Priority Development Project (PDP)
Storm Water Quality Management Plan (SWQMP)

The Cambridge School

PRJ-1109086

[Insert Drawing Number (if applicable) and Internal Order Number (if applic

☐ **Check if electing for offsite alternative compliance**

Engineer of Work:



Danny Abada, RCE 45381
Provide Wet Signature and Stamp Above Line

Prepared For:

The Cambridge School, Attn: Scott Kim
12855 Black Mountain Road, San Diego, CA 92129
858-484-3488
[Insert Applicant Phone Number]

Prepared By:

SPEAR & ASSOCIATES, INC
475 Production Street, San Marcos, CA 92078
Phone: 760-736-2040
[Insert Company Phone Number]

Date:
2/11/26

Approved by: City of San Diego Date

The City of SAN DIEGO

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Project Name: The Cambridge School

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Acronyms

APN	Assessor's Parcel Number
ASBS	Area of Special Biological Significance
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CGP	Construction General Permit
DCV	Design Capture Volume
DMA	Drainage Management Areas
ESA	Environmentally Sensitive Area
GLU	Geomorphic Landscape Unit
GW	Ground Water
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
HU	Harvest and Use
INF	Infiltration
LID	Low Impact Development
LUP	Linear Underground/Overhead Projects
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
POC	Pollutant of Concern
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWPPP	Stormwater Pollutant Protection Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load
WMAA	Watershed Management Area Analysis
WPCP	Water Pollution Control Program
WQIP	Water Quality Improvement Plan

Project Name: The Cambridge School

Certification Page

Project Name:
Permit Application PRJ-1109086

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature

45381 — PE#

9/30/26 — Expiration Date

Danny Abada

Print Name

Spear & Associates, Inc.

Company

2/11/26

Date



Engineer's Stamp

Project Name: The Cambridge School

Submittal Record

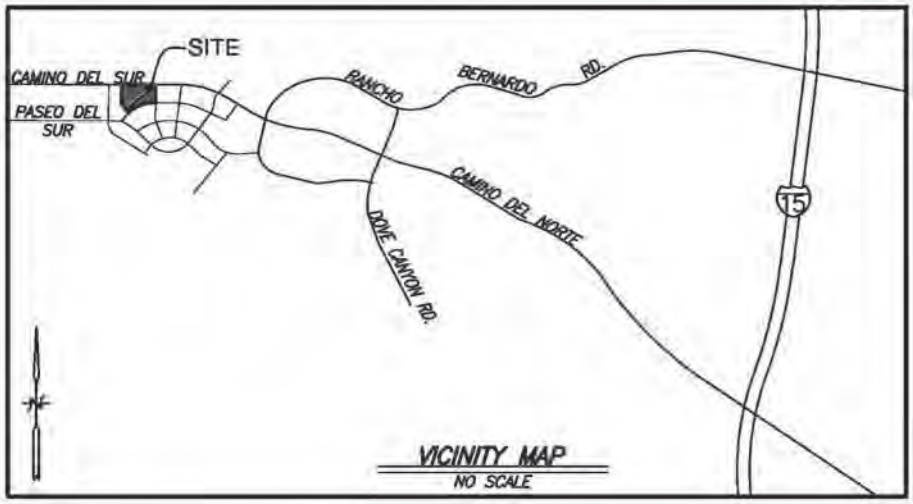
Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments.

Submittal Number	Date	Project Status	Changes
1	11/30/23	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2	2/6/25	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Revisions Made
3	2/11/26	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Revisions Made
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

Project Name: The Cambridge School

Project Vicinity Map

Project Name:
Permit Application



City of San Diego Form DS-560 Storm Water Requirements Applicability Checklist

Attach DS-560 form.

Development Services

THE CITY OF SAN DIEGO

FORM
DS-560
September 2021

Stormwater Requirements Applicability Checklist

Project Address: The Cambridge School **Project Number:**

SECTION 1: Construction Stormwater Best Management Practices (BMP) Requirements

All construction sites are required to implement construction BMPs per the performance standards in the Stormwater Standards Manual. Some sites are also required to obtain coverage under the State Construction General Permit (CGP)[1], administered by the California State Water Resources Control Board.

For all projects, complete Part A - If the project is required to submit a Stormwater Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP), continue to Part B.

PART A – Determine Construction Phase Stormwater Requirements

1. Is the project subject to California's statewide General National Pollutant Discharge Elimination System (NPDES) permit for Stormwater Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

   ◉ Yes, SWPPP is required; skip questions 2-4. ○ No; proceed to the next question.

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and/or contact with stormwater?

   ○ Yes, WPCP is required; skip questions 3-4. ◉ No; proceed to the next question.

3. Does the project propose routine maintenance to maintain the original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

   ○ Yes, WPCP is required; skip question 4. ◉ No; proceed to the next question.

4. Does the project only include the following Permit types listed below?

   - Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
   - Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
   - Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, potholing, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes, no document is required.

Check one of the boxes below and continue to Part B

◉ **If you checked "Yes" for question 1**, an SWPPP is REQUIRED – **continue to Part B**

○ **If you checked "No" for question 1 and checked "Yes" for question 2 or 3**, a WPCP is REQUIRED. If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to Part B**

○ **If you check "No" for all questions 1-3 and checked "Yes" for question 4,** Part B does not apply, and no document is required. **Continue to Section 2.**

[1] More information on the City's construction BMP requirements as well as CGP requirements can be found at http://www.sandiego.gov/stormwater/regulations/index.shtml

CLEAR FORM

PART B – Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete Part B and continue to Section 2

☐ **1. ASBS**

A. Projects located in the ASBS watershed.

☐ **2. High Priority**

A. Projects that qualify as Risk Level 2 or Risk Level 3 per the Construction General Permit (CGP) and are not located in the ASBS watershed.
B. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and are not located in the ASBS watershed.

☑ **3. Medium Priority**

A. Projects that are not located in an ASBS watershed or designated as a High priority site.
B. Projects that qualify as Risk Level 1 or LUP Type 1 per the CGP and are not located in an ASBS watershed.
C. WPCP projects (>5,000 square feet of ground disturbance) located within the Los Peñasquitos watershed management area.

☐ **4. Low Priority**

A. Projects not subject to a Medium or High site priority designation and are not located in an ASBS watershed.

Section 2: Construction Stormwater BMP Requirements

Additional information for determining the requirements is found in the Stormwater Standards Manual.

PART C – Determine if Not Subject to Permanent Stormwater Requirements

Projects that are considered maintenance or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Stormwater Standards Manual are not subject to Permanent Stormwater BMPs.

- **If "yes" is checked for any number in Part C**: Proceed to Part F and check "Not Subject to Permanent Stormwater BMP Requirements."
- **If "no" is checked for all the numbers in Part C:** Continue to Part D.

1. Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact stormwater?

   ○ Yes ◉ No

2. Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?

   ○ Yes ◉ No

3. Does the project fall under routine maintenance? Examples include but are not limited to roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay and pothole repair).

   ○ Yes ◉ No

CLEAR FORM

PART D – PDP Exempt Requirements

PDP Exempt projects are required to implement site design and source control BMPs.

- **If "yes" is checked for any questions in Part D**, continue to Part F and check the box labeled "PDP Exempt."
- **If "no" is checked for all questions in Part D**, continue to Part E.

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:
   - Are designed and constructed to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;
   - Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;
   - Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Stormwater Standards manual?

   ○ Yes, PDP exempt requirements apply ◉ No, proceed to next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Stormwater Standards Manual?

   ○ Yes, PDP exempt requirements apply ◉ No, proceed to next question

PART E – Determine if Project is a Priority Development Project (PDP)

Projects that match one of the definitions below are subject to additional requirements, including preparation of a Stormwater Quality Management Plan (SWQMP).

- **If "yes" is checked for any number in Part E**, continue to Part F and check the box labeled "Priority Development Project."
- **If "no" is checked for every number in Part E**, continue to Part F and check the box labeled "Standard Development Project."

1. **New development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ◉ Yes ○ No

2. **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ○ Yes ◉ No

3. **New development or redevelopment of a restaurant.** Facilities that sell prepared foods and beverages for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) 5812), and where the land development creates and/or replaces 5,000 square feet or more of impervious surface. ◉ Yes ○ No

4. **New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater. ○ Yes ◉ No

5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).** ◉ Yes ○ No

6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site). ○ Yes ◉ No

CLEAR FORM

7. **New development or redevelopment discharging directly to an environmentally sensitive area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over the project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). ○ Yes ◉ No

8. **New development or redevelopment projects of retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ○ Yes ◉ No

9. **New development or redevelopment projects of an automotive repair shop that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534 or 7536-7539. ○ Yes ◉ No

10. **Other Pollutant Generating Project.** These projects are not covered in any of the categories above but involve the disturbance of one or more acres of land and are expected to generate post-construction phase pollutants, including fertilizers and pesticides. This category does not include projects creating less than 5,000 square feet of impervious area and projects containing landscaping without a requirement for the regular use of fertilizers and pesticides (such as a slope stabilization project using native plants). Impervious area calculations need not include linear pathways for infrequent vehicle use, such as emergency maintenance access or bicycle and pedestrian paths if the linear pathways are built with pervious surfaces or if runoff from the pathway sheet flows to adjacent pervious areas. ◉ Yes ○ No

PART F – Select the appropriate category based on the outcomes of Part C through Part E

1. The project is **NOT SUBJECT TO PERMANENT STORMWATER REQUIREMENTS** ○ Yes ◉ No

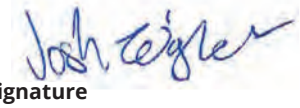
2. The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Stormwater Standards Manual for guidance. ○ Yes ◉ No

3. The Project is **PDP EXEMPT**. Site design and source control BMP requirements apply. Refer to the Stormwater Standards Manual for guidance. ○ Yes ◉ No

4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control and structural pollutant control BMP requirements apply. Refer to the Stormwater Standards Manual for guidance on determining if the project requires hydromodification plan management. ◉ Yes ○ No

Josh Zeigler ~ Spear & Associates, Inc.

Name of Owner or Agent



Signature

Civil Engineer/Agent

Title

2/11/26

Date

CLEAR FORM

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Project Name: The Cambridge School

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: The Cambridge School		
Permit Application Number: PRJ-1109086		Date: 2/11/26
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.		
Step	**Answer**	**Progression**
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2**.
	☐ No	**Stop**. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3**.
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

Project Name: The Cambridge School

Form I-1 Page 2 of 2		
Step	**Answer**	**Progression**
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to **Step 4**.
	☑ No	BMP Design Manual PDP requirements apply. Go to **Step 4**.
Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to **Step 5**.
	☐ No	**Stop**. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do not apply:		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). **Stop**.
	☑ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. **Stop**.
Discussion / justification if protection of critical coarse sediment yield areas does not apply: No CCSYA within the project site		

HMP Exemption Exhibit

Attach a HMP Exemption Exhibit that shows direct storm water runoff discharge from the project site to HMP exempt area. Include project area, applicable underground storm drain line and/or concrete lined channels, outfall information and exempt waterbody.
Reference applicable drawing number(s).

Exhibit must be provided on 11"x17" or larger paper.

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Project Name: The Cambridge School

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	The Cambridge School
Project Address	Coyote Bush Dr & Camino del Sur, San Diego, CA 92127
Assessor's Parcel Number(s) (APN(s))	678-690-70-00, 678-690-71-00, 678-690-72-00
Permit Application Number	PRJ-1109086
Project Watershed	Select One: ☑ San Dieguito River ☐ Penasquitos ☐ Mission Bay ☐ San Diego River ☐ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	HU: San Dieguito, HA: Solane Beach 905.1
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	6.53 Acres (284292 Square Feet) 0.30 Acres, 13,068 s.f. Offsite
Area to be disturbed by the project (Project Footprint)	6.53 Acres (284292 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	4.85 Acres (211357 Square Feet) 0.25 Acres, 10,768 s.f. Offsite
Project Proposed Pervious Area (subset of Project Footprint)	1.67 Acres (72935 Square Feet) 0.05 Acres, 2,300 s.f. Offsite
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition	74.35 % Increase

Project Name: The Cambridge School

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):

- ☐ Existing development
- ☑ Previously graded but not built out
- ☐ Agricultural or other non-impervious use
- ☑ Vacant, undeveloped/natural

Description / Additional Information:

Existing Land Cover Includes (select all that apply):

- ☐ Vegetative Cover
- ☑ Non-Vegetated Pervious Areas
- ☑ Impervious Areas

Description / Additional Information:

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
- ☐ NRCS Type B
- ☑ NRCS Type C
- ☐ NRCS Type D

Approximate Depth to Groundwater:

- ☐ Groundwater Depth < 5 feet
- ☐ 5 feet < Groundwater Depth < 10 feet
- ☐ 10 feet < Groundwater Depth < 20 feet
- ☐ Groundwater Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- ☐ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☑ None

Description / Additional Information:

Form I-3B Page 3 of 11

Description of Existing Site Topography and Drainage

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

1. Whether existing drainage conveyance is natural or urban;
2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site;
3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels;
4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Descriptions/Additional Information

The existing drainage conveyance is natural. The site drains northeasterly towards and existing bioretention basin located at the northeast corner of the site. Also 0.30 acres of offsite runoff from Coyote Bush Drive drain into the northeast corner of the site. The entire runoff then drains to a headwall connecting to an existing 24" RCP. The runoff is then directed approximately 1.69 miles through public stormdrains to the San Dieguito River, then 7.9 miles to the Pacific Ocean

Summary of flow rates

	Q100-yr cfs	*Outlet V100-yr ft/s*
Pre-Dev. Total	9.6	14.8
Post-Dev. Total w/Onsite Det. @ POC 1	8.5	14.1

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The project consists of developing a vacant lot with a private school parking structure landscaping, proprietary modular wetlands for stormwater treatment and underground detention to address hydromodification. Three modular wetlands are proposed, two for onsite runoff and one to treat offsite runoff from Coyote Bush Drive draining into the site.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

Building rooftops, parking lots and hardscape

List/describe proposed pervious features of the project (e.g., landscape areas):

Landscaping

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

Minimal grading is proposed to accommodate the development.

