	Included?
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☐
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐
Other:	☐
Other:	☐

Rainwater harvesting was considered for this project. This involves capturing the initial storm water runoff in a tank either above ground or below ground and later reusing it for irrigation or toilet flushing. The goal with this method is to keep the initial runoff from entering the storm drain system. The major concern with this method is the situation in which there are two successive storms in a short amount of time. The first storm would fill the tank and then before there was sufficient time to empty the tank the second storm would hit. The initial runoff from the second storm would have to bypass the tank and would end up draining untreated to the storm drain. In light of this, the next tier of biotreatment was considered.

IV.3.4 Biotreatment BMPs

Name	Included?
Bioretention with underdrains	☐
Stormwater planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☒
Wet extended detention basin	☐
Dry extended detention basins	☐
Other:	☐
Other:	☐

Since both infiltration and harvest and reuse are considered infeasible, runoff from the project site will be treated through the use of a biofiltration BMP: a proprietary biotreatment system (Modular Wetlands) with downstream of the improvements. In accordance with the Model WQMP and TGD, the biofiltration BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). Location and tributary drainage area is shown on the WQMP Exhibit. Detailed calculations, associated TGD Worksheets and BMP details are included in Attachment B.

Modular Wetlands by Modular Wetlands Systems, Inc. are proprietary biotreatment systems that utilize multi-stage treatment processes including screening media filtration, settling, and biofiltration. The pre-treatment chamber contains the first three stages of treatment, and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical, chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.

IV.3.5 Hydromodification Control BMPs

BMP Name	BMP Description

IV.3.6 Regional/Sub-Regional LID BMPs

Regional/Sub-Regional LID BMPs
Not Applicable

IV.3.7 Treatment Control BMPs

Treatment Control BMPs	
BMP Name	**BMP Description**

IV.3.8 Non-structural Source Control BMPs

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No hazardous material on site
N6	Local Industrial Permit Compliance	☐	☒	No local industrial permits required
N7	Spill Contingency Plan	☐	☒	There are no loading docks or vehicle maintenance areas
N8	Underground Storage Tank Compliance	☐	☒	There are no underground storage tanks on site
N9	Hazardous Materials Disclosure Compliance	☐	☒	No hazardous material on site
N10	Uniform Fire Code Implementation	☐	☒	No hazardous material on site
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No loading dock on site
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	No gas outlet onsite.

N1. Education of Property Owners, Tenants and Occupants.

Proper education of onsite occupants will help to reduce all potential and anticipated pollutants from the site. Practical information shall be provided by the property owner to the employees on general good housekeeping BMP's and other practices that contribute to protection of storm water quality. This WQMP shall be provided with emphasis placed on the materials included in, but not limited to, Sections IV, V, VI, VII and Attachment A of this report. For additional information, see BMP SC-10, Non-Stormwater Discharges, included in Section Attachment A and the BMP Maintenance Responsibility/Frequency Matrix in Section V. Copies of The Ocean Begins at Your Front Door, Sewer Spill, Tips for Landscaping and Gardening, and Proper Maintenance Practices for Your Business are contained in Attachment A. Additional Education Materials to be used include, but are not limited to, SC-10, Non-Stormwater Discharges, SC-11, Spill Prevention, Control, and Cleanup, SC-34, Waste Handling and Disposal, and SC-41, Building & Grounds Maintenance. Also reference the Orange County Public Works website at http://www.ocwatersheds.com.

N2. Activity Restrictions.

Onsite activities shall be restricted to those currently granted by the City of Irvine and as outlined throughout this WQMP. Some general activity restrictions that shall be adhered to are:

- No discharges of fertilizer, pesticides, and wastes to streets or storm drains
- No blowing or sweeping of debris into streets or storm drains
- No hosing down of paved surfaces
- No vehicle fueling, washing, or maintenance

In addition, onsite activities shall be limited to the requirements of this WQMP as described herein. Adhering to appropriate activity restrictions will help to reduce all anticipated and potential pollutants from the site.

N3. Common Area Landscape Management.

All maintenance shall be consistent with City of Irvine guidelines. Proper landscape maintenance practices will help to reduce or eliminate pollution from pesticides, nutrients, trash/debris, and sediments. General guidelines include the following: Plant vegetation that reduces water, fertilizer, herbicide, and pesticide use. Waste shall be disposed of by composting or at a permitted landfill and shall not be raked or blown into the street, gutter, or storm drains. Irrigation systems shall be inspected monthly for poorly aligned sprinkler heads, broken sprinkler heads, and leaks. Detected problems shall be repaired as soon as they are observed. Avoid over-watering of vegetation. If excessive runoff is observed, automatic timers shall be adjusted. Note that the actual irrigation schedule and levels may vary based on soil type, maturity of vegetation, exposure, and seasonal conditions. If fertilizer is spilled on a paved surface it should be swept up immediately and placed in its container. Water shall not be used to clean fertilizer spills unless necessary and only after the area has been thoroughly cleaned using

dry cleaning methods. Pesticides, herbicides, and fertilizers shall not be applied within 48 hours prior to rain or if wind speeds exceed 5 mph. Pesticides shall be applied only as a last resort and after other pest mitigation efforts have been attempted. Non-pesticide mitigation measures include cultural tactics (modifying routine landscape activities, adjusting the amount of irrigation applied to the area, etc.), mechanical tactics (mulching and manual removal of weeds and larger pests such as snails), environmental/ physical tactics (netting, etc.), and biological tactics (using living organisms such as lady bugs and herbivores to control pests). Storage of pesticides shall be away from living areas and in a covered area that is not subject to temperature extremes. For additional information, see BMP SC-41, Building & Grounds Maintenance, SC-73, Landscape Maintenance, and BMP SD-10, Site Design and Landscape Planning, included in Attachment A and the BMP Maintenance Responsibility/Frequency Matrix in Section V.

N4. BMP Maintenance.

Selected BMP's will be maintained to ensure proper operation and that they are properly maintained. See the BMP Maintenance Responsibility/Frequency Matrix in Section V for details. Appropriate BMP Maintenance practices will help to reduce all pollutants from the site.

N11. Common Area Litter Control. (SC-60)

The owner shall implement trash management and litter control procedures aimed at reducing pollution of storm water runoff due to trash and debris. The owner will contract with a maintenance firm to provide regularly scheduled landscape maintenance and parking lot maintenance that will include litter removal, emptying of trash receptacles, and picking up of grass and plant clippings. For additional information, see BMP SC-41, Building & Grounds Maintenance, and SC-43, Parking/Storage Area Maintenance, included in Attachment A. Also see the BMP Maintenance Responsibility/Frequency Matrix in Section V.

N12. Employee Training.

Ensuring that employees are properly trained will help to reduce all anticipated and potential pollutants from the site. All new employees will be trained on how to minimize impacts to water quality. The educational materials provided in Attachment A will be reviewed including The Ocean Begins at Your Front Door, Sewer Spill, Tips for Landscaping and Gardening, and Proper Maintenance Practices for Your Business are contained in Attachment A. Additional Education Materials to be used are, but are not limited to, SC-10, Non-Stormwater Discharges, SC-11, Spill Prevention, Control, and Cleanup, SC-34, Waste Handling and Disposal, and SC-41, Building & Grounds Maintenance. Also reference the Orange County Public Works website at http://www.ocwatersheds.com. For additional information, see the BMP Maintenance Responsibility/Frequency Matrix in Section V.

N14. Common Area Catch Basin Inspection (SC-74).

Proper maintenance of the onsite catch basins will help to reduce the amount of trash/debris and silt/sediment in runoff. The onsite catch basins shall be inspected and cleaned of any trash or debris in or around the opening prior to the rainy season (by October 1st). Thereafter, inspections will be conducted every four months. See the Maintenance Responsibility/ Frequency Matrix in Section V.

N15 Street Sweeping Private Streets and Parking Lots (SC-43 & SC-70).

Access roads and drive aisles shall be swept twice a month to remove debris or more frequently as needed. Less traffic areas to be swept once a month minimum. For additional information, see BMP SC-43, Parking/Storage Area Maintenance and BMP SC-70, Road and Street Maintenance included in Attachment A. Also see the Maintenance Responsibility/ Frequency Matrix in Section V.

IV.3.9 Structural Source Control BMPs

Fill out structural source control check box forms or provide a brief narrative explaining if Structural source controls were not used.

Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor material storage areas proposed.
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☐	☒	A trash enclosure already exists on the site
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☐	☒	No large slopes on site
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	Requirements applicable to individual priority project categories listed below
S6	Dock areas	☐	☒	No docks are proposed
S7	Maintenance bays	☐	☒	No maintenance bays are proposed
S8	Vehicle wash areas	☐	☒	No vehicle wash areas are proposed
S9	Outdoor processing areas	☐	☒	No outdoor processing areas are proposed
S10	Equipment wash areas	☐	☒	No equipment wash areas are proposed
S11	Fueling areas	☐	☒	No fueling areas are proposed
S12	Hillside landscaping	☐	☒	No hillside landscaping areas are proposed
S13	Wash water control for food preparation areas	☐	☒	No food prep areas are proposed
S14	Community car wash racks	☐	☒	No community wash areas are proposed

S1. Provide Storm Drain Stenciling and Signage.

The proposed drainage inlets will be stenciled with the phrase "No Dumping – Drains to Ocean". Storm drain signage will help to reduce all pollution. The storm drain signage shall be inspected once per year for legibility and re-stenciled as necessary. Stenciling should be done at minimum once every five years. See BMP SD-13, Storm Drain Signage, in Attachment A and the BMP Maintenance Responsibility/Frequency Matrix in Section V.

S4. Use Efficient Irrigation Systems & Landscape Design, Water Conservation, Smart Controllers, and Source Control.

All landscape maintenance shall be consistent with City of Irvine guidelines. Efficient irrigation practices will help to reduce pollution due to pesticides, nutrients, and sediments. General guidelines include the following: Plant vegetation that reduces water, fertilizer, herbicide, and pesticide use. Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration.

IV.4 ALTERNATIVE COMPLIANCE PLAN (IF APPLICABLE)

IV.4.1 Water Quality Credits

Description of Proposed Project		
Project Types that Qualify for Water Quality Credits (Select all that apply):		
☐ Redevelopment projects that reduce the overall impervious footprint of the project site.	☐ Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.	☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).
☐ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).

☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐ Developments in a city center area.	☐ Developments in historic districts or historic preservation areas.	☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.
Calculation of Water Quality Credits (if applicable)				

IV.4.2 Alternative Compliance Plan Information

Not applicable. Water quality credits will not be applied for the project. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS_4 Permit hierarchy identified at the beginning of this Section.

Section V Inspection/Maintenance Responsibility for BMPs

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
N1 – Education of property owners, tenants, occupants	City of Irvine	Education of employees /owners shall be done within 4 weeks of start-up and continue on an annual refreshing basis with each new on-site employee/owner being given a Water Quality orientation using this WQMP as reference within two weeks of hire date.	Ongoing. Ensure all employees are adhering to the activity restrictions and are not engaged in activities that can have a negative impact on storm water.
N2 – Activity Restrictions	City of Irvine	There shall be no discharges of fertilizer, pesticides, or wastes to streets or storm drains. There shall be no blowing or sweeping of debris into storm drain. All debris shall be collected and relocated to an approved landfill.	Ongoing. Ensure all employees are adhering to the activity restrictions and are not engaged in activities that can have a negative impact on storm water.
N3 – Common area landscape management	City of Irvine	Landscape maintenance will consist of trimming and replanting of vegetation, repair and maintenance of irrigation systems, and appropriate use of fertilizers and pesticides.	Landscape maintenance shall be performed on a weekly basis. Irrigation systems shall be inspected monthly for leaks. Leaks shall be

			repaired as soon as they are observed.
N4 – BMP Maintenance	City of Irvine	The proposed treatment BMPs will be maintained as outlined in Attachment F of this report.	As outlined in Attachment F of this report.
N11 – Common area litter control	City of Irvine	The Owner will contract with a maintenance firm to provide weekly landscape maintenance and parking lot maintenance that will include litter removal and picking up grass and plant clippings. During routine maintenance, all trash and debris will be picked up and placed in waste receptacles.	Weekly

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
N12 – Employee training	City of Irvine	Education of employees /owner(s) shall be done within 4 weeks of startup and continue on an annual refreshing basis with each new onsite	Ongoing. Ensure all employees are adhering to the activity restrictions and are not engaged

		employee/owner(s) being given a water quality orientation using this WQMP as reference within two weeks of hire date.	in activities that can have a negative impact on storm water.
N14 – Common area catch basin inspection	City of Irvine	Inspect area in around catch basins for trash/debris and clean as necessary but at a minimum once prior to the rainy season (by Oct. 1st)	Once prior to the rainy season (by Oct. 1st) and every four months thereafter
N15 – Street sweeping private streets and parking lots	City of Irvine	The access roads and drive aisles shall be swept on a regular basis to remove debris. (See BMP SC-43 and BMP SC-70)	Twice a month to remove debris in drive aisles/access roads or more frequently as needed. Areas with less traffic to be done a minimum of once a month
Efficient Irrigation	City of Irvine	Inspect irrigation equipment. Check water sensors and adjust irrigation heads and timing.	Monthly
Modular Wetlands Biofilters	City of Irvine	· Remove trash from screening device. · Remove sediment from separation chamber. · Replace cartridge filter media. · Replace drain down filter media. · Trim vegetation.	Annually
Storm drain stencilling	Owner	The storm drain signage shall be inspected once per year for legibility and re-stencilled as necessary	Once every year, repaint every five years at minimum

Section VI Site Plan and Drainage Plan

VI.1 SITE PLAN AND DRAINAGE PLAN

Section VII Educational Materials

Refer to the Orange County Stormwater Program (ocwatersheds.com) for a library of materials available. For the copy submitted to the Permittee, only attach the educational materials specifically applicable to the project. Other materials specific to the project may be included as well and must be attached.

Education Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☐	Proper Maintenance Practices for Your Business	☒
Household Tips	☐	**Other Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☐		
Recycle at Your Local Used Oil Collection Center (North County)	☐	SC-10 Non-Stormwater Discharges	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	SC-11 Spill Prevention, Control and Clean-up	☒
Recycle at Your Local Used Oil Collection Center (South County)	☐	SC-34 Waste Handling and Disposal	☒
Tips for Maintaining a Septic Tank System	☐	SC-41 Building and Grounds Maintenance	☒
Responsible Pest Control	☐		☐
Sewer Spill	☐		☐
Tips for the Home Improvement Projects	☐		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☐		☐
Tips for Pet Care	☐		☐
Tips for Pool Maintenance	☐		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐		☐
Tips for Projects Using Paint	☐		☐