Form I-3B Page 5 of 11

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☑ Yes

☐ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Description / Additional Information:

The development will maintain existing drainage patterns. Post development runoff will be directed to proprietary modular wetlands for stormwater treatment and underground detention to address hydromodification located at the northeast corner of the site. Three modular wetlands are proposed, two for onsite runoff and one to treat offsite runoff from Coyote Bush Drive draining to the site. The outlet flows will be directed to the same drainage system as in pre-development

Summary of flow rates

	Q100-yr cfs	*Outlet V100-yr ft/s*
Pre-Dev. Total	9.6	14.8
Post-Dev. Total w/Onsite Det. @ POC 1	8.5	14.1

Form I-3B Page 6 of 11

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- [x] Onsite storm drain inlets
- [ ] Interior floor drains and elevator shaft sump pumps
- [x] Interior parking garages
- [ ] Need for future indoor & structural pest control
- [x] Landscape/outdoor pesticide use
- [x] Pools, spas, ponds, decorative fountains, and other water features
- [x] Food service
- [ ] Refuse areas
- [ ] Industrial processes
- [x] Outdoor storage of equipment or materials
- [ ] Vehicle and equipment cleaning
- [ ] Vehicle/equipment repair and maintenance
- [ ] Fuel dispensing areas
- [ ] Loading docks
- [x] Fire sprinkler test water
- [ ] Miscellaneous drain or wash water
- [x] Plazas, sidewalks, and parking lots

Description/Additional Information:

Form I-3B Page 7 of 11
Identification and Narrative of Receiving Water
Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable) The entire runoff then drains to a headwall connecting to an existing 24" RCP. The runoff is then directed approximately 1.69 miles through public stormdrains to the San Dieguito River, then 7.9 miles to the Pacific Ocean.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations San Dieguito Lagoon: REC1, REC2, BIOL, EST, WILD, RARE, MAR, MIGR, SPWN.
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations None
Provide distance from project outfall location to impaired or sensitive receiving waters 1.69 miles
Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands The project's post-construction storm water BMPs is not located within the City's Multi-Habitat Planning Area and environmentally sensitive lands

Project Name: The Cambridge School

Form I-3B Page 8 of 11		
Identification of Receiving Water Pollutants of Concern		
List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:		
303(d) Impaired Water Body (Refer to Appendix K)	**Pollutant(s)/Stressor(s) (Refer to Appendix K)**	**TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1)**
San Dieguito River	Enterococcus, Fecal Coliform, Nitrogen, Phosphorus, Total Dissolved Solids, Toxicity	Indicator Bacteria
Pacific Ocean Shoreline @ San Dieguito River	Total Coliform	

Identification of Project Site Pollutants*			
*Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated) Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see Appendix B.6):			
Pollutant	**Not Applicable to the Project Site**	**Anticipated from the Project Site**	**Also a Receiving Water Pollutant of Concern**
Sediment	☐	☐	☐
Nutrients	☐	☐	☐
Heavy Metals	☐	☐	☐
Organic Compounds	☐	☐	☐
Trash & Debris	☐	☐	☐
Oxygen Demanding Substances	☐	☐	☐
Oil & Grease	☐	☐	☐
Bacteria & Viruses	☐	☐	☐
Pesticides	☐	☐	☐

Project Name: The Cambridge School

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

☑ Yes, hydromodification management flow control structural BMPs required.

☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.

Critical Coarse Sediment Yield Areas*

*This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

☐ Yes

☑ No

Discussion / Additional Information:

No CCSYA within the project site

Project Name: The Cambridge School

Form I-3B Page 10 of 11
Flow Control for Post-Project Runoff*   ***This Section only required if hydromodification management requirements apply**
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.   POC 1 @ the northeast corner of the site
Has a geomorphic assessment been performed for the receiving channel(s)?   ☑ No, the low flow threshold is $0.1Q_2$ (default low flow threshold)   ☐ Yes, the result is the low flow threshold is $0.1Q_2$ ☐ Yes, the result is the low flow threshold is $0.3Q_2$ ☐ Yes, the result is the low flow threshold is $0.5Q_2$ If a geomorphic assessment has been performed, provide title, date, and preparer:
Discussion / Additional Information: (optional)

Form I-3B Page 11 of 11

Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

DMA SM-1 is self mitigating and it complies with all items listed in section 5.2.1 of the stormwater standards manual.

Optional Additional Information or Continuation of Previous Sections As Needed

This space provided for additional information or continuation of information from previous sections as needed.

Project Name: The Cambridge School

Source Control BMP Checklist for PDPs	Form I-4B

Source Control BMPs

All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.

Source Control Requirement	Applied?		
4.2.1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.3 not implemented: Not proposed			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.4 not implemented: Not proposed			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

Project Name: The Cambridge School

Form I-4B Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☑ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☑ N/A
Interior parking garages	☑ Yes	☐ No	☐ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☑ N/A
Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☑ Yes	☐ No	☐ N/A
Refuse areas	☑ Yes	☐ No	☐ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☑ Yes	☐ No	☐ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☑ N/A
Plazas, sidewalks, and parking lots	☑ Yes	☐ No	☐ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive Facilities	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			

Project Name: The Cambridge School

Site Design BMP Checklist for PDPs	Form I-5B

Site Design BMPs

All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

A site map with implemented site design BMPs must be included at the end of this checklist.

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.1 not implemented: None existing			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☐ No	☑ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☑ No	☐ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.2 not implemented: Tree wells are not feasible			

Project Name: The Cambridge School

Form I-5B Page 2 of 4			
Site Design Requirement	**Applied?**		
4.3.3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.3 not implemented:			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.5 not implemented:			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☑ Yes	☐ No	☐ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☑ No	☐ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A

Project Name: The Cambridge School

Form I-5B Page 3 of 4			
Site Design Requirement	Applied?		
4.3.6 Runoff Collection	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.6 not implemented:			
6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix	☐ Yes	☑ No	☐ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented: Green Roofs and permeable pavements are not feasible			
4.3.8 Harvest and Use Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: Found Infeasible per Harvest and Use Feasibility Checklist Form I-7			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A

Project Name: The Cambridge School

Form I-5B Page 4 of 4
Insert Site Map with all site design BMPs identified:

Project Name: The Cambridge School

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

The entire development area will have 3 proprietary modular wetlands for stormwater treatment, and underground detention will address hydromodification.

Runoff factors were adjusted to account for the site design BMPs and the DCV was calculated.

Harvest and use of stormwater within the project was found unfeasible because there will be no significant demand with the proposed drought tolerant landscaping and development type, in accordance with Form I-7. Infiltration is unfeasible due to adjacent structures and roads.

DMA SM-1 is self mitigating and it complies with all items listed in section 5.2.1 of the stormwater standards manual.

The Modular Wetlands a were designed and sized in accordance with design criteria and considerations listed in the BMP design manual fact sheets. (See Specs Below)

Retention Requirements for DMAs A1 & A2 will be met with a tree well

DMA B is self retaining with a ratio of impervious to pervious = 0.29:1 (1840 s.f. of hardscape and 6281 s.f. landscape)

(Continue on page 2 as necessary.)

Project Name: The Cambridge School

Form I-6 Page 2 of 2

(Continued from page 1)

Detailed description for mitigating DMA A:

DMA A drainage is routed to a summation point inside the storm drain cleanout located near the N.W. corner of the parking structure. That SDCO has a 6" pipe at the bottom of the box, that will route the required low flow retention volume to drain out to the tree well located at the north side of the parking structure. That same SDCO has a primary 24" pipe that is elevated 6" above the bottom of box, to bypass the larger flows directly to the (2) MWS Units. The 24" primary outlet pipe will drain to a splitter box located in between the (2) MWS Units on the north side of the parking structure. That splitter box is simply a 2nd storm drain clean out with two equally sized outlet pipes set at the same elevation, to let gravity split the runoff to drain to either of the (2) MWS Units. From the (2) MWS Units, the treated runoff will drain to the Underground Detention facility that is located under the north side of the parking structure. The treated runoff from DMA B & O will also drain to the same underground detention facility. The underground detention facility has a restricted and emergency overflow outlet near the N.E. corner of the parking structure, where the detention facility will drain out to the existing public storm drain system through the existing public curb inlet on Camino Del Sur, near the N.E. corner of the parking structure.

CONTECH®
ENGINEERED SOLUTIONS

Modular Wetlands® Linear Stormwater Biofiltration



The experts you need to solve your stormwater challenges



Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team



STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.



STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.



REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.



SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions



Restoring Nature's Presence in Urban Areas – Modular Wetlands® Linear

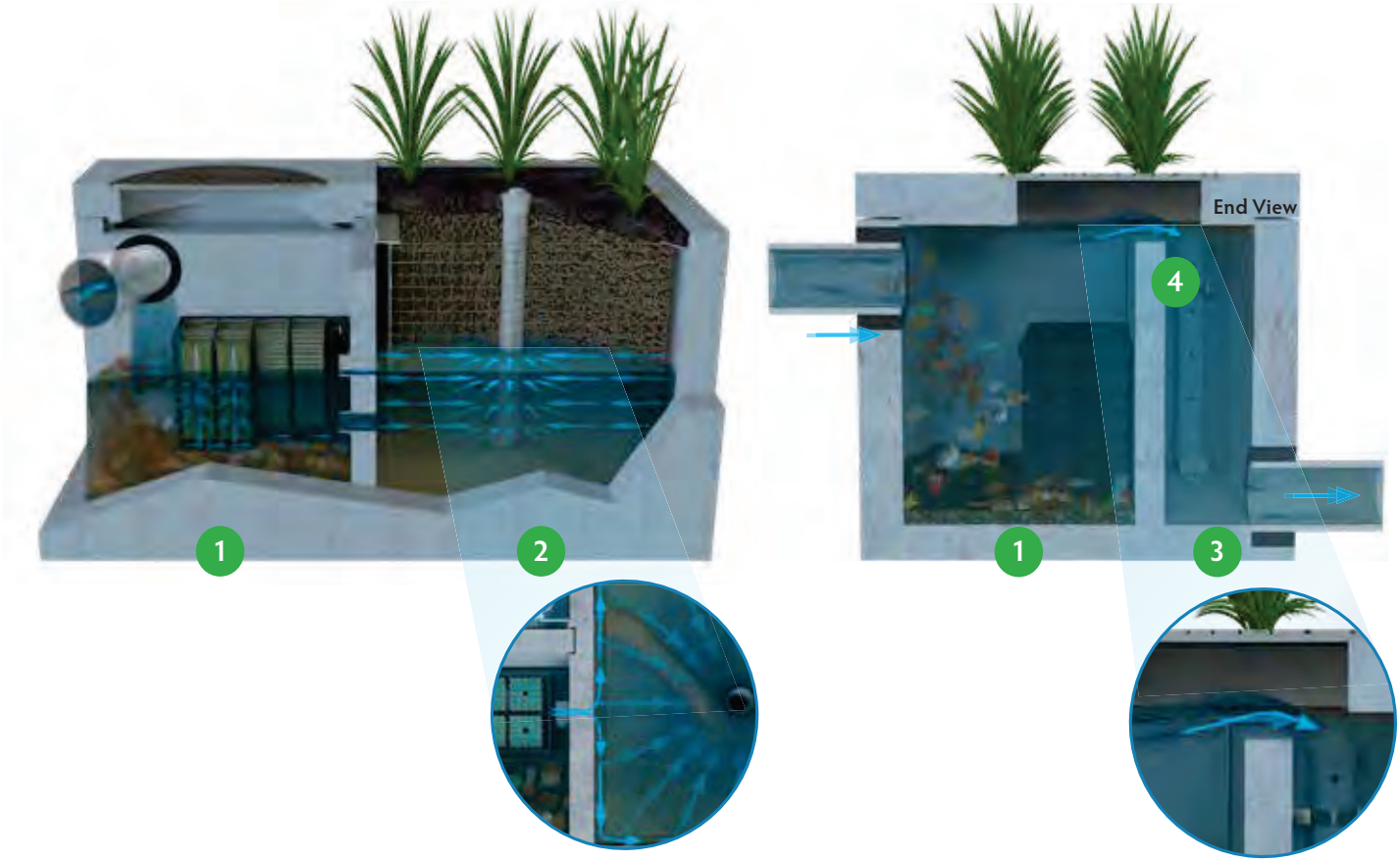
As cities grow, there is less space for natural solutions to treat stormwater. Contech understands this and is committed to providing compact, Low Impact Development (LID) solutions like the Modular Wetlands Linear to protect our nation's waterways.

The Modular Wetlands® Linear is the only biofiltration system to utilize patented horizontal flow, allowing for a small footprint, high treatment capacity, and design versatility. It is also the only biofiltration system that can be routinely installed downstream of storage for additional volume control and treatment.

With numerous regulatory approvals, the system's aesthetic appeal and superior pollutant removal make it the ideal solution for a wide range of stormwater applications, including urban development projects, commercial parking lots, residential streets, mixed-use developments, streetscapes, and more.

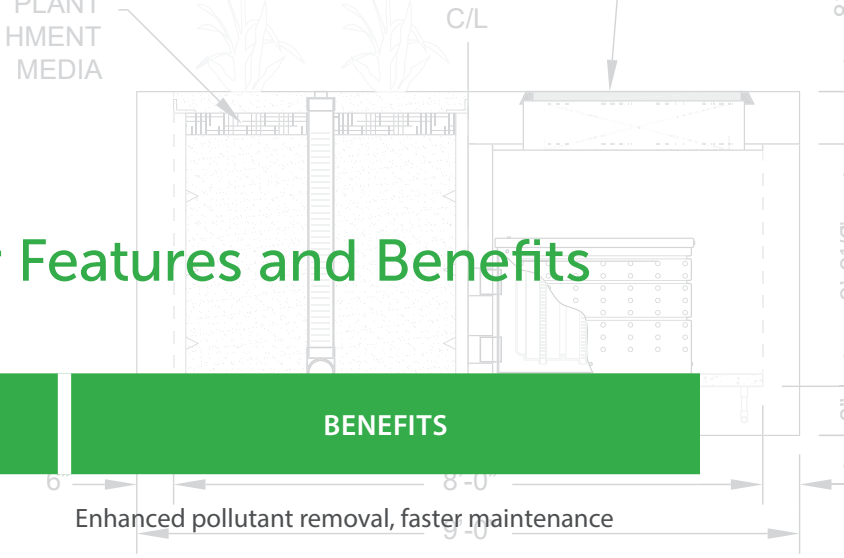
MODULAR WETLANDS®

How the Modular Wetlands® Linear Works



1. **PRETREATMENT** | Stormwater enters the pretreatment chamber where total suspended solids settle, and trash and debris are contained within the chamber. Stormwater then travels through the pretreatment filter boxes that provide additional treatment.
2. **BIOFILTRATION** | As water enters the biofiltration chamber, it fills the void space in the chamber's perimeter. Horizontal forces push the water inward through the biofiltration media, where nutrients and metals are captured. The water then enters the drain pipe to be discharged.
3. **DISCHARGE** | The specially designed vertical drain pipe and orifice control plate control the flow of water through the media to a level lower than the media's capacity, ensuring media effectiveness. The water then enters the horizontal drain pipe to be discharged.
4. **BYPASS** | During peak flows, an internal weir in the side-by-side configuration allows high flows to bypass treatment, eliminating flooding and the need for a separate bypass structure. Bypass is not provided in the end-to end configuration.

Using horizontal flow to improve performance



Modular Wetlands® Linear Features and Benefits

FEATURE	BENEFITS
Pretreatment chamber	Enhanced pollutant removal, faster maintenance
Horizontal flow biofiltration	Greater filter surface area
Performance verified by both the WA DOE and NJ DEP	Superior pollutant capture with confidence
Built-in high flow bypass	Eliminates flooding and the need for a separate bypass structure
Available in multiple configurations and sizes	Flexibility to meet site-specific needs



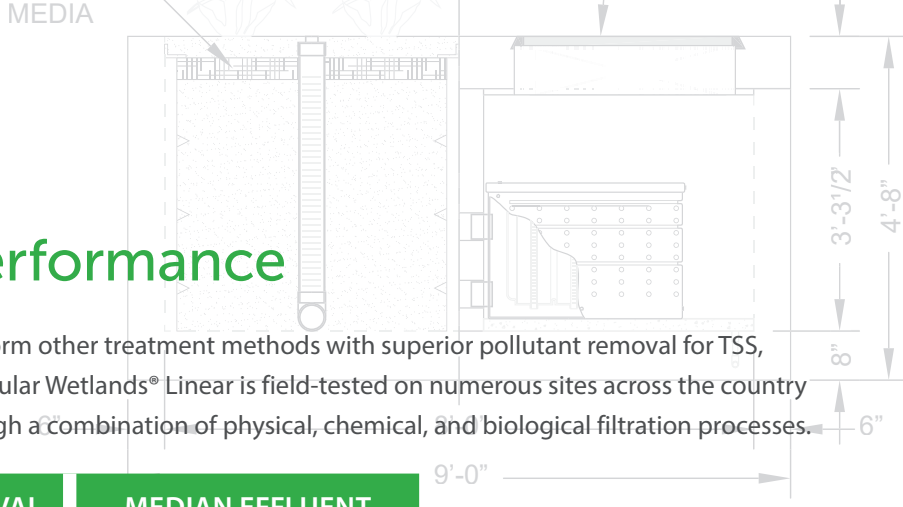
The Modular Wetlands system offers many different configurations.

Select Modular Wetlands® Linear Approvals

Modular Wetlands Linear is approved through numerous local, state and federal programs, including but not limited to:

- Washington State Department of Ecology TAPE
- California Water Resources Control Board, Full Capture Certification
- Virginia Department of Environmental Quality (VA DEQ)
- New Jersey Department of Environmental Protection (NJDEP)
- Maryland Department of the Environment - Environmental Site Design (ESD)
- Rhode Island Department of Environmental Management BMP
- Texas Commission on Environmental Quality (TCEQ)
- Atlanta Regional Commission Certification





Modular Wetlands® Performance

The Modular Wetlands® Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, and hydrocarbons. The Modular Wetlands® Linear is field-tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes.

POLLUTANT OF CONCERN	MEDIAN REMOVAL EFFICIENCY	MEDIAN EFFLUENT CONCENTRATION (MG/L)
Total Suspended Solids (TSS)	89%	12
Total Phosphorus - TAPE (TP)	61%	0.041
Nitrogen (TN)	23%	1
Total Copper (TCu)	50%	0.006
Total Dissolved Copper	37%	0.006
Total Zinc (TZn)	66%	0.019
Dissolved Zinc	60%	0.0148
Motor Oil	79%	0.8

Sources:
TAPE Field Study - 2012
TAPE Field Study - 2013

Note: Some jurisdictions recognize higher removal rates. Contact your Contech Stormwater Consultant for performance expectations.

Modular Wetlands® Linear Maintenance

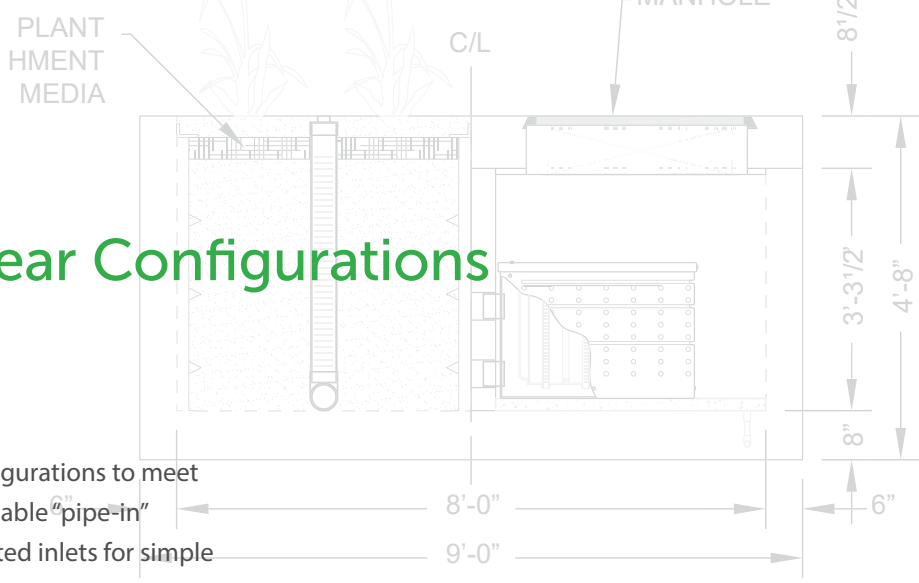
The Modular Wetlands® Linear is a self-contained treatment train. Maintenance requirements for the unit consist of five simple steps that can be completed using a vacuum truck. The system can also be cleaned by hand.

- Remove trash from the screening device
- Remove sediment from the separation chamber
- Periodically replace the pretreatment cartridge filter media
- Replace the drain down filter media
- Trim vegetation



Most Modular Wetland Linear systems can be cleaned in about thirty minutes.

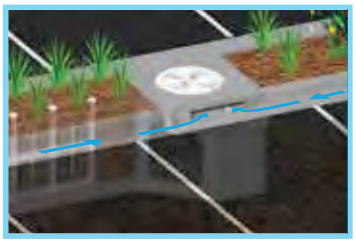
Multiple configurations allow for easy site integration



Modular Wetlands® Linear Configurations

Multiple system configurations integrate with site hydraulic design and layout ...

The Modular Wetlands Linear is offered in multiple configurations to meet site specific needs. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



Curb Inlet

The Curb Inlet configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions.



Vault

The Vault configuration can be used in end-of-the-line installations. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements, or for traffic-rated designs (no plants).



Downspout

The Downspout configuration is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

A partner you can rely on



STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

TAKE THE NEXT STEP

For more information: www.ContechES.com

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Project Name: The Cambridge School

Form I-6 Page 1 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. Modular Wetland Unit 1	
Construction Plan Sheet No. 4	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	SPEAR & ASSOCIATES, INC. c/o Josh Ziegler, P.E. 475 Production Street, San Marcos, CA 92078 Phone: (760) 736-2040
Who will be the final owner of this BMP?	The Cambridge School, Attn: Scott Kim 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488
Who will maintain this BMP into perpetuity?	The Cambridge School, Attn: Scott Kim, 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488
What is the funding mechanism for maintenance?	The Cambridge School, Attn: Scott Kim 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488

Flow Through Treatment with Proprietary Modular Wetland Systems and underground detention storage for HMP (Modular wetland Unit 1 Located Adjacent to Coyote Bush Dr.)

Project Name: The Cambridge School

Form I-6 Page 2 of 2 (Copy as many as needed)
Structural BMP ID No. Modular Wetland Unit 1
Construction Plan Sheet No. 4
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Project Name: The Cambridge School

Form I-6 Page 1 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. Modular Wetland Unit 2A	
Construction Plan Sheet No. 4	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	SPEAR & ASSOCIATES, INC. c/o Josh Ziegler, P.E. 475 Production Street, San Marcos, CA 92078 Phone: (760) 736-2040
Who will be the final owner of this BMP?	The Cambridge School, Attn: Scott Kim 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488
Who will maintain this BMP into perpetuity?	The Cambridge School, Attn: Scott Kim, 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488
What is the funding mechanism for maintenance?	The Cambridge School, Attn: Scott Kim 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488

Flow Through Treatment with Proprietary Modular Wetland Systems and underground detention storage for HMP (Modular wetland 2A Located Adjacent to Camino Del Sur)

Project Name: The Cambridge School

Form I-6 Page 2 of 2 (Copy as many as needed)
Structural BMP ID No. Modular Wetland Unit 2A
Construction Plan Sheet No. 4
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Project Name: The Cambridge School

Form I-6 Page 1 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. Modular Wetland Unit 2B	
Construction Plan Sheet No. 4	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	SPEAR & ASSOCIATES, INC. c/o Josh Ziegler, P.E. 475 Production Street, San Marcos, CA 92078 Phone: (760) 736-2040
Who will be the final owner of this BMP?	The Cambridge School, Attn: Scott Kim 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488
Who will maintain this BMP into perpetuity?	The Cambridge School, Attn: Scott Kim, 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488
What is the funding mechanism for maintenance?	The Cambridge School, Attn: Scott Kim 12855 Black Mountain Road, San Diego, CA 92129 Phone: 858-484-3488

Flow Through Treatment with Proprietary Modular Wetland Systems and underground detention storage for HMP (Modular wetland 2B Located Adjacent to Camino Bel Sur)

Project Name: The Cambridge School

Form I-6 Page 2 of 2 (Copy as many as needed)
Structural BMP ID No. Modular Wetland Unit 2B
Construction Plan Sheet No. 4
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

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Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

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Project Name: The Cambridge School

Indicate which Items are Included:

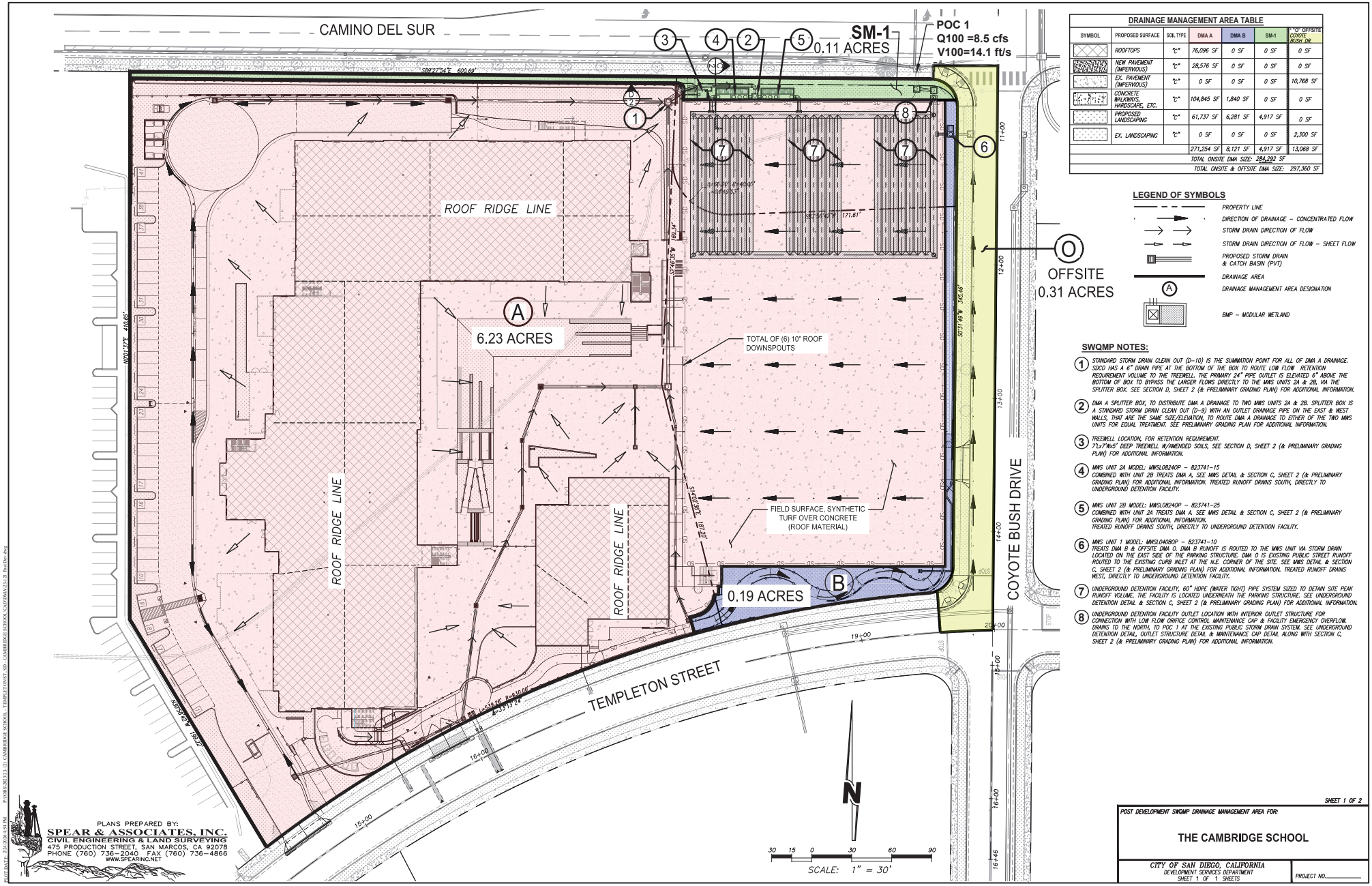
Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	✓ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a ☐ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition: • No Infiltration Condition: o Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) o Form I-8A (optional) o Form I-8B (optional) • Partial Infiltration Condition: o Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) o Form I-8A o Form I-8B • Full Infiltration Condition: o Form I-8A o Form I-8B o Worksheet C.4-3 o Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.	☑ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☑ Included

Project Name: The Cambridge School

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [x] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [ ] Critical coarse sediment yield areas to be protected
- [x] Existing topography and impervious areas
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [x] Proposed design features and surface treatments used to minimize imperviousness
- [x] Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- [ ] Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- [x] Structural BMPs (identify location, type of BMP, size/detail, and include cross-section)



DRAINAGE MANAGEMENT AREA TABLE

SYMBOL	PROPOSED SURFACE	SOIL TYPE	DMA A	DMA B	SM-1	"O" OFFSITE COYOTE BUSH DR.
	ROOFTOPS	"C"	76,096 SF	0 SF	0 SF	0 SF
	NEW PAVEMENT (IMPERVIOUS)	"C"	28,576 SF	0 SF	0 SF	0 SF
	EX. PAVEMENT (IMPERVIOUS)	"C"	0 SF	0 SF	0 SF	10,768 SF
	CONCRETE WALKWAYS, HARDSCAPE, ETC.	"C"	104,845 SF	1,840 SF	0 SF	0 SF
	PROPOSED LANDSCAPING	"C"	61,737 SF	6,281 SF	4,917 SF	0 SF
	EX. LANDSCAPING	"C"	0 SF	0 SF	0 SF	2,300 SF
			271,254 SF	8,121 SF	4,917 SF	13,068 SF
			TOTAL ONSITE DMA SIZE: 284,292 SF			
			TOTAL ONSITE & OFFSITE DMA SIZE: 297,360 SF			

LEGEND OF SYMBOLS

- PROPERTY LINE
- DIRECTION OF DRAINAGE – CONCENTRATED FLOW
- STORM DRAIN DIRECTION OF FLOW
- STORM DRAIN DIRECTION OF FLOW – SHEET FLOW
- PROPOSED STORM DRAIN & CATCH BASIN (PVT)
- DRAINAGE AREA
- DRAINAGE MANAGEMENT AREA DESIGNATION
- BMP – MODULAR WETLAND

SWQMP NOTES:

1. STANDARD STORM DRAIN CLEAN OUT (D-10) IS THE SUMMATION POINT FOR ALL OF DMA A DRAINAGE. SDCO HAS A 6" DRAIN PIPE AT THE BOTTOM OF THE BOX TO ROUTE LOW FLOW RETENTION REQUIREMENT VOLUME TO THE TREEWELL. THE PRIMARY 24" PIPE OUTLET IS ELEVATED 6" ABOVE THE BOTTOM OF BOX TO BYPASS THE LARGER FLOWS DIRECTLY TO THE MWS UNITS 2A & 2B, VIA THE SPLITTER BOX. SEE SECTION D, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.
2. DMA A SPLITTER BOX, TO DISTRIBUTE DMA A DRAINAGE TO TWO MWS UNITS 2A & 2B. SPLITTER BOX IS A STANDARD STORM DRAIN CLEAN OUT (D-9) WITH AN OUTLET DRAINAGE PIPE ON THE EAST & WEST WALLS, THAT ARE THE SAME SIZE/ELEVATION, TO ROUTE DMA A DRAINAGE TO EITHER OF THE TWO MWS UNITS FOR EQUAL TREATMENT. SEE PRELIMINARY GRADING PLAN FOR ADDITIONAL INFORMATION.
3. TREEWELL LOCATION, FOR RETENTION REQUIREMENT. 7'Lx7'Wx5' DEEP TREEWELL W/AMENDED SOILS, SEE SECTION D, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.
4. MWS UNIT 2A MODEL: MWSL0824OP – 823741-15
COMBINED WITH UNIT 2B TREATS DMA A, SEE MWS DETAIL & SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION. TREATED RUNOFF DRAINS SOUTH, DIRECTLY TO UNDERGROUND DETENTION FACILITY.
5. MWS UNIT 2B MODEL: MWSL0824OP – 823741-25
COMBINED WITH UNIT 2A TREATS DMA A. SEE MWS DETAIL & SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.
TREATED RUNOFF DRAINS SOUTH, DIRECTLY TO UNDERGROUND DETENTION FACILITY.
6. MWS UNIT 1 MODEL: MWSL0408OP – 823741-10
TREATS DMA B & OFFSITE DMA O. DMA B RUNOFF IS ROUTED TO THE MWS UNIT VIA STORM DRAIN LOCATED ON THE EAST SIDE OF THE PARKING STRUCTURE. DMA O IS EXISTING PUBLIC STREET RUNOFF ROUTED TO THE EXISTING CURB INLET AT THE N.E. CORNER OF THE SITE. SEE MWS DETAIL & SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION. TREATED RUNOFF DRAINS WEST, DIRECTLY TO UNDERGROUND DETENTION FACILITY.
7. UNDERGROUND DETENTION FACILITY, 60" HDPE (WATER TIGHT) PIPE SYSTEM SIZED TO DETAIN SITE PEAK RUNOFF VOLUME. THE FACILITY IS LOCATED UNDERNEATH THE PARKING STRUCTURE. SEE UNDERGROUND DETENTION DETAIL & SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.
8. UNDERGROUND DETENTION FACILITY OUTLET LOCATION WITH INTERIOR OUTLET STRUCTURE FOR CONNECTION WITH LOW FLOW ORIFICE CONTROL MAINTENANCE CAP & FACILITY EMERGENCY OVERFLOW. DRAINS TO THE NORTH, TO POC 1 AT THE EXISTING PUBLIC STORM DRAIN SYSTEM. SEE UNDERGROUND DETENTION DETAIL, OUTLET STRUCTURE DETAIL & MAINTENANCE CAP DETAIL ALONG WITH SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.

PLANS PREPARED BY:
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CIVIL ENGINEERING & LAND SURVEYING
475 PRODUCTION STREET, SAN MARCOS, CA 92078
PHONE (760) 736-2040 FAX (760) 736-4866
WWW.SPEARINC.NET

PLOT DATE: 2/3/2020 4:54 PM P:\JOBS\2023\23-12 CAMBRIDGE SCHOOL - TEMPLE\CONST SD - CAMBRIDGE SCHOOL - CADD\MAS23-12 PreDev .dwg

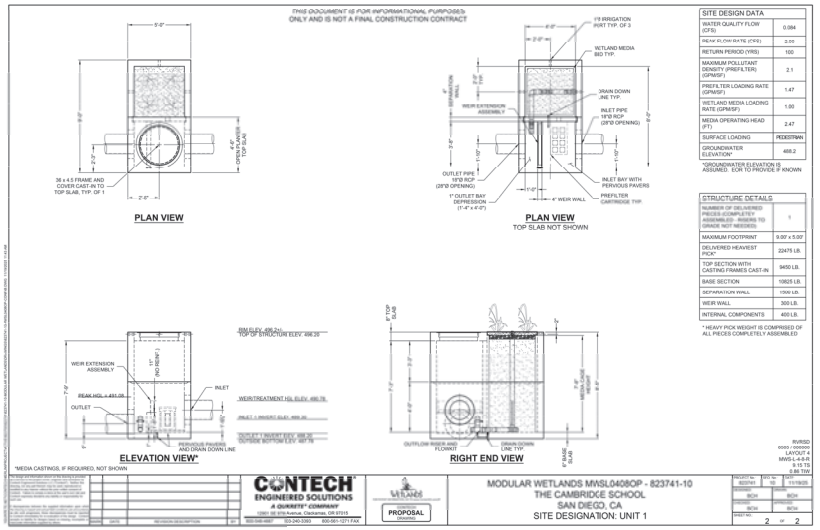
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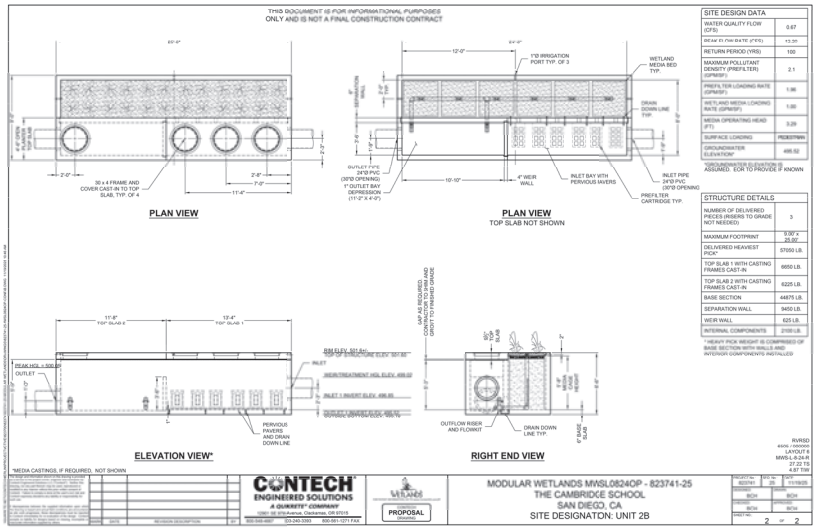
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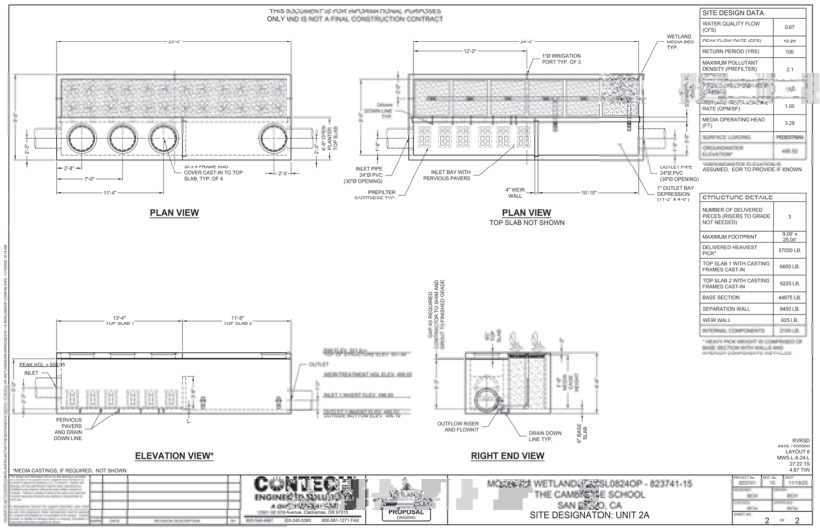
THE CAMBRIDGE SCHOOL