ATTACHMENT A

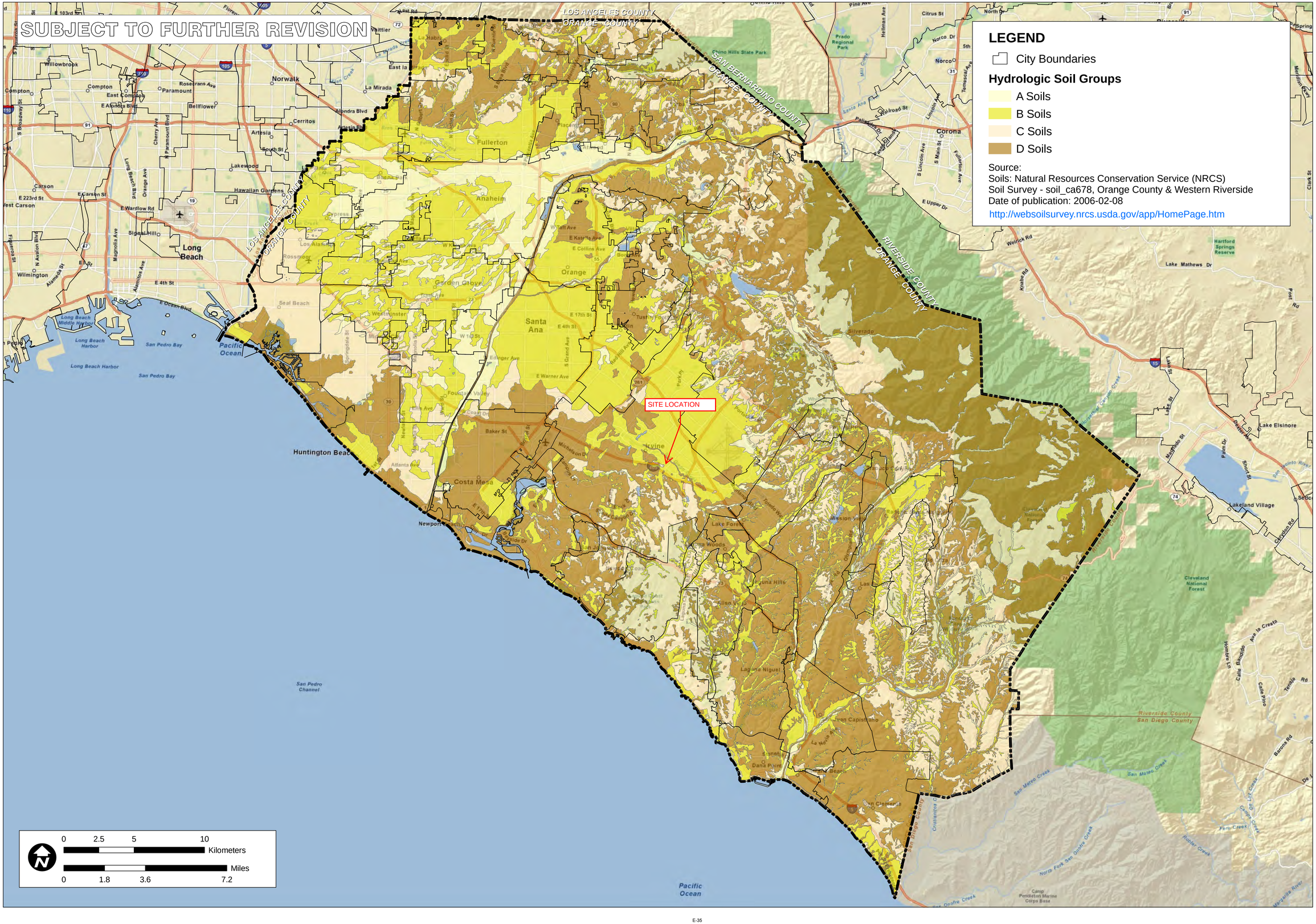
EDUCATIONAL MATERIALS

http://www.ocwatersheds.com

ATTACHMENT B

BMP CALCULATIONS

SUBJECT TO FURTHER REVISION



LEGEND

- City Boundaries

Hydrologic Soil Groups

- A Soils
- B Soils
- C Soils
- D Soils

Source:
Soils: Natural Resources Conservation Service (NRCS)
Soil Survey - soil_ca678, Orange County & Western Riverside
Date of publication: 2006-02-08
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

0 2.5 5 10 Kilometers

0 1.8 3.6 7.2 Miles

TITLE

NRCS HYDROLOGIC SOILS GROUPS

JOB

ORANGE COUNTY INFILTRATION STUDY

ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE

XVI-2a

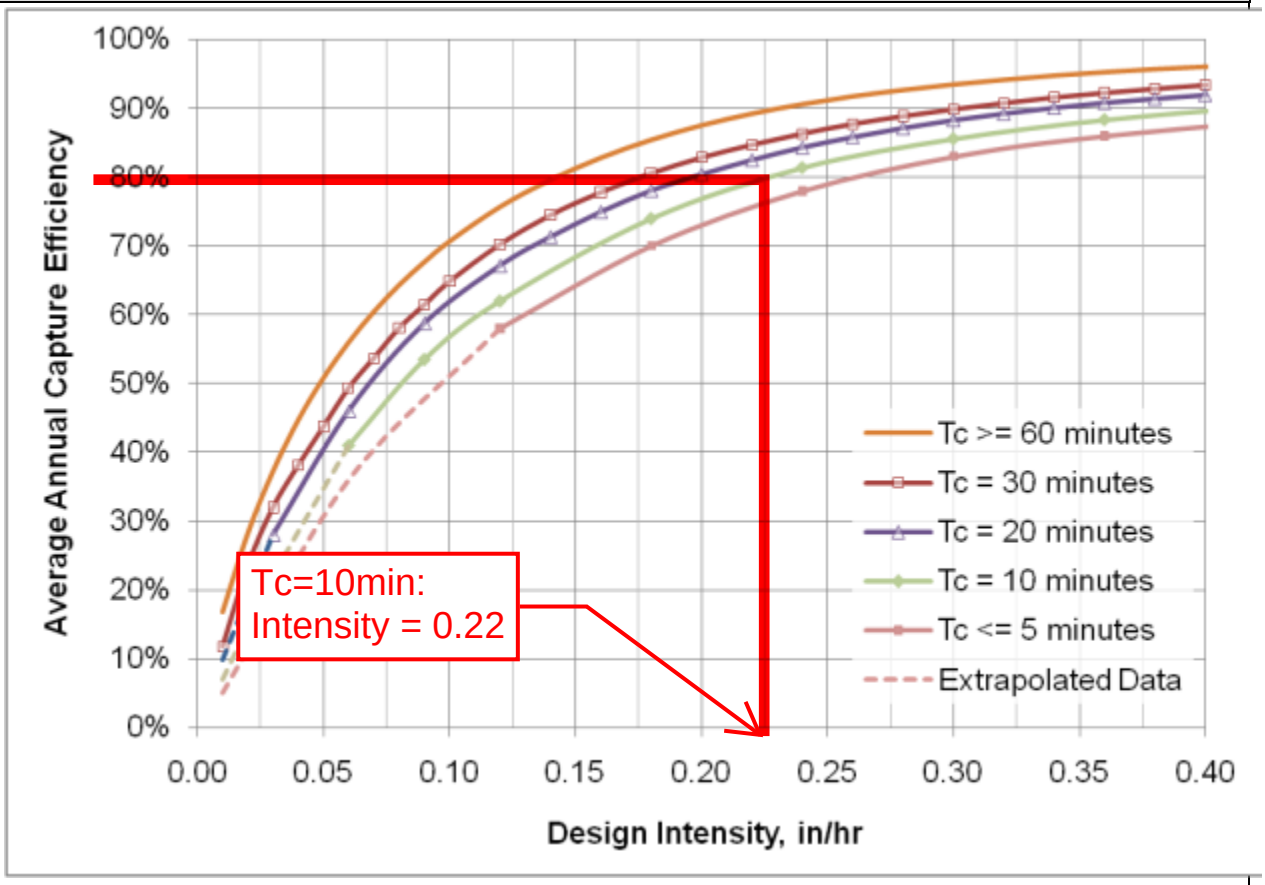
P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2a_HydroSoils_20110215.mxd

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See **Appendix IV.2**)	T_c=	10	
2	Using **Figure III.4**, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	.22	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (**Worksheet A**)	d_{HSC}=	0	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (**Worksheet A**)	Y_2=	0	%
5	Using **Figure III.4**, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency(Y_2), I_2	I_2=	0	
6	Determine the design intensity that must be provided by BMP, $I_{design}= I_1-I_2$	I_{design}=	.22	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.71	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	.9	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	.825	
4	Calculate design flowrate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.31	cfs
Supporting Calculations				
Describe system: The Qdesign for DMA-A is 0.31. The total treatment capacity of a 8'x12' MWS unit is 0.34 CFS				
Provide time of concentration assumptions:				

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Graphical Operations



Provide supporting graphical operations. See Example III.7.

Worksheet B: Simple Design Capture Volume Sizing Method

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	.75	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=		inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	.75	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.71	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	.9	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	.25	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	1163.87	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{observed}$[1] (in/hr) (**Appendix VII**)	$K_{observed}$=		In/hr
2	Enter combined safety factor from Worksheet H, S_{total} (unitless)	S_{total}=		
3	Calculate design infiltration rate, $K_{design} = K_{observed} / S_{total}$	K_{design}=		In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=		Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=		feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=		sq-ft