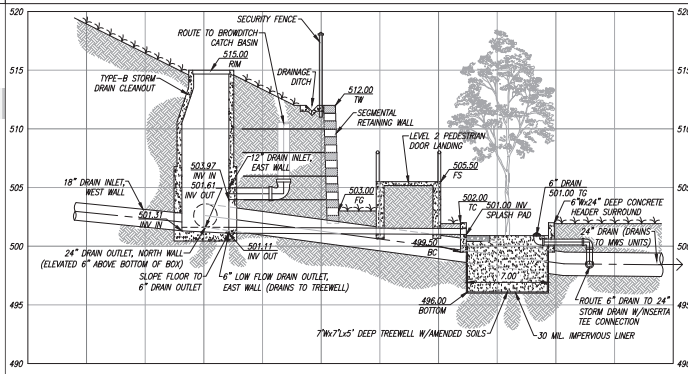
CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 1 OF 1 SHEETS

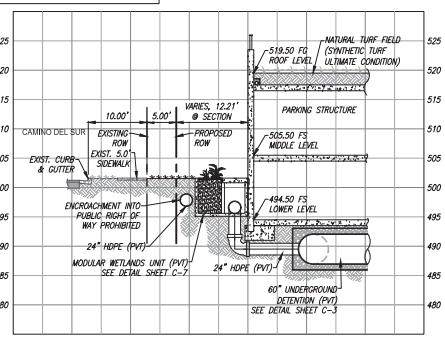
PROJECT NO._____

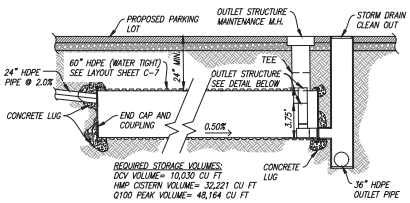


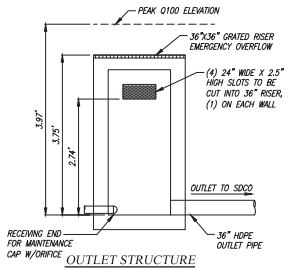


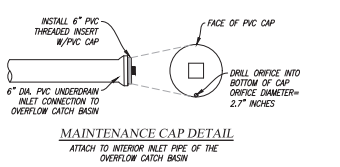












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POST DEVELOPMENT SWQMP DRAINAGE MANAGEMENT AREA FOR:

THE CAMBRIDGE SCHOOL

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 1 OF 1 SHEETS

PROJECT NO._____

PLOT DATE: 2/24/2020 4:55 PM P:\JOBS\2023\23-21 CAMBRIDGE SCHOOL - TEMP\LIT\CONST. SD - CAMBRIDGE SCHOOL CAD\DWG\23-21 Post Dev .dwg

Project Name: The Cambridge School

Tabular Summary of DMAs							Worksheet B-1		
DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
A	6.227	4.81	77.2	C	0.77	9440	MW Unit 2A & 2B	Prop. MWS Unit	POC 1
B	0.186	0.042	22.7	C	0.83	110	MW Unit 1	Prop. MWS Unit	POC 1
Offsite O	0.30	0.247	82.4	C	0.63	480	MW Unit 1	Prop. MWS Unit	POC 1
SM-1	0.113	0.0	0	C			SM	Self-Mitigating	POC-1

Summary of DMA Information (Must match project description and SWQMP Narrative)									
No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp		Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
4	6.826	5.099	70		0.70	10030	6.826		1

Where: DMA = Drainage Management Area; Imp = Imperviousness; HSG = Hydrologic Soil Group; DCV= Design Capture Volume; BMP = Best Management Practice; POC = Point of Compliance; ID = identifier; No. = Number

SELF MITIGATING

SM1: 4,917 s.f.

Harvest and Use Feasibility Checklist	Worksheet B.3-1 : Form I-7

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
☑ Toilet and urinal flushing
☑ Landscape irrigation
☐ Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.
[Provide a summary of calculations here]

Toilet & Urinal Flushing: 300 users (36 hour total) = 662 c.f.
Landscape Irrigation: Total Planted Area 75,235 s.f., w/drought tolerant low water use (36 hour total) = 61 c.f.
Anticipated Total Use Over 36 hours = 722 c.f.

3. Calculate the DCV using worksheet B-2.1.
DCV = 10030 (cubic feet)
[Provide a summary of calculations here]

DCV x 0.25 = 2,508 c.f.

3a. Is the 36-hour demand greater than or equal to the DCV?	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36-hour demand less than 0.25DCV?
☐ Yes ⇩ / ☑ No ⇨	☐ Yes ⇩ / ☑ No ⇨	☑ Yes ⇩
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.

Is harvest and use feasible based on further evaluation?
☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
☐ No, select alternate BMPs.

UES Professional Solutions, Inc.
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

December 12, 2025 UES Project No. A23165.00473

The Cambridge School
12855 Black Mountain Road
San Diego, California 92129

Attention: Mr. Brandon Hong
(858) 484-3488
Bhong@cambridgeclassical.org

Subject: Revised Infiltration Feasibility Condition Letter
Cambridge School
SWC Camino Del Sur and Coyote Bush Drive, San Diego, California

References: Appendix A

Mr. Hong:

According to your request, UES Professional Solutions (UES) is providing this "Infiltration Feasibility Condition" letter to be included in the Storm Water Quality Management Plan (SWQMP) to confirm that the proposed project site (referenced above) classifies under a "no infiltration" site condition. This revision incorporates additional information requested by the City of San Diego reviewer.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The near-trapezoidal shaped site covers approximately 6.52 acres and is bounded by Camino Del Sur to the north, Coyote Bush Drive to the east, Templeton Street to the south, and an existing industrial development to the west. The improvement area is currently vacant and descends gradually to the northeast with elevations ranging from approximately 528 feet msl in the southwest to approximately 510 feet msl to the east.

UES understands that the proposed improvements consist of multiple campus buildings, a partially underground parking garage, driveways, an athletic field, flatwork, landscaping, utilities and other associated improvements.

STORM WATER MANAGEMENT DISCUSSION

We understand storm water management devices are being proposed in accordance with the City of San Diego Storm Water Standards Manual (2021). If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of concentrated water infiltration.

Presented below is a discussion for each item requested in Appendix C.1.1 of the 2021 City of San Diego Storm Water Standards.

- *The phase of the project in which the geotechnical engineer first analyzed the site for infiltration feasibility.*

  The site was first analyzed for infiltration feasibility in the planning phase.

- *Results of previous geotechnical analysis conducted in the project area, if any.*

  The site was graded starting on 2011 through 2013 under the observation of Geocon, Inc. (Geocon, 2014). Based on previous site usage, Toxaphene was found present in site soils. Environmental reports by Geocon (2013, 2016) indicate that soils exceeding threshold values were placed in specific encapsulation zones below the depth of recommended removals provided in those reports. In accordance with RWQCB-approved 2006 Limited Pesticide Assessment and Soil Reuse Plan, the encapsulated soil was placed at least 10 feet below ultimate ground surface and at least 5 feet above highest anticipated groundwater level. Given the noted site conditions, the geotechnical investigation by CTE (2023a) included seven exploratory borings and soil sampling limited to 10 feet below existing ground surface (bgs) at the graded site. The two existing stormwater drainage basins in the northeast corner of the property were not included in the CTE (2023a) investigation.

  Previously placed fill was encountered in all CTE (2023a) borings to the explored depth of approximately 10 feet bgs and generally consisted of loose to medium dense/soft to stiff, brown to gray-brown, fine- to coarse-grained clayey sand/sandy clay. According to the as-graded report by Geocon (2014), the site is mantled by previously placed fill to approximate depths ranging between 16 and 25 feet underlain by dense sandstone materials of the undifferentiated Del Mar/Friars Formation or Stadium Conglomerate in the southwestern corner of the site. Groundwater was not encountered by CTE (2023a) and is not expected to impact site development. As indicated by Geocon (2018), "depth to groundwater is anticipated to be in excess of 50 feet and groundwater flow direction is expected to be generally to the west toward the Pacific Ocean with local variations associated with topography."

- *The development status of the site prior to the project application (i.e., new development with raw ungraded land, or redevelopment with existing graded conditions).*

  As indicated above, the project site has been sheet graded and is currently vacant.

- *The history of design discussions for the project footprint, resulting in the final design determination.*

  UES (previously as CTE) began providing geotechnical consulting services in 2023 with the current design team.

- *Full/partial infiltration BMP standard setbacks to underground utilities, structures, retaining walls, fill slopes, and natural slopes applicable to the DMA that prevent full/partial infiltration.*

  According to the Post Development Management Area plan for the Cambridge School "SWQMP

Report" prepared by Spear and Associates (2024), the proposed BMP areas are located along the northern, eastern and southeastern limits of the site in the vicinity of Camino del Sur, Coyote Bush Drive, and Templeton Street, respectively. As indicated above, the site is mantled by previously placed fill to approximate depths ranging between 16 and 25 feet. The BMPs will be constructed in the vicinity of the proposed partially underground garage structure and several retaining walls.

UES has prepared the attached Figure 2, Geotechnical Exploration Map which is based on the preliminary grading plan by Spear and Associates and includes an overlay presenting the proposed Drainage Management Areas (DMAs) for the project. Figures 2A and 2B present geologic cross sections in the West-East and North-South directions which depict the proposed structures, approximate extents of previously placed fill including the extents of the toxaphene impacted fill zone, and the geologic contact with underlying formational materials.

In summary, proposed structures and retaining walls are located within the 10-foot minimum setback requirement for BMPs designated in Section C.1 – Simple Feasibility Criteria of the current City of San Diego BMP Design Manual (2021). Additionally, the proposed BMPs are located in areas of existing fill soils greater than 5 feet thick. Based on these conditions, the BMPs should be designed for a "no infiltration" condition.

- *Physical impairments (i.e., fire road egress, public safety considerations, etc.) that prevent full/partial infiltration.*

  Physical impairments are not anticipated to prevent full/partial infiltration.

- *The consideration of site design alternatives to achieve partial/full infiltration within the DMA.*

  The artificial fill soils at the project site do not possess adequate permeability to support full infiltration. Partial infiltration at a rate of 0.05 in/hr or greater may be possible; however, this would likely require import or manufacture of select permeable soils to be utilized beneath the basin as a 'conduit' to more permeable strata at depth. This option is highly cost prohibitive and not considered a reasonable mitigation in accordance with the current BMP Design Manual.

- *The extent site design BMP requirements were included in the overall design.*

  The following narrative is from the Civil Engineer (Spear & Associates) regarding storm water BMP design:

  > The project proposes the following Source Control and Site Design BMP besides the proposed Biofiltration BMP for Pollutant Control.
  >
  > Source Control:
  > 1. SC-A Onsite storm drain inlet stenciling
  > 2. SC-C Interior parking garage floor drains plumbed to sewer
  >
  > Site Design:
  > 1. 4.3.3 Minimize impervious area
  > 2. 4.3.4 Minimize compaction of soil
  > 3. 4.3.7 Landscaping with native or drought tolerant species

- *Conclusion or recommendation from the geotechnical engineer regarding the DMA's infiltration condition.*

  The proposed BMPs will be located within the 10-foot required setback for proposed retaining walls, next to a partially underground garage structure and within areas of existing fill soil that is greater than 5 feet in thickness. There is a high likelihood that infiltrating water will flow laterally and negatively impact nearby onsite and offsite improvements. Of particular concern is the encapsulated zone of toxaphene impacted fill present at an approximate depth of 10 ft. The potential geotechnical hazard could be mitigated by lining the BMP improvements with an impermeable membrane.

  It is our professional opinion that the geotechnical hazards associated with infiltrating stormwater in the proposed BMPs as currently planned cannot be reasonably mitigated and should be avoided. Therefore, UES recommends a "no infiltration" condition for the proposed BMPs. Worksheet C4.1: Form I-8A - Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions in support of this conclusion is attached.

This document is subject to the same limitations as the referenced geotechnical reports. The opportunity to be of service is appreciated. If you have any questions regarding our recommendations, please do not hesitate to contact this office.

Respectfully submitted,
UES PROFESSIONAL SOLUTIONS, INC.