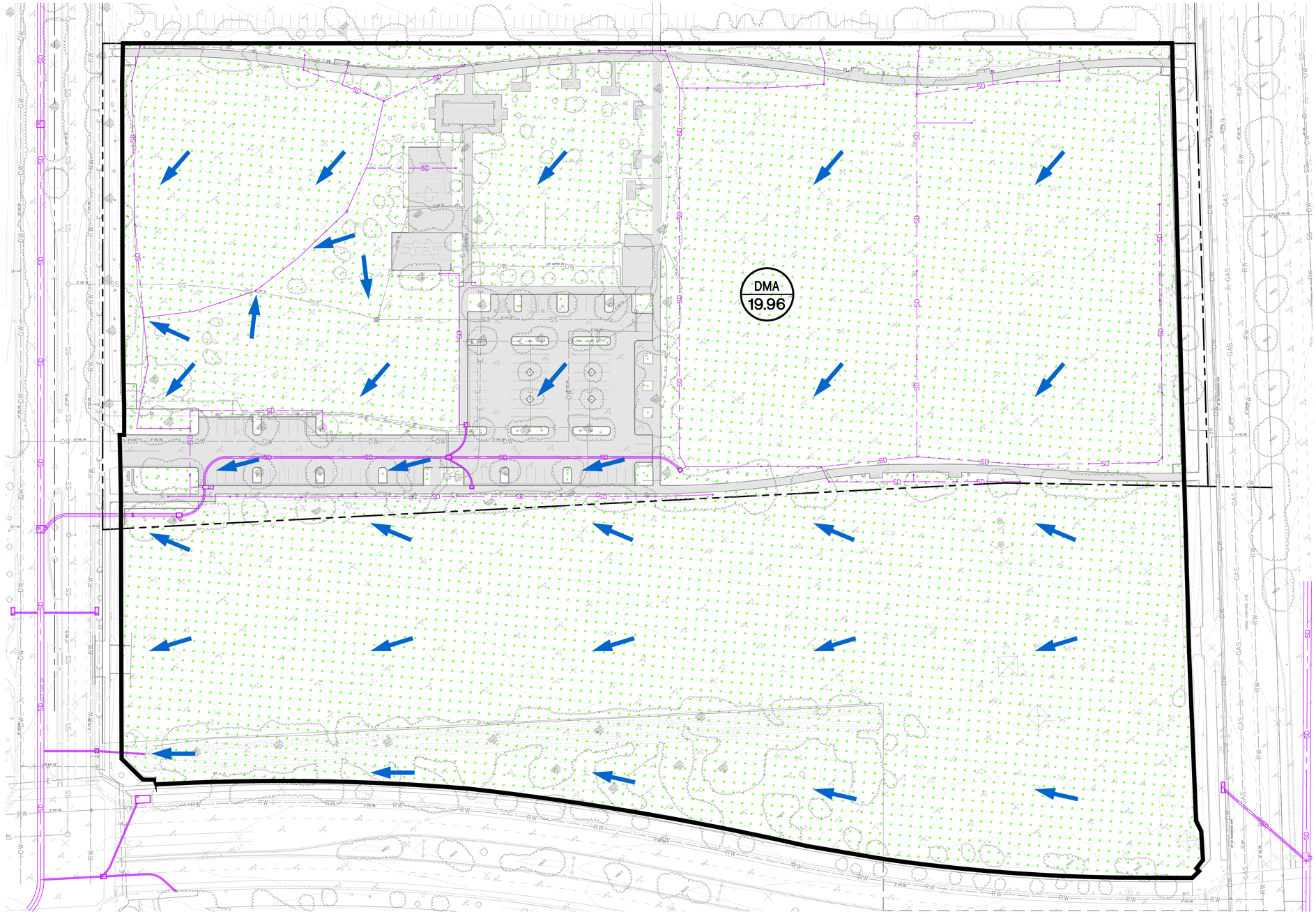
[1] $K_{observed}$ is the vertical infiltration measured in the field, before applying a factor of safety. If field testing measures a rate that is different than the vertical infiltration rate (for example, three-dimensional borehole percolation rate), then this rate must be adjusted by an acceptable method (for example, Porchet method) to yield the field estimate of vertical infiltration rate, $K_{observed}$. See Appendix VII.

MWS Linear 2.0 HGL Sizing Calculations

MWS MODEL SIZE	WETLAND PERMITER LENGTH	LOADING RATE GPM/SF	HGL HEIGHT																												
			SHALLOW MODELS																			STANDARD HEIGHT MODEL	HIGH CAPACITY MODELS									
			1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.65	3.70	3.75	3.80	3.85	3.90	3.95
MWS-L-4-4	6.70	1.0	0.022	0.023	0.025	0.026	0.028	0.029	0.031	0.032	0.034	0.035	0.037	0.038	0.040	0.042	0.043	0.045	0.046	0.048	0.049	0.051	**0.052**	0.054	0.055	0.056	0.057	0.058	0.058	0.059	0.060	0.061
MWS-L-3-6	10.06	1.0	0.032	0.035	0.037	0.039	0.042	0.044	0.046	0.048	0.051	0.053	0.055	0.058	0.060	0.062	0.065	0.067	0.069	0.072	0.074	0.076	**0.078**	0.081	0.083	0.084	0.085	0.087	0.088	0.089	0.090	0.091
MWS-L-4-6	9.30	1.0	0.030	0.032	0.034	0.036	0.038	0.041	0.043	0.045	0.047	0.049	0.051	0.053	0.055	0.058	0.060	0.062	0.064	0.066	0.068	0.070	**0.073**	0.075	0.077	0.078	0.079	0.080	0.081	0.082	0.083	0.084
MWS-L-4-8	14.80	1.0	0.048	0.051	0.054	0.058	0.061	0.065	0.068	0.071	0.075	0.078	0.082	0.085	0.088	0.092	0.095	0.099	0.102	0.105	0.109	0.112	**0.115**	0.119	0.122	0.124	0.126	0.127	0.129	0.131	0.132	0.134
MWS-L-4-13	18.40	1.0	0.059	0.063	0.068	0.072	0.076	0.080	0.084	0.089	0.093	0.097	0.101	0.106	0.110	0.114	0.118	0.122	0.127	0.131	0.135	0.139	**0.144**	0.148	0.152	0.154	0.156	0.158	0.160	0.163	0.165	0.167
MWS-L-4-15	22.40	1.0	0.072	0.077	0.082	0.087	0.093	0.098	0.103	0.108	0.113	0.118	0.123	0.129	0.134	0.139	0.144	0.149	0.154	0.159	0.165	0.170	**0.175**	0.180	0.185	0.188	0.190	0.193	0.195	0.198	0.200	0.203
MWS-L-4-17	26.40	1.0	0.085	0.091	0.097	0.103	0.109	0.115	0.121	0.127	0.133	0.139	0.145	0.151	0.158	0.164	0.170	0.176	0.182	0.188	0.194	0.200	**0.206**	0.212	0.218	0.221	0.224	0.227	0.230	0.233	0.236	0.239
MWS-L-4-19	30.40	1.0	0.098	0.105	0.112	0.119	0.126	0.133	0.140	0.147	0.153	0.160	0.167	0.174	0.181	0.188	0.195	0.202	0.209	0.216	0.223	0.230	**0.237**	0.244	0.251	0.255	0.258	0.262	0.265	0.269	0.272	0.276
MWS-L-4-21	34.40	1.0	0.111	0.118	0.126	0.134	0.142	0.150	0.158	0.166	0.174	0.182	0.189	0.197	0.205	0.213	0.221	0.229	0.237	0.245	0.253	0.261	**0.268**	0.276	0.284	0.288	0.292	0.296	0.300	0.304	0.308	0.312
MWS-L-6-8	18.80	1.0	0.060	0.065	0.069	0.073	0.078	0.082	0.086	0.091	0.095	0.099	0.104	0.108	0.112	0.116	0.121	0.125	0.129	0.134	0.138	0.142	**0.147**	0.151	0.155	0.157	0.160	0.162	0.164	0.166	0.168	0.170
MWS-L-8-8	29.60	1.0	0.095	0.102	0.109	0.115	0.122	0.129	0.136	0.143	0.149	0.156	0.163	0.170	0.177	0.183	0.190	0.197	0.204	0.211	0.217	0.224	**0.231**	0.238	0.245	0.248	0.251	0.255	0.258	0.262	0.265	0.268
MWS-L-8-12	44.40	1.0	0.143	0.153	0.163	0.173	0.183	0.194	0.204	0.214	0.224	0.234	0.245	0.255	0.265	0.275	0.285	0.296	0.306	0.316	0.326	0.336	**0.346**	0.357	0.367	0.372	0.377	0.382	0.387	0.392	0.397	0.402
MWS-L-8-16	59.20	1.0	0.190	0.204	0.217	0.231	0.245	0.258	0.272	0.285	0.299	0.312	0.326	0.340	0.353	0.367	0.380	0.394	0.408	0.421	0.435	0.448	**0.462**	0.476	0.489	0.496	0.503	0.509	0.516	0.523	0.530	0.537
MWS-L-8-20	74.00	1.0	0.238	0.255	0.272	0.289	0.306	0.323	0.340	0.357	0.374	0.391	0.408	0.425	0.442	0.459	0.476	0.493	0.509	0.526	0.543	0.560	**0.577**	0.594	0.611	0.620	0.628	0.637	0.645	0.654	0.662	0.671
MWS-L-10-20 or MWS-L-8-24	88.80	1.0	0.285	0.306	0.326	0.346	0.367	0.387	0.408	0.428	0.448	0.469	0.489	0.509	0.530	0.550	0.571	0.591	0.611	0.632	0.652	0.673	**0.693**	0.713	0.734	0.744	0.754	0.764	0.774	0.785	0.795	0.805
4'x'4 media cage	14.80	1.0	0.048	0.051	0.054	0.058	0.061	0.065	0.068	0.071	0.075	0.078	0.082	0.085	0.088	0.092	0.095	0.099	0.102	0.105	0.109	0.112	**0.115**	0.119	0.122	0.124						

ATTACHMENT C

BMP SITE PLAN



LEGEND

- BMP CATCHMENT AREA
- SD — EXISTING STORM DRAIN
- DIRECTION OF FLOW
- PERVIOUS AREAS
- IMPERVIOUS AREAS
- DMA-X / X.XX — DRAINAGE AREA / AREA (ACRE)