Andres Bernal, GE #2715
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
ANDRES BERNAL
No. 2715
Exp. 9/30/27
GEOTECHNICAL
STATE OF CALIFORNIA

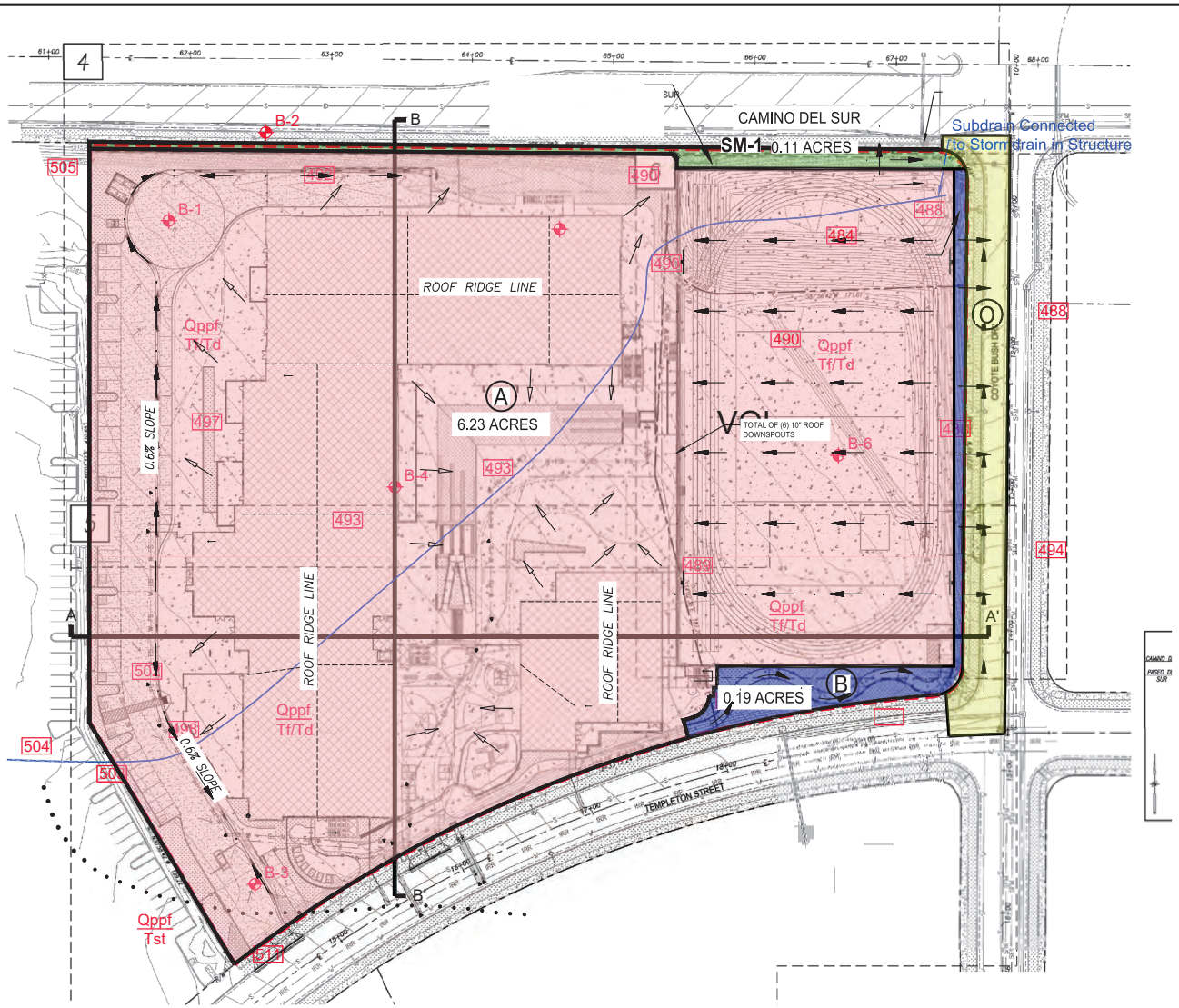
ATTACHMENTS:

Appendix A - References

Figure 2 - Geotechnical Exploration Location Map
Figure 2A - Geologic Cross Section A-A'
Figure 2B - Geologic Cross Section B-B'
C.4-1 Infiltration Feasibility Worksheet

APPENDIX A
REFERENCES

1. CTE, 2023a, "Geotechnical Investigation, Proposed Cambridge School, Southwest Corner of Camino Del Sur and Coyote Bush Drive, San Diego, California 92127," CTE Job No. 4830.2300106, dated October 5, 2023.
2. CTE, 2023b, "Infiltration Feasibility Condition Letter, Cambridge School, Southwest Corner of Camino Del Sur and Coyote Bush Drive, San Diego, California 92127," CTE Job No. 4830.2300106, dated December 6, 2023.
3. Geocon, 2005, "Black Mountain Ranch (Del Sur), North Village East, San Diego, California, Placement of Soil Containing Toxaphene," Geocon Project No. 07096-32-17, dated October 11, 2005.
4. Geocon, 2006, "Limited Pesticide Assessment and Soils Reuse Plan, Black Mountain Ranch North Village East and Future Golf Course Site, San Diego, California," Geocon Project No. 08003-06-21, dated February 7, 2006.
5. Geocon, 2013a, "Updated Limits of Toxaphene in Soil and Placement Areas, Black Mountain Ranch North Village East, San Diego, California," Geocon Project No. 07096-32-44, dated March 20, 2013.
6. Geocon, 2013b, "Transmittal, Black Mountain Ranch (Del Sur) North Village East, San Diego, California," Geocon Project No. 07096-32-44, dated June 5, 2013.
7. Geocon, 2014, "Final Report of Testing and Observation Services during Grading Black Mountain Ranch, North Village East, Unit 11 (Town Center Lots 1 through 29) and Motor Courts, I.O. No. 23425237, P.T.S. No. 83713, V.T.M. 40-0528, Drawing No. 33873, San Diego, California," Geocon Project No. 07096-32-44, dated February 19, 2014.
8. Geocon, 2016, "Transmittal of Laboratory Analysis Results, Del Sur Town Center, Lots 1 and 2, San Diego, California," Geocon Project No. 07096-32-98A, dated February 24, 2016.
9. Spear & Associates, 2023, Preliminary Grading Plans, The Cambridge School – CUP, 0 Templeton Street, San Diego, California 92127, Sheets C-1 though C-6, dated November 30, 2023.
10. UES, 2024a, "Response to Comments and Geotechnical Addendum, Cambridge School, SW Corner of Camino Del Sur and Coyote Bush Drive, San Diego, California," UES Project No. 4830.2300106, dated May 28, 2024.
11. UES, 2024b, "Response to Comment and Infiltration Feasibility Condition Letter for Stormwater BMP Cambridge School, SW Corner of Camino Del Sur and Coyote Bush Drive, San Diego, California," UES Project No. 4830.2300106, dated June 20, 2024.
12. UES, 2025, "Response to comment, Infiltration Feasibility Condition Letter for Stormwater BMPs, Cambridge School, SWC Camino Del Sur and Coyote Bush Drive, San Diego, California," UES Project No. A23165.00473, dated December 9, 2025.



GRAPHIC SCALE

80' 0 40' 80' 160'

1 inch = 80 ft.

EXPLANATION

- B-7 — APPROXIMATE BORING LOCATION (UES,2023)
- Qppf — QUATERNARY PREVIOUSLY PLACED FILL
- Tf/Td — FRIARS FORMATION/DEL MAR FORMATION (UNDIFFERENTIATED, GEOCON, 2014)
- Tst — STADIUM CONGLOMERATE (GEOCON, 2014)
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT (DOTTED WHERE BURIED, GEOCON, 2014)
- 502 — APPROXIMATE ELEVATION AT BASE OF FILL (GEOCON, 2014)
- APPROXIMATE LOCATION OF SUBDRAIN (GEOCON, 2014)
- APPROXIMATE LIMITS OF GRADING
- A — A' GEOLOGIC CROSS SECTION

DRAINAGE MANAGEMENT AREAS

DMA A	DMA B	SM-1	* "O" OFFSITE COYOTE BUSH DR.

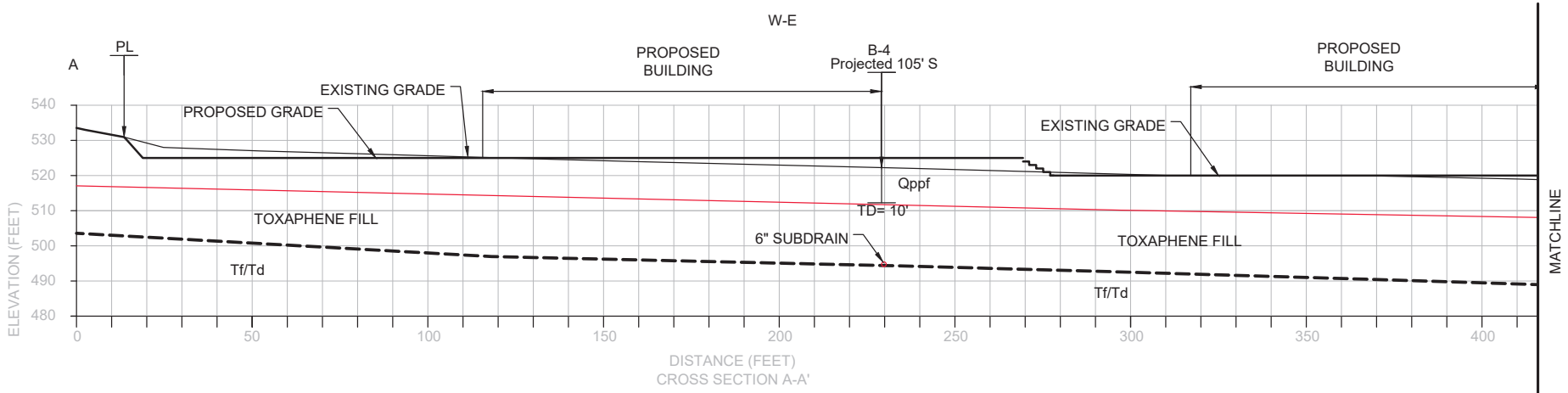
UES

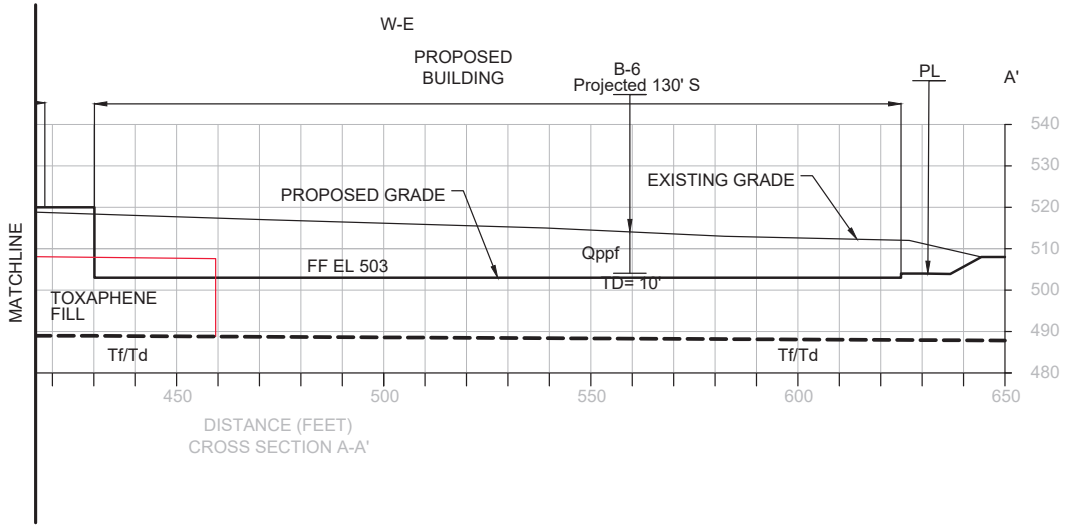
GEOTECHNICAL EXPLORATION LOCATION MAP

PROPOSED CAMBRIDGE SCHOOL
SW CORNER OF CAMINO DEL SUR & COYOTE BUSH ROAD
SAN DIEGO, CALIFORNIA

CTE JOB NO:	4830.2300106
SCALE:	1" = 80'
DATE: 5/24	FIGURE: 2

S:\Projects\4830 (GEO)\4830.23\4830.2300106.0000 (Cambridge School)\DWG\Figure 2 (Exploration Map)(5-24).dwg





EXPLANATION

B-4	APPROXIMATE BORING LOCATION
Qppf	QUATERNARY PREVIOUSLY PLACED FILL
Tf/Td	FRIARS FORMATION/DEL MAR FORMATION (UNDIFFERENTIATED, GEOCON, 2014)
	APPROXIMATE LIMITS OF TOXAPHENE FILL (GEOCON, 2013)
	APPROXIMATE GEOLOGIC CONTACT (GEOCON, 2013)

30' 0 15' 30'

1 inch = 30 ft.

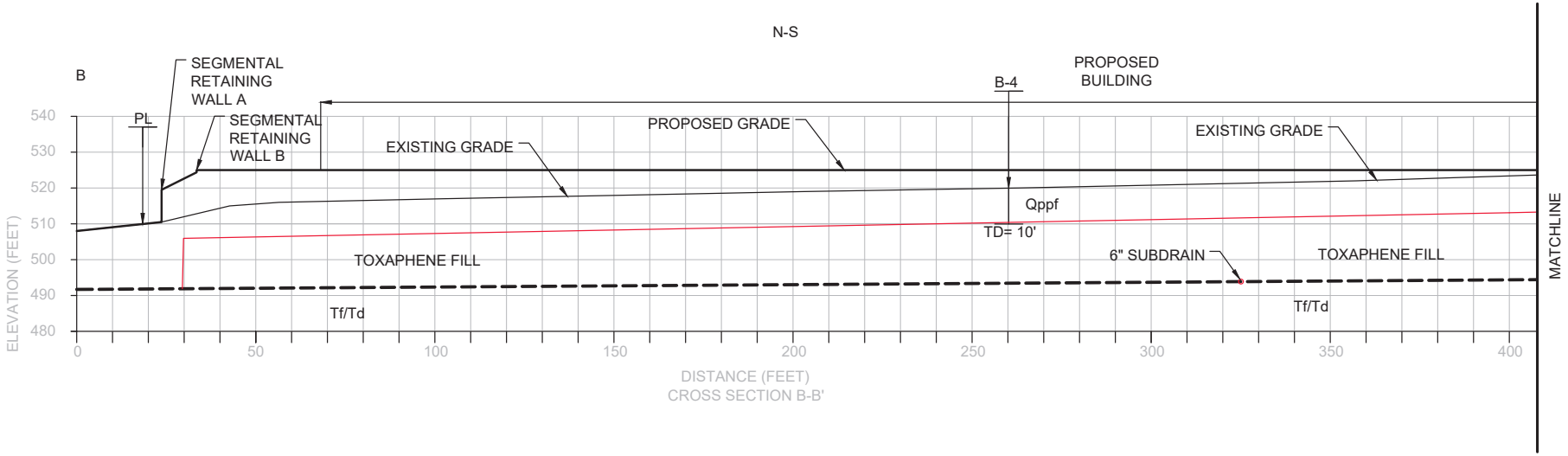
UES

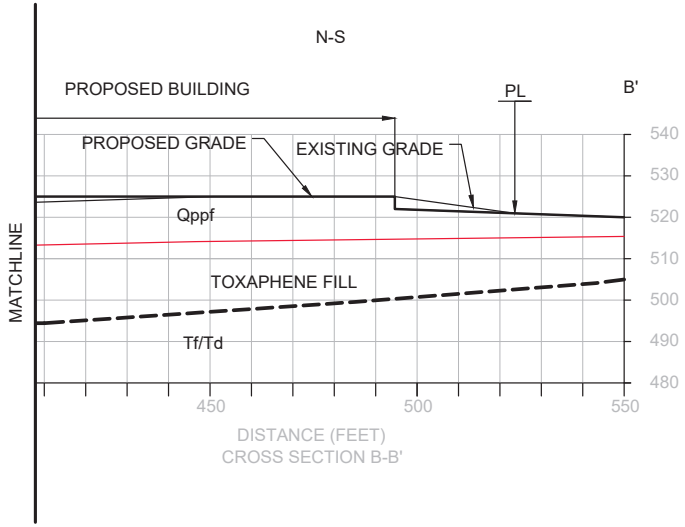
GEOLOGIC CROSS SECTION

PROPOSED CAMBRIDGE SCHOOL
SW CORNER OF CAMINO DEL SUR & COYOTE BUSH ROAD
SAN DIEGO, CALIFORNIA

CTE JOB NO: 4830.2300106
SCALE: 1" = 30'
DATE: 5/24
FIGURE: 2A

S:\Projects\4830 (GEO)\4830.23\4830.2300106.0000 (Cambridge School)\DWG\Fig 2A (Cross Section A).dwg