50' 25' 0' 50' 100'

GRAPHIC SCALE: 1"=50'

DRAINAGE AREAS

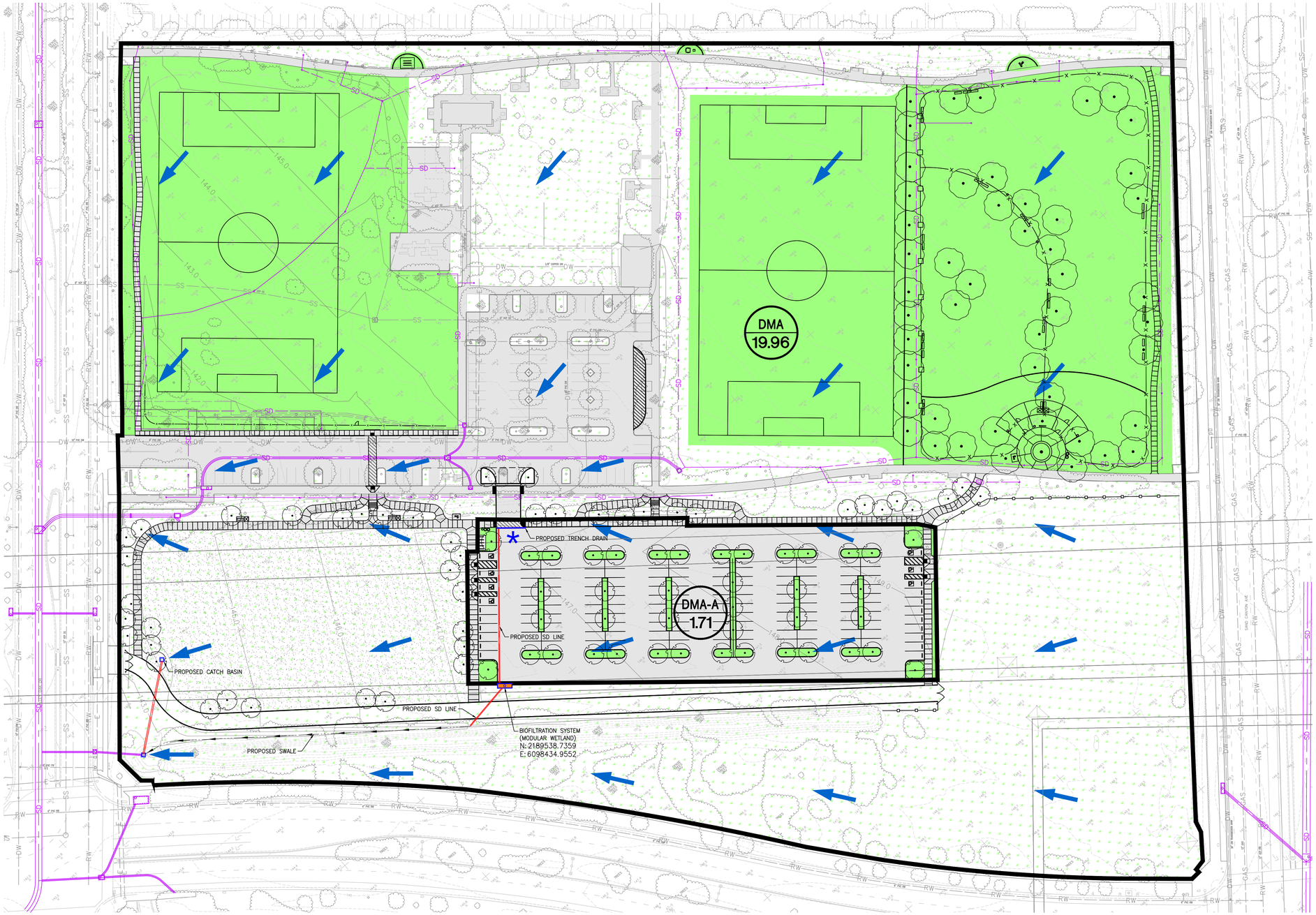
DRAINAGE AREA	AREA (ACRE)	IMPERVIOUS AREA (ACRE)	PERVIOUS AREA (ACRE)	% IMPERVIOUS	% PERVIOUS
TOTAL	19.10	2.00	17.10	11	89

CITY OF IRVINE
OAK CREEK COMMUNITY PARK

WQMP EXHIBIT
EXISTING CONDITION

JOB NO.:	19-2260
DATE:	4/7/2022
DRAWNED BY:	GC
DESIGNED BY:	GC
APPROVED BY:	MO

SHEET 1 OF 2



LEGEND

- BMP CATCHMENT AREA
- SD — EXISTING STORM DRAIN
- SD — PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN INLET
- * CATCH BASIN STENCILING
- DIRECTION OF FLOW
- PERVIOUS AREA
- COMMON AREA EFFICIENT IRRIGATION AND RUN–OFF MINIMIZING LANDSCAPE
- IMPERVIOUS AREA
- BIOFILTRATION SYSTEM (BIOCLEAN MODULAR WETLAND SYSTEM)

DMA-X / X.XX — DRAINAGE AREA / AREA (ACRE)

50' 25' 0' 50' 100'

GRAPHIC SCALE: 1"=50'

DRAINAGE AREAS

DRAINAGE AREA	AREA (ACRE)	IMPERVIOUS AREA (ACRE)	PERVIOUS AREA (ACRE)	% IMPERVIOUS	% PERVIOUS
TOTAL	19.10	3.97	15.13	21	79

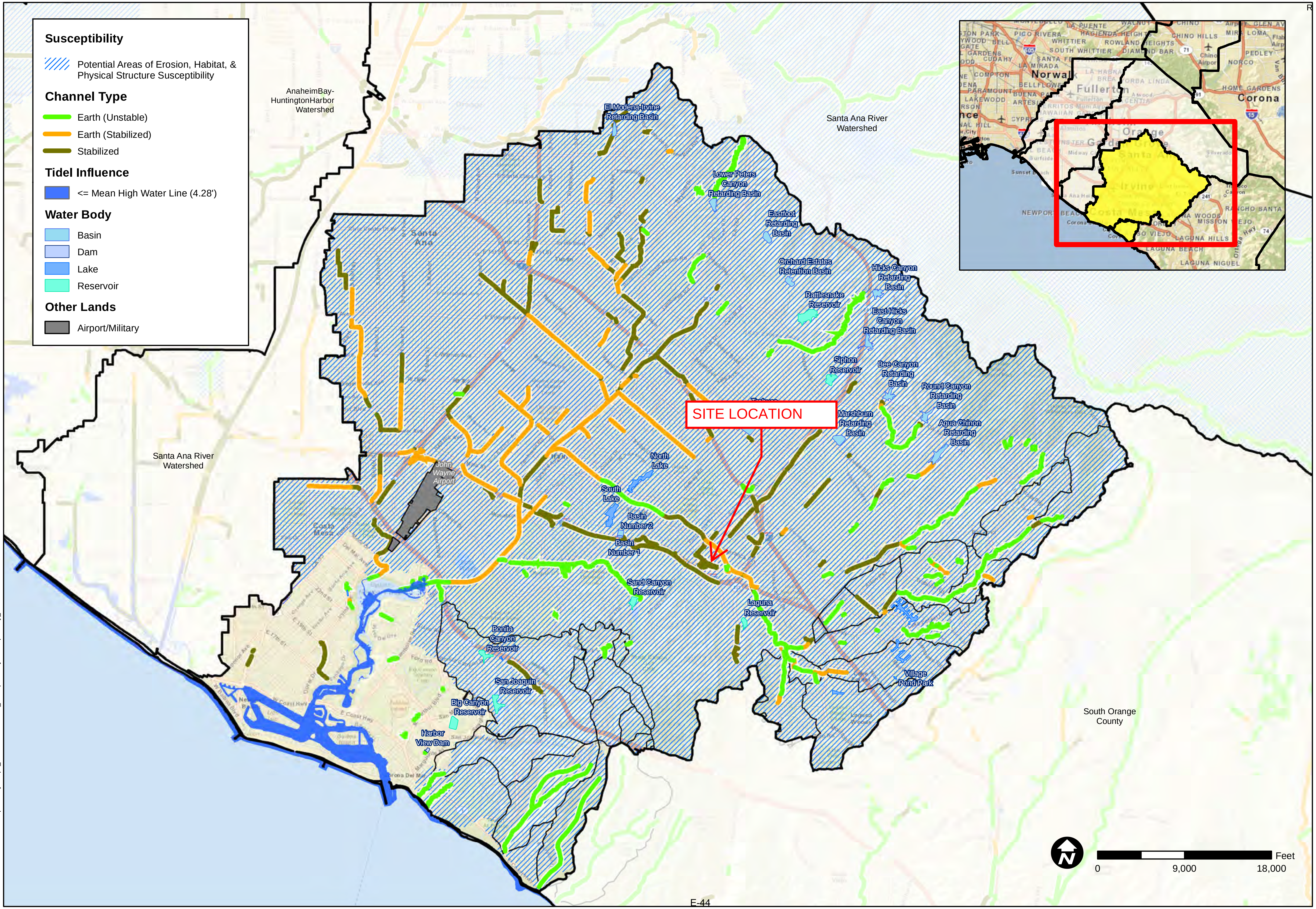
CITY OF IRVINE
OAK CREEK COMMUNITY PARK

WQMP EXHIBIT
PROPOSED CONDITION

JOB NO.:	19–2260
DATE:	4/7/2022
DRAWNED BY:	GC
DESIGNED BY:	GC
APPROVED BY:	MO
SHEET	2 OF 2

ATTACHMENT D

HYDROMODIFICATION CALCULATIONS



P:\9526E\6-GIS\Mxds\SuceptabilityMaps_20100505\9526E_NewportBaySusceptibility_20100430.mxd

TITLE
SUSCEPTIBILITY ANALYIS
NEWPORT BAY-
NEWPORT COASTAL STREAMS

JOB
ORANGE COUNTY
WATERSHED
MASTER PLANNING
ORANGE CO. CA

SCALE	DESIGNED	DRAWING	CHECKED	DATE	JOB NO.
1" = 12000'	TH	TH	BMP	04/30/10	9526-E

PACE Advanced Water Engineering

FIGURE 4

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                           Analysis prepared by:

                         ADAMS STREETER CIVIL ENGINEERS
                       16755 VON KARMAN AVENUE, SUITE 150
                               IRVINE, CA 92606
                                (949) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
* 2-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                             *
* EXISTING CONDITION                                                     *
 **************************************************************************

  FILE NAME: OAK02EXA.DAT
  TIME/DATE OF STUDY: 15:59 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *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   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.60  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.355
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.580
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    36    9.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.08
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  ** WARNING: Computed Flowrate is less than 0.1 cfs,
               Routing Algorithm is UNAVAILABLE.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.36
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.580
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.37

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.12
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.37
  PIPE TRAVEL TIME(MIN.) =   1.47    Tc(MIN.) =   10.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     614.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.82
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.453
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.46      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       0.83

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.11
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.83
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     711.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.14
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.11      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.12
  EFFECTIVE AREA(ACRES) =      0.88   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       0.93

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.93
```

```
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   11.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     846.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.57
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.399
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.77      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.77      SUBAREA RUNOFF(CFS) =    0.79
 EFFECTIVE AREA(ACRES) =      1.65   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       1.70

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.70
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.58
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     851.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.58
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.398
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        3.91      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    3.91      SUBAREA RUNOFF(CFS) =    4.02
 EFFECTIVE AREA(ACRES) =      5.56   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =       5.72

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.00
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.72
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   12.22
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =   12.22
  RAINFALL INTENSITY(INCH/HR) =   1.36
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.56
  TOTAL STREAM AREA(ACRES) =       5.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.72

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.76      0.30      0.850    36   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
```

```
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.83
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   11.09
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.09
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.433
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.60      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    0.76
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.56

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0077
 FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.74
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.56
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.25
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =   11.25
 RAINFALL INTENSITY(INCH/HR) =   1.42
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       1.36
 TOTAL STREAM AREA(ACRES) =       1.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.56

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

```
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   252.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.261
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.990
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.44      0.30     0.100    36    6.26
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.78
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.78
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.36
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     289.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =    6.36
 RAINFALL INTENSITY(INCH/HR) =   1.97
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.44
 TOTAL STREAM AREA(ACRES) =       0.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.78

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.72   12.22    1.355  0.30( 0.26) 0.85       5.6       1.00
     2        1.56   11.25    1.421  0.30( 0.16) 0.52       1.4       8.10
```

```
    3        0.78    6.36    1.971  0.30( 0.03) 0.10       0.4       8.40

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.69    6.36    1.971  0.30( 0.21) 0.71       4.1       8.40
      2        7.70   11.25    1.421  0.30( 0.22) 0.74       6.9       8.10
      3        7.73   12.22    1.355  0.30( 0.22) 0.74       7.4       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.73    Tc(MIN.) =    12.22
  EFFECTIVE AREA(ACRES) =       7.36   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =        7.4
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.73
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   13.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1343.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.12
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.52      0.30     0.100    36
  PUBLIC PARK                B        3.04      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.740
  SUBAREA AREA(ACRES) =    3.56      SUBAREA RUNOFF(CFS) =    3.46
  EFFECTIVE AREA(ACRES) =     10.92   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      10.60

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.08    7.29    1.823  0.30( 0.22) 0.72       7.7       8.40
```

```
      2       10.74   12.15    1.360  0.30( 0.22) 0.74      10.5       8.10
      3       10.60   13.12    1.301  0.30( 0.22) 0.74      10.9       1.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      11.08  Tc(MIN.) =    7.29
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.72  EFFECTIVE AREA(ACRES) =       7.66

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.29
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.823
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.31      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      7.97   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      11.51

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.31
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1431.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    7.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1525.60 FEET.
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =     2.35
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    149.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.63      0.30     1.000    72    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.11
 TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.11

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    149.00  DOWNSTREAM(FEET) =    139.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   858.00   CHANNEL SLOPE =  0.0106
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.11
 FLOW VELOCITY(FEET/SEC) =   1.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.07   Tc(MIN.) =   14.07
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =     860.35 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.07
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.250
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                   B        4.59      0.30     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    4.59      SUBAREA RUNOFF(CFS) =    3.92
 EFFECTIVE AREA(ACRES) =      5.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       4.46

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 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) =   1.25
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       5.22
  TOTAL STREAM AREA(ACRES) =       5.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.46

********************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    B        0.84      0.30     1.000    72   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      0.78

********************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   791.00   CHANNEL SLOPE =  0.0100
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.78
  FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.79   Tc(MIN.) =   21.32
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   21.32
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
  SUBAREA LOSS RATE DATA(AMC  I ):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                     B        1.81      0.30      1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       1.63

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.32
  RAINFALL INTENSITY(INCH/HR) =   0.98
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       2.65
  TOTAL STREAM AREA(ACRES) =       2.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.63

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.46   14.07    1.250  0.30( 0.30) 1.00       5.2      21.00
      2        1.63   21.32    0.985  0.30( 0.30) 1.00       2.6      23.10

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.96   14.07    1.250  0.30( 0.30) 1.00       7.0      21.00
      2        4.85   21.32    0.985  0.30( 0.30) 1.00       7.9      23.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.96    Tc(MIN.) =    14.07
  EFFECTIVE AREA(ACRES) =       6.97   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.9
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
```

```
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.89
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.96
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.20
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     24.00 =    1121.70 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =         7.9  TC(MIN.) =     14.20
  EFFECTIVE AREA(ACRES) =      6.97  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       5.96

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.96   14.20    1.243  0.30( 0.30) 1.00       7.0      21.00
      2        4.85   21.45    0.981  0.30( 0.30) 1.00       7.9      23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                           Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 2-YEAR STORM EVENT HYDROLOGY ANYLYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                             *
* PROPOSED CONDITION                                                     *
 **************************************************************************

  FILE NAME: OAK02PRA.DAT
  TIME/DATE OF STUDY: 16:01 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *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   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.560
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    36    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.08
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  ** WARNING: Computed Flowrate is less than 0.1 cfs,
               Routing Algorithm is UNAVAILABLE.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.560
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.28
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.36

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.06
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.36
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     614.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.05
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.436
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        2.53      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    2.69
  EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       3.02

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.65
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.02
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     711.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.422
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        0.25      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.26
  EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       3.25

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.30
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

```
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.25
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   11.48
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     846.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.48
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.405
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.71      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    0.73
 EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       3.93

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.48
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.93
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.49
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     851.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.49
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.404
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.01      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    2.08
 EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       6.01