EXPLANATION

B-4	APPROXIMATE BORING LOCATION
Qppf	QUATERNARY PREVIOUSLY PLACED FILL
Tf/Td	FRIARS FORMATION/DEL MAR FORMATION (UNDIFFERENTIATED, GEOCON, 2014)
———	APPROXIMATE LIMITS OF TOXAPHENE FILL (GEOCON, 2013)
- - - -	APPROXIMATE GEOLOGIC CONTACT (GEOCON, 2013)

30' 0 15' 30'

1 inch = 30 ft.

UES

GEOLOGIC CROSS SECTION

PROPOSED CAMBRIDGE SCHOOL
SW CORNER OF CAMINO DEL SUR & COYOTE BUSH ROAD
SAN DIEGO, CALIFORNIA

CTE JOB NO:	4830.2300106
SCALE:	1" = 30'
DATE:	5/24
FIGURE:	2B

S:\Projects\4830 (GEO)\4830.23\4830.2300106.0000 (Cambridge School)\DWG\Fig 2B (Cross Section B).dwg

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition Based on Geotechnical Conditions[9]

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
Cambridge School	Limited Geotechnical Investigation
Criteria 1: Infiltration Rate Screening	
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☒ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☐ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☐ Yes; Continue to Step 1C. ☐ No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☐ No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐ Yes; continue to Step 1E. ☐ No; select an appropriate infiltration testing method.

[9] Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[10] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site stormwater design.

[11] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☐ Yes; continue to Step 1F. ☐ No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐ Yes; continue to Step 1G. ☐ No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐ Yes; answer "Yes" to Criteria 1 Result. ☐ No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☒ No; full infiltration is not required. Skip to Part 1 Result.

Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report.

The NRCS soils across the site are all well drained Type C soils with high surface runoff. The NRCS capacity of the most limiting layer to transmit water is moderately high and ranges from .06 to .57 inches per hour.

Infiltration testing was not conducted due to known Toxaphene encapsulated soil on-site.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A-1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	☐ Yes	☒ No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☐ No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☐ No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐ Yes	☐ No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☒ No

Summarize findings and basis; provide references to related reports or exhibits.

Toxaphene is a known site contaminant with encapsulation zones 10 feet below the surface and at least 5 feet above highest anticipated groundwater level. Encapsulation zones are known to underly a minimum 10 feet thick layer of fill.

Infiltration testing was not conducted due to known Toxaphene encapsulated soil on-site.

Part 1 Result – Full Infiltration Geotechnical Screening [12]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	☐ Full infiltration Condition ☒ Complete Part 2

[12] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
Cambridge School	Limited Geotechnical Investigation
Criteria 3 : Infiltration Rate Screening	
3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☒ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☐ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☒ Yes; Continue to Criteria 4. ☐ No: Skip to Part 2 Result.
Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate). The NRCS soils across the site are all well drained Type C soils with high surface runoff. The NRCS capacity of the most limiting layer to transmit water is moderately high and ranges from .06 to .57 inches per hour.	

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A-1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	☐ Yes	☒ No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☐ No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☐ No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1 If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐ Yes	☐ No
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☒ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Summarize findings and basis; provide references to related reports or exhibits. Toxaphene is a known site contaminant with encapsulation zones 10 feet below the surface and at least 5 feet above highest anticipated groundwater level. Encapsulation zones are known to underly a minimum 10 feet thick layer of fill. Infiltration testing was not conducted due to known Toxaphene encapsulated soil on-site.	

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐ Partial Infiltration Condition ☒ No Infiltration Condition

[13] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Runoff Factors

DMA A	s.f.	(A) acres	**(C) Runoff**	C x A			
Roof	76096	**1.747**	0.9	1.57			
Hardscape	104845	**2.407**	0.9	2.17			
Pvmt	28576	**0.656**	0.9	0.59	imperv	209517	4.810
Landscape	61737	**1.417**	0.1	0.14	% Imperv		77.2%
total	271254	**6.227**		4.47			
			Composite C	**0.72**			

DMA B	s.f.	(A) acres	**(C) Runoff**	C x A			
Roof	0	**0.000**	0.9	0.00			
Hardscape	1840	**0.042**	0.9	0.04			
Pvmt	0	**0.000**	0.9	0.00	imperv	1840	0.042
Landscape	6281	**0.144**	0.1	0.01	% Imperv		22.7%
total	8121	**0.186**		0.05			
			Composite C	**0.28**			

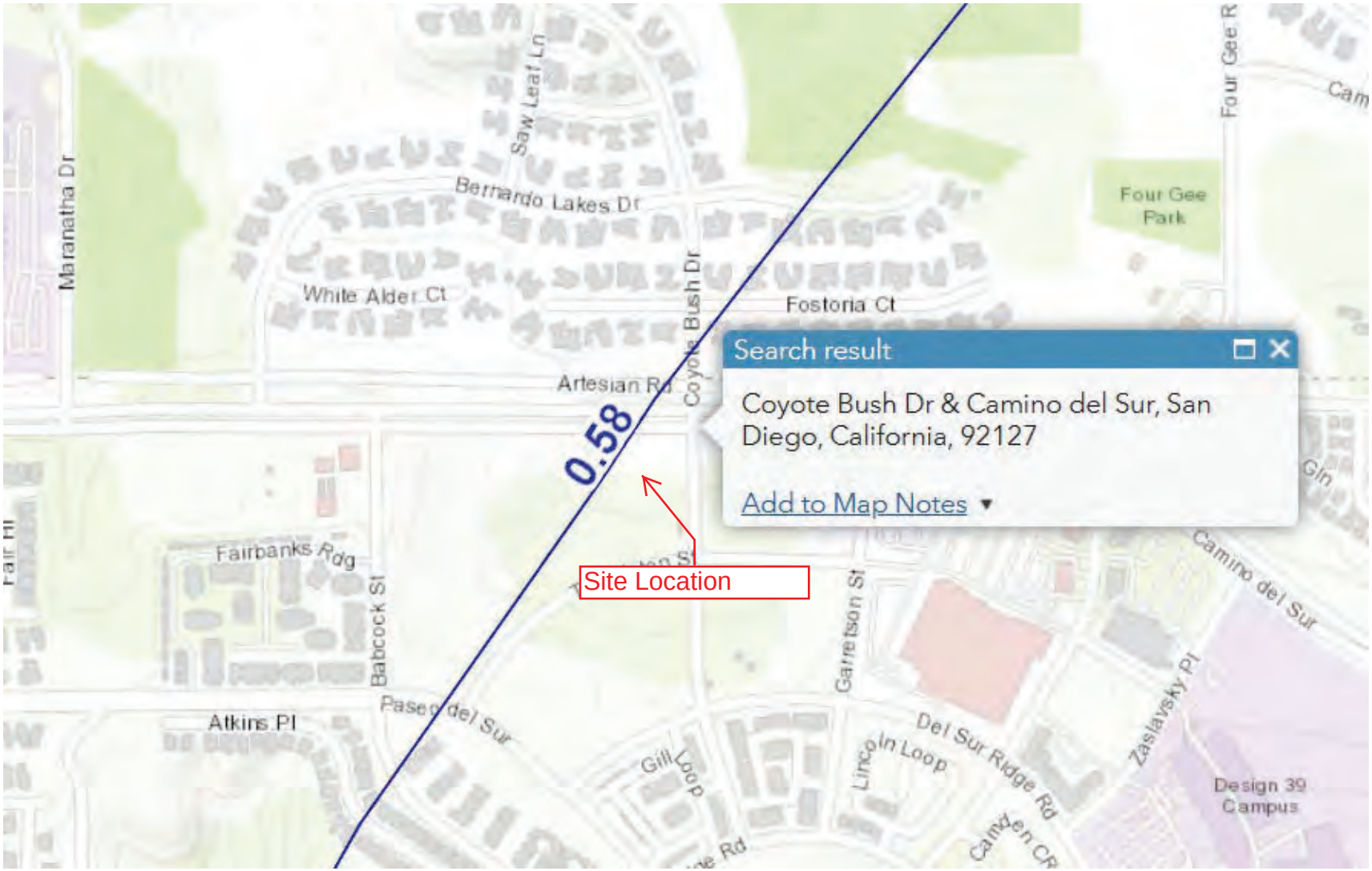
Offsite

DMA O	s.f.	(A) acres	**(C) Runoff**	C x A			
Roof	0	**0.000**	0.9	0.00			
Hardscape	0	**0.000**	0.9	0.00			
Pvmt	10768	**0.247**	0.9	0.22	imperv	10768	0.247
Landscape	2300	**0.053**	0.1	0.01	% Imperv		82.4%
total	13068	**0.300**		0.23			
			Composite C	**0.76**			

DMA SM-1	s.f.	(A) acres	**(C) Runoff**	C x A			
Roof	0	**0.000**	0.9	0.00			
Hardscape	0	**0.000**	0.9	0.00			
Pvmt	0	**0.000**	0.9	0.00	imperv	0	0.000
Landscape	4917	**0.113**	0.1	0.01	% Imperv		0.0%
total	4917	**0.113**		0.01			
			Composite C	**0.10**			

Total Site	C x A =	4.76
Total Area =		6.826
Composite C =		0.70

85% Map Location



Appendix B: Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods

Worksheet B.2-1 DCV

DMA A

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.58	inches
2	Area tributary to BMP (s)	A=	6.2271	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.72	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	9440	cubic-feet

DMA B

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.58	inches
2	Area tributary to BMP (s)	A=	0.1864	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and	C=	0.28	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	110	cubic-feet

DMA O

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.58	inches
2	Area tributary to BMP (s)	A=	0.3	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and	C=	0.76	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	480	cubic-feet

DMAs A1 & A2 Retention Requirements Calculation to be addressed with Tree Well

The City of SAN DIEGO	Project Name	Cambridge School	
	BMP ID	A	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	271254	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.72	
3	85th percentile 24-hour rainfall depth	0.58	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	9440	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	217	cu. ft.

Proprietary Flow Thorugh Based Treatment Flow Rate

Q = C I A
C = (Runoff Factor)
I = 0.2
A = (Tributary Area)

BMP ID: Modular Wetland Units 2A & 2B

DMA A	Surface	C	(s.f.) A	(acres) A	CA	Σ CA	I	Q cfs	Treatment Flow (Scaling 1.5 x Q) (cfs)		Manufacturer	Model	Capacity (cfs)	Bypass Flow Q100 cfs
Onsite	Imperv	0.90	209517	4.810	4.33		0.2	0.866	1.299					
	Landscape	0.10	61737	1.417	0.14		0.2	0.028	0.043		Contech LLC	Modular Wetland Systems		
											Unit 2A	MWSL0824OP - 823741-15		
Total Flow						4.47	0.2	0.894	**1.34**		Unit 2B	MWSL0824OP - 823741-25		
													1.34	**24.4**

BMP ID Modular Wetland Unit 1

DMA O & B	Surface	C	(s.f.) A	(acres) A	CA	Σ CA	I	Q cfs	Treatment Flow (Scaling 1.5 x Q) (cfs)		Manufacturer	Model	Capacity (cfs)	Bypass Flow Q100 cfs
Offsite	Imperv	0.90	12608	0.289	0.26		0.2	0.052	0.078					
Coyote B.	Landscape	0.10	8581	0.197	0.02		0.2	0.004	0.006		Contech LLC	Modular Wetland Systems		
											Unit 1	MWSL0408OP - 823741-010		
Total Flow						0.28	0.2	0.056	**0.08**				**0.08**	**2**

DMA A, Modular Wetland Units # 1 & # 2

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	9440	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	9440	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	6.227	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.72	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.897	cfs

DMAs B & O, Modular Wetland Unit # 3

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	590	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	590	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	0.486	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.576	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.056	cfs

Contech Engineered Solutions LLC
12901 SE 97th Ave, Suite 400 | Clackamas, OR 97015
Phone: (503)-258-3165
www.ContechES.com

November 19, 2025

The Cambridge School: Modular Wetlands System Linear Units

Project number: 823741

To Whom It May Concern,

The Modular Wetlands System (MWS) Linear units for this project are sized in accordance with the Washington State Technological Assessment Protocol – Ecology (TAPE) General Use Level Designation (GULD) approval. The MWS wetland media is approved at a loading rate of 1 gpm/sq ft of surface area, and the prefilters are approved at a loading rate of 2.1 gpm/sq ft of surface area. The MWS Linear has GULD designation at these loading rates for total suspended solids (basic), phosphorous, and dissolved metals (enhanced). For this project, the design, sizing, and loading are all confirmed by a Contech representative to ensure the systems are sized appropriately.