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

```
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0111
 FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.01
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   12.12
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =   12.12
 RAINFALL INTENSITY(INCH/HR) =   1.36
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.85
 EFFECTIVE STREAM AREA(ACRES) =       5.81
 TOTAL STREAM AREA(ACRES) =       5.81
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.01

****************************************************************************
 FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 PUBLIC PARK                B        0.76      0.30     0.850    36   10.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      0.83
 TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
 FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.83
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   11.09
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.09
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.433
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.51      0.30     0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    0.64
 EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       1.45

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0077
 FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.45
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.26
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =   11.26
 RAINFALL INTENSITY(INCH/HR) =   1.42
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.55
 EFFECTIVE STREAM AREA(ACRES) =       1.27
 TOTAL STREAM AREA(ACRES) =       1.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.45
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.982
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.45      0.30      0.100    36    6.31
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.79
 TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      0.79

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.14
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.79
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.41
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =    6.41
 RAINFALL INTENSITY(INCH/HR) =   1.96
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.79

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
    1        6.01   12.12    1.361  0.30( 0.26) 0.85       5.8       1.00
    2        1.45   11.26    1.421  0.30( 0.16) 0.55       1.3       8.10
    3        0.79    6.41    1.963  0.30( 0.03) 0.10       0.4       8.40

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.87    6.41    1.963  0.30( 0.22) 0.72       4.2       8.40
      2        7.90   11.26    1.421  0.30( 0.22) 0.75       7.1       8.10
      3        7.93   12.12    1.361  0.30( 0.23) 0.75       7.5       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =        7.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.93
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1343.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.01
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.30      0.100    36
  PUBLIC PARK                B        3.13      0.30      0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
  SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    3.54
  EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      10.86

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       11.32    7.33    1.817  0.30( 0.22) 0.73       7.9       8.40
    2       10.98   12.15    1.360  0.30( 0.22) 0.75      10.7       8.10
    3       10.86   13.01    1.307  0.30( 0.23) 0.75      11.2       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      11.32  Tc(MIN.) =    7.33
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.73  EFFECTIVE AREA(ACRES) =       7.87

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.33
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.817
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.33      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.46
 EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      11.79

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.33
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.817
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.31
 EFFECTIVE AREA(ACRES) =      8.42   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      12.10

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
```

```
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.47
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1388.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.90
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.58
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1431.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.90
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    7.80
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1525.60 FEET.
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.383
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.88      0.30     1.000    72   11.80
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.86
 TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      0.86

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.86
 FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.26   Tc(MIN.) =   17.05
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.05
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.119
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.48      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.37
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.02

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.05
  RAINFALL INTENSITY(INCH/HR) =   1.12
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.02

********************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.833
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    36    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.15
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      1.15

********************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

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

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

    **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) =    9.90
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   2.33   Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.561
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.84      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.16
  EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       2.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.82
  FLOW VELOCITY(FEET/SEC.) =  1.66   DEPTH*VELOCITY(FT*FT/SEC.) =   0.57
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.561
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.21
  EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       2.34

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.64
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.34
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.74
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.74
  RAINFALL INTENSITY(INCH/HR) =   1.54
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.34

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.02   17.05    1.119  0.30( 0.28) 0.95       1.4      21.00
      2        2.34    9.74    1.544  0.30( 0.03) 0.10       1.7      22.51

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.22    9.74    1.544  0.30( 0.11) 0.37       2.5      22.51
      2        2.71   17.05    1.119  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.22    Tc(MIN.) =     9.74
  EFFECTIVE AREA(ACRES) =       2.48   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.22
  FLOW VELOCITY(FEET/SEC) =   2.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.53   Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.352
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN
  PUBLIC PARK              B        0.25      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       3.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 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.) =   12.27
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.73
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.22

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    72   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
```

```
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.78
 FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.04   Tc(MIN.) =   21.56
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.56
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.978
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    1.11
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       1.62

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   21.56
 RAINFALL INTENSITY(INCH/HR) =   0.98
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.62

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.22   12.27    1.352  0.30( 0.12) 0.41       2.7      22.51
     1        2.71   19.69    1.031  0.30( 0.15) 0.50       3.3      21.00
     2        1.62   21.56    0.978  0.30( 0.30) 1.00       2.6      23.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.65   12.27    1.352  0.30( 0.19) 0.62       4.2      22.51
     2        4.30   19.69    1.031  0.30( 0.21) 0.71       5.7      21.00
     3        4.16   21.56    0.978  0.30( 0.22) 0.72       6.0      23.10
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.65    Tc(MIN.) =    12.27
  EFFECTIVE AREA(ACRES) =       4.23   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.352
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.49      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      5.72   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =       5.92

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.88
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.92
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     12.40
  EFFECTIVE AREA(ACRES) =      5.72  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.680
  PEAK FLOW RATE(CFS)   =       5.92

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.92   12.40    1.344  0.30( 0.20) 0.68       5.7      22.51
      2        5.25   19.82    1.027  0.30( 0.22) 0.74       7.2      21.00
      3        5.05   21.70    0.975  0.30( 0.22) 0.75       7.4      23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix I

Proposed Q_{10} Hydrology Calculations

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 10-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* PROPOSED CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK10PRA.DAT
  TIME/DATE OF STUDY: 16:13 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    56    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    49.40   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.30
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.16
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    9.81
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     300.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.81
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.759
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.70

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.70
```

```
 PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =   11.05
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     663.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.577
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.53      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    5.29
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       5.94

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.00
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.94
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.15
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.15
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.564
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.25      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.52
 EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       6.42

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.40
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.42
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     895.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.27
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.548
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.71      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       7.84

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.99
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.84
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.28
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     900.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.28
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.547
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        2.01      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    4.15
  EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      11.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.99
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.80
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.81
  TOTAL STREAM AREA(ACRES) =       5.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.99

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.648
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK              B        0.76      0.30      0.850    56   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.64
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.64

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.64
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   11.01
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.582
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.51      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    1.17
  EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       2.76

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0077
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.39
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.76
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =   11.15
 RAINFALL INTENSITY(INCH/HR) =   2.56
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.55
 EFFECTIVE STREAM AREA(ACRES) =       1.27
 TOTAL STREAM AREA(ACRES) =       1.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.76

****************************************************************************
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.554
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.45      0.30      0.100    56    6.31
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.43
 TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      1.43

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.34
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.43
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.39
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =    6.39
 RAINFALL INTENSITY(INCH/HR) =   3.53
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.43

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       11.99   11.80    2.482  0.30( 0.26) 0.85       5.8       1.00
     2        2.76   11.15    2.563  0.30( 0.16) 0.55       1.3       8.10
     3        1.43    6.39    3.527  0.30( 0.03) 0.10       0.4       8.40

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       13.18    6.39    3.527  0.30( 0.22) 0.72       4.3       8.40
     2       15.54   11.15    2.563  0.30( 0.23) 0.75       7.2       8.10
     3       15.66   11.80    2.482  0.30( 0.23) 0.75       7.5       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.66    Tc(MIN.) =    11.80
 EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =        7.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.98
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.66
 PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   12.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1392.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.68
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.382
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
 COMMERCIAL                 B        0.50      0.30     0.100    56
 PUBLIC PARK                B        3.13      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
 SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    7.05
 EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      21.66

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       22.02    7.19    3.297  0.30( 0.22) 0.73       8.0       8.40
     2       21.75   12.03    2.454  0.30( 0.22) 0.75      10.8       8.10
     3       21.66   12.68    2.382  0.30( 0.23) 0.75      11.2       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      22.02  Tc(MIN.) =    7.19
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.73  EFFECTIVE AREA(ACRES) =       7.95

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.19
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.33      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.90
 EFFECTIVE AREA(ACRES) =      8.28   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      22.93

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.19
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.60
 EFFECTIVE AREA(ACRES) =      8.50   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      23.53

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

```
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.29
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1437.40 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.29
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1481.10 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.29
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1575.00 FEET.
======================================================================
======================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.482
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.88      0.30     1.000    86   11.80
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.73
 TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      1.73

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.73
 FLOW VELOCITY(FEET/SEC) =   1.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.72   Tc(MIN.) =   16.52
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.52
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.047
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.48      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.77
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.16

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.52
  RAINFALL INTENSITY(INCH/HR) =   2.05
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.16

****************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.288
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    56    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.08
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      2.08

****************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.82
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.69
 STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.84      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.14
 EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.95
 FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
 LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.15      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.38
 EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       4.32

****************************************************************************
 FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.32
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    9.40
 LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.40
  RAINFALL INTENSITY(INCH/HR) =   2.83
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.16   16.52    2.047  0.30( 0.28) 0.95       1.4      21.00
      2        4.32    9.40    2.828  0.30( 0.03) 0.10       1.7      22.51

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.09    9.40    2.828  0.30( 0.11) 0.36       2.5      22.51
      2        5.27   16.52    2.047  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.09    Tc(MIN.) =     9.40
  EFFECTIVE AREA(ACRES) =       2.47   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.09
  FLOW VELOCITY(FEET/SEC) =   2.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.18   Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  PUBLIC PARK                B        0.25      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      2.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       6.09
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 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.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   2.51
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.72
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.09

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.399
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    86   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.59
  FLOW VELOCITY(FEET/SEC) =   1.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
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```
 TRAVEL TIME(MIN.) =   8.26   Tc(MIN.) =   20.78
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.78
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.794
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    2.43
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       3.56

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.78
 RAINFALL INTENSITY(INCH/HR) =   1.79
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.56

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        6.09   11.58    2.508  0.30( 0.12) 0.41       2.7      22.51
     1        5.27   18.78    1.902  0.30( 0.15) 0.50       3.3      21.00
     2        3.56   20.78    1.794  0.30( 0.30) 1.00       2.6      23.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        9.03   11.58    2.508  0.30( 0.19) 0.62       4.2      22.51
     2        8.72   18.78    1.902  0.30( 0.21) 0.71       5.7      21.00
     3        8.51   20.78    1.794  0.30( 0.22) 0.72       6.0      23.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
 PEAK FLOW RATE(CFS) =       9.03    Tc(MIN.) =    11.58
 EFFECTIVE AREA(ACRES) =       4.20   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =        6.0
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.58
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        1.49      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    3.02
 EFFECTIVE AREA(ACRES) =      5.69   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      11.81

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.68
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.81
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.70
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     11.70
 EFFECTIVE AREA(ACRES) =      5.69  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.678
 PEAK FLOW RATE(CFS)   =      11.81

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       11.81   11.70    2.494  0.30( 0.20) 0.68       5.7      22.51
     2       10.87   18.91    1.895  0.30( 0.22) 0.74       7.2      21.00
     3       10.52   20.91    1.788  0.30( 0.22) 0.75       7.4      23.10
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Appendix J

Proposed Q_{25} Hydrology Calculations

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                          Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 25-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* PROPOSED CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK25PRA.DAT
  TIME/DATE OF STUDY: 16:23 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.342
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    56    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    49.40   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.46
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.19
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     300.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.296
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.66
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.85

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.13
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.85
```

```
 PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   10.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     663.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.98
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.090
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.53      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    6.46
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.25

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.76
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.25
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   11.06
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.06
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.078
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.25      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.64
 EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       7.85

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.49
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.85
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     895.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.062
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.71      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       9.60

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.22
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.60
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     900.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.061
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        2.01      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    5.08
  EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      14.67

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.66
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.67
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   11.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.67
  RAINFALL INTENSITY(INCH/HR) =   2.99
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.81
  TOTAL STREAM AREA(ACRES) =       5.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.67

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.162
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK              B        0.76      0.30      0.850    56   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.99

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.99
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   11.03
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.082
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.51      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.33

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0077
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.62
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.33
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =   11.16
  RAINFALL INTENSITY(INCH/HR) =   3.06
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.55
  EFFECTIVE STREAM AREA(ACRES) =       1.27
  TOTAL STREAM AREA(ACRES) =       1.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.33

**************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
  ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.230
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.45      0.30     0.100    56    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.70
  TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      1.70

**************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  REPRESENTATIVE SLOPE =  0.0557
  FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.70
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.39
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 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.) =    6.39
```

```
 RAINFALL INTENSITY(INCH/HR) =   4.20
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.70

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       14.67   11.67    2.986  0.30( 0.26) 0.85       5.8       1.00
     2        3.33   11.16    3.061  0.30( 0.16) 0.55       1.3       8.10
     3        1.70    6.39    4.200  0.30( 0.03) 0.10       0.4       8.40

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       15.96    6.39    4.200  0.30( 0.22) 0.72       4.4       8.40
     2       19.00   11.16    3.061  0.30( 0.23) 0.75       7.3       8.10
     3       19.13   11.67    2.986  0.30( 0.23) 0.75       7.5       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.13    Tc(MIN.) =    11.67
 EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =        7.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.09
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.13
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   12.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1392.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.38
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.887
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        0.50      0.30      0.100    56
  PUBLIC PARK              B        3.13      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
  SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    8.70
  EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      26.73

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       26.53    7.24    3.911  0.30( 0.22) 0.73       8.0       8.40
      2       26.81   11.88    2.955  0.30( 0.22) 0.75      10.9       8.10
      3       26.73   12.38    2.887  0.30( 0.23) 0.75      11.2       1.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      26.81  Tc(MIN.) =   11.88
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.75  EFFECTIVE AREA(ACRES) =      10.91

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        0.33      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.80
  EFFECTIVE AREA(ACRES) =     11.24   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      27.61

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        0.22      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.53
  EFFECTIVE AREA(ACRES) =     11.46   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      28.14
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       28.34    7.24    3.911  0.30( 0.22) 0.74       8.5       8.40
     2       28.14   11.88    2.955  0.30( 0.23) 0.75      11.5       8.10
     3       28.04   12.38    2.887  0.30( 0.23) 0.76      11.7       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      28.34  Tc(MIN.) =    7.24
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.74  EFFECTIVE AREA(ACRES) =       8.54

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.02
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.34
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.33
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1437.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.34
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.41
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1481.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.34
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.59
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1575.00 FEET.
============================================================================
```

==========

END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
  ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.967
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.88      0.30     1.000    86   11.80
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.11
  TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      2.11

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
  FLOW VELOCITY(FEET/SEC) =   1.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.53   Tc(MIN.) =   16.33
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.33
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.469
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.48      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.67

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.33
  RAINFALL INTENSITY(INCH/HR) =   2.47
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.67

****************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.917
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    56    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.48
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      2.48

****************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.84      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
  FLOW VELOCITY(FEET/SEC.) =  2.01   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.46
  EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       5.20

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.20
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.30
  RAINFALL INTENSITY(INCH/HR) =   3.39
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.67   16.33    2.469  0.30( 0.28) 0.95       1.4      21.00
      2        5.20    9.30    3.394  0.30( 0.03) 0.10       1.7      22.51

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.36    9.30    3.394  0.30( 0.11) 0.37       2.5      22.51
      2        6.44   16.33    2.469  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.36    Tc(MIN.) =     9.30
  EFFECTIVE AREA(ACRES) =       2.47   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.36
  FLOW VELOCITY(FEET/SEC) =   2.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.09   Tc(MIN.) =   11.39
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.027
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  PUBLIC PARK                B        0.25      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.62
  EFFECTIVE AREA(ACRES) =      2.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       7.36
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 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.) =   11.39
  RAINFALL INTENSITY(INCH/HR) =   3.03
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.72
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.36

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.869
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    86   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.94
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.94

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.94
  FLOW VELOCITY(FEET/SEC) =   1.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
 TRAVEL TIME(MIN.) =   7.93   Tc(MIN.) =   20.45
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.45
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.173
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    3.05
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       4.47

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.45
 RAINFALL INTENSITY(INCH/HR) =   2.17
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.47

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.36   11.39    3.027  0.30( 0.12) 0.41       2.7      22.51
     1        6.44   18.48    2.301  0.30( 0.15) 0.50       3.3      21.00
     2        4.47   20.45    2.173  0.30( 0.30) 1.00       2.6      23.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.99   11.39    3.027  0.30( 0.19) 0.62       4.2      22.51
     2       10.75   18.48    2.301  0.30( 0.21) 0.71       5.7      21.00
     3       10.52   20.45    2.173  0.30( 0.22) 0.72       6.0      23.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      10.99    Tc(MIN.) =    11.39
  EFFECTIVE AREA(ACRES) =       4.20   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.027
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.49      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    3.72
  EFFECTIVE AREA(ACRES) =      5.69   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      14.46

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.46
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   11.48
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     11.48
  EFFECTIVE AREA(ACRES) =      5.69  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.678
  PEAK FLOW RATE(CFS)   =      14.46

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       14.46   11.48    3.013  0.30( 0.20) 0.68       5.7       22.51
      2       13.46   18.58    2.294  0.30( 0.22) 0.74       7.2       21.00
      3       13.06   20.55    2.167  0.30( 0.22) 0.75       7.4       23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

ATTACHMENT E

ORANGE COUNTY RAINFALL ZONES MAP

SUBJECT TO FURTHER REVISION

LEGEND

- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

- 0.65"
- 0.7
- 0.75
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.10"

Note: Events defined as 24-hour periods (calendar days) with greater than 0.1 inches of rainfall.
For areas outside of available data coverage, professional judgment shall be applied.

0.65 0.7 0.75 0.8 0.85 0.9 0.95 1 1.05 1.1

SITE LOCATION

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
Pacific Ocean
San Pedro Bay
San Pedro Channel
Long Beach Harbor
Riverside County
San Diego County

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

P:\19526E\16-GIS\Mxds\Reports\InfiltrationFeasability_20110215\19526E_FigureXVI-1_RainfallZones_20110215.mxd

TITLE: RAINFALL ZONES

JOB: ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT — ORANGE CO. — CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	19526-E

PACE Advanced Water Engineering

FIGURE XVI-1