Unit 1 - MWS-L-4-8-OP

- Required Treatment Flow Rate = 0.084 cfs (37.69 gpm)
- Operating Head = 2.47 ft

Unit 2A - MWS-L-8-24-OP

- Required Treatment Flow Rate = 0.67 cfs (300.70 gpm)
- Operating Head = 3.29 ft

Unit 2B - MWS-L-8-24-OP

- Required Treatment Flow Rate = 0.67 cfs (300.70 gpm)
- Operating Head = 3.29 ft

If you have any questions, please feel free to contact us at your convenience.

Sincerely,

Bobby Hodgins,
Designer – Stormwater Products
Contech Engineered Solutions LLC
12901 SE 97th Ave, Suite 400 | Clackamas, OR 97015
Phone: (503)-258-3168

MWS-L-4-8-V

Required treatment flow rate = 0.084 cfs = 37.70 gpm

MWS-L-4-8-V vault treatment capacity = 0.084 cfs = 37.70 gpm at 2.47 ft operating hydraulic grade line (HGL)

MWS-L-4-8-V wetland perimeter = P = 14.8 ft x 1 media cages = 14.8 ft

WetlandMedia surface area = operating HGL x wetland perimeter

WetlandMedia surface area = 2.47 ft x 14.8 ft = 36.56 ft^2

WetlandMedia Loading Rate = 37.70 gpm / 36.56 ft^2 = 1.0 gpm/ft^2

FLOW-BASED SIZING

Discharge Equation: Q = vA

Solve for the pre treatment loading rate, which must be less than 2.1 gpm/sf^2

Q = 0.084 cfs = 37.70 gpm

Pretreatment surface area = 25.6 ft^2 per cartridge

$$v\ pretreatment = Q/A = \frac{37.70\ gpm}{25.6\ ft^2 \times 1\ cartridges} = 1.47\ gpm/ft^2$$

< 2.1 gpm/ft^2, OK

Solve for the required HGL:

Q = 0.084 cfs = 37.70 gpm

v = WetlandMedia loading rate = 1.0 gpm/ft^2

A = wetland perimeter x height = P x h

Solve for height, h:

$$h = Q / (v * P) = \frac{37.70\ gpm}{1.0\ gpm/ft^2 \times 14.8\ ft} = 2.47\ ft$$

The Media Operating Head within the MWSL unit needs to be 2.47 ft in order to treat 0.084 cfs

MWS-L-8-24-V

Required treatment flow rate = 0.670 cfs = 300.70 gpm

MWS-L-8-24-V vault treatment capacity = 0.670 cfs = 300.70 gpm at 3.29 ft operating hydraulic grade line (HGL)

MWS-L-8-24-V wetland perimeter = P = 14.8 ft x 6 media cages = 88.8 ft

WetlandMedia surface area = operating HGL x wetland perimeter

WetlandMedia surface area = 3.29 ft x 88.8 ft = 292.15 ft^2

WetlandMedia Loading Rate = 300.70 gpm / 292.15 ft² = 1.0 gpm/ft²

FLOW-BASED SIZING

Discharge Equation: Q = vA

Solve for the pre treatment loading rate, which must be less than 2.1 gpm/sf²

Q = 0.670 cfs = 300.70 gpm

Pretreatment surface area = 25.6 ft² per cartridge

$$v\ pretreatment = Q/A = \frac{300.70\ gpm}{25.6\ ft^2 \times 6\ cartridges} = 1.96\ gpm/ft^2$$

< 2.1 gpm/ft², OK

Solve for the required HGL:

Q = 0.670 cfs = 300.70 gpm

v = WetlandMedia loading rate = 1.0 gpm/ft²

A = wetland perimeter x height = P x h

Solve for height, h:

$$h = Q / (v * P) = \frac{300.70\ gpm}{1.0\ gpm/ft^2 \times 88.8\ ft} = 3.29\ ft$$

The Media Operating Head within the MWSL unit needs to be 3.29 ft in order to treat 0.670 cfs

MWS-L-8-24-V

Required treatment flow rate = 0.670 cfs = 300.70 gpm

MWS-L-8-24-V vault treatment capacity = 0.670 cfs = 300.70 gpm at 3.29 ft operating hydraulic grade line (HGL)

MWS-L-8-24-V wetland perimeter = P = 14.8 ft x 6 media cages = 88.8 ft

WetlandMedia surface area = operating HGL x wetland perimeter

WetlandMedia surface area = 3.29 ft x 88.8 ft = 292.15 ft^2

WetlandMedia Loading Rate = 300.70 gpm / 292.15 ft² = 1.0 gpm/ft²

FLOW-BASED SIZING

Discharge Equation: Q = vA

Solve for the pre treatment loading rate, which must be less than 2.1 gpm/sf²

Q = 0.670 cfs = 300.70 gpm

Pretreatment surface area = 25.6 ft² per cartridge

$$v\ pretreatment = Q/A = \frac{300.70\ gpm}{25.6\ ft^2 \times 6\ cartridges} = 1.96\ gpm/ft^2$$

< 2.1 gpm/ft², OK

Solve for the required HGL:

Q = 0.670 cfs = 300.70 gpm

v = WetlandMedia loading rate = 1.0 gpm/ft²

A = wetland perimeter x height = P x h

Solve for height, h:

$$h = Q / (v * P) = \frac{300.70\ gpm}{1.0\ gpm/ft^2 \times 88.8\ ft} = 3.29\ ft$$

The Media Operating Head within the MWSL unit needs to be 3.29 ft in order to treat 0.670 cfs

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	○ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

See TAPE Certification Below

WASHINGTON STATE DEPARTMENT OF ECOLOGY

January 2024

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS) METALS AND PHOSPHORUS TREATMENT

For

Contech Engineered Solutions, LLC (Contech) Modular Wetlands Linear

Ecology's Decision

Based on Modular Wetland Systems, Inc, application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General Use Level Designation (GULD) for the Modular Wetlands Linear Stormwater Treatment System for Basic, Phosphorus, and Metals treatment
    - Sized at a hydraulic loading rate of:
        - 1 gallon per minute (gpm) per square foot (sq ft) of Wetland Cell Surface Area
        - Prefilter box (approved at either 22 inches or 33 inches tall)
            - 3.0 gpm/sq ft of prefilter box surface area for moderate pollutant loading rates (low to medium density residential basins).
            - 2.1 gpm/sq ft of prefilter box surface area for high pollutant loading rates (commercial and industrial basins).
2. Ecology approves the Modular Wetlands Linear Stormwater Treatment System units for Basic, Phosphorus, and Metals treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:
    - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute water quality treatment design flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology- approved continuous runoff model.

- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute water quality treatment design flow rate as calculated using one of the three methods described in Chapter 2.7.6 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality treatment design flow rate is the full 2-year release rate of the detention facility.

3. These use level designations have no expiration date but may be amended or revoked by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use

Applicants shall comply with the following conditions:

1) Design, assemble, install, operate, and maintain the Modular Wetlands Linear Stormwater Treatment System units, in accordance with Contech's. applicable manuals and documents and the Ecology Decision.
2) Each site plan must undergo Contech review and approval before site installation. This ensures that site grading and slope are appropriate for use of a Modular Wetlands Linear Stormwater Treatment System unit.
3) Modular Wetlands Linear Stormwater Treatment System media shall conform to the specifications submitted to and approved by Ecology.
4) The applicant tested the Modular Wetlands Linear Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to Modular Wetlands Linear Stormwater Treatment Systems whether plants are included in the final product or not.
5) Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of stormwater treatment technology.
    - Typically, Contech designs Modular Wetland systems for a target prefilter media life of 6 to 12 months.
    - Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
    - Owners/operators must inspect Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to the SWMMEW, the wet

season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
    - Standing water remains in the vault between rain events, or
    - Bypass occurs during storms smaller than the design storm.
    - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
    - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6) Discharges from the Modular Wetlands Linear Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant:	Contech Engineered Solutions, LLC
Applicant's Address:	11815 NE Glenn Widing Dr. Portland, OR 97220

Application Documents:

Original Application for Conditional Use Level Designation, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011

Quality Assurance Project Plan: Modular Wetland System – Linear Treatment System Performance Monitoring Project, draft, January 2011

Revised Application for Conditional Use Level Designation, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011

Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data, April 2014

Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring, April 2014

Applicant's Use Level Request:

- General Use Level Designation as a Basic, Metals, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The Modular Wetlands Linear is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/L.
- The Modular Wetlands Linear is capable of removing a minimum of 50-percent of total phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/L.
- The Modular Wetlands Linear is capable of removing a minimum 30-percent of dissolved copper from stormwater with influent concentrations between 0.005 and 0.020 mg/L.
- The Modular Wetlands Linear is capable of removing a minimum 60-percent of dissolved zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/L.

Ecology's Recommendations:

- Contech has shown Ecology, through laboratory and field-testing, that the Modular Wetlands Linear Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Phosphorus, and Metals treatment goals.

Findings of Fact:

<u>Laboratory Testing</u>

The Modular Wetlands Linear Stormwater Treatment System has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.

- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).
- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Contech should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Contech should use these data to establish required maintenance cycles.
2. Contech should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Contech will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:
Download at https://www.conteches.com/modular-wetlands

Contact Information:

Applicant: Jeremiah Lehman
Contech Engineered Solutions, LLC
11815 NE Glenn Widing Dr.
Portland, OR 97220
Jeremiah.Lehman@ContechES.com

Applicant website: http://www.conteches.com

Ecology web link: http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 870-0983
douglas.howie@ecy.wa.gov

Revision History

Date	Revision
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment
December 2015	Updated GULD to document the acceptance of MWS – Linear Modular Wetland installations with or without the inclusion of plants
July 2017	Revised Manufacturer Contact Information (name, address, and email)
December 2019	Revised Manufacturer Contact Address
July 2021	Added additional prefilter sized at 33 inches
August 2021	Changed “Prefilter” to “Prefilter box”
November 2022	Changed Contacts to Contech ES
January 2024	Revised Dissolved Metals (Enhanced) to Metals

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
<u>Criteria 5</u>: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 5: Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.		
Criteria	**Answer**	**Progression**
<u>Criteria 6</u>: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 6: Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).		

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	◉ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	○ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	◉ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

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THE CAMBRIDGE SCHOOL
SAN DIEGO, CA

PROPOSAL PACKAGE
MODULAR WETLANDS MWSL0408OP - 823741-10
SITE DESIGNATION: UNIT 1

MATERIAL LIST (INCLUDED WITH STRUCTURE DELIVERY UNLESS NOTED OTHERWISE)

COUNT	DESCRIPTION	PART NUMBER	PROVIDED BY	INSTALLED BY
100.96 CF	WETLAND MEDIA (5 BAGS, 2.99 TONS)	BIO-WMEDIA	CONTECH	CONTRACTOR
1	MWSL0408 INTERNALS KIT	MWSINT040859586V	CONTECH	PRECASTER
1	DRAINDOWN ASSEMBLY	----	CONTECH	PRECASTER
1	8x4 PPE WEIR EXTENSION ASSEMBLY, 12" NO REINF.	SNOWFLAKE	CONTECH	PRECASTER
1	SEALANT FOR JOINTS		PRECASTER	CONTRACTOR
1	36"Ø x 4.5" FRAME AND COVER, EJ #001580008A01, OR EQUIV.	325-002168	CONTECH	PRECASTER

GENERAL NOTES

1. MODULAR WETLANDS LINEAR (MWSL) WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING
2. STRUCTURE SHALL MEET PEDESTRIAN (300 PSF) LIVE LOAD WITH INCIDENTAL HS-20 SURCHARGE AND GROUNDWATER ELEVATION AT OR BELOW OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION
3. MWSL STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C857, ASTM C918 AND ACI-318-14 LOAD FACTOR DESIGN METHOD
4. WETLAND MEDIA SUPPLIED BY CONTECH AND DELIVERED IN ACCORDANCE WITH PROJECT SCHEDULE, UNLESS MEDIA IS INSTALLED PRIOR TO SHIPPING
5. PLANTINGS ARE NOT PROVIDED BY CONTECH. PLANT SELECTION SHALL BE DONE BY THE ENGINEER OF RECORD IN ACCORDANCE WITH THE PROJECT PLANS AND SPECIFICATIONS

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD
B. MWSL UNIT MUST BE INSTALLED ON A LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE ENGINEER OF RECORD. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE RECOMMENDED BASE SPECIFICATIONS OF THE PROJECT ENGINEER
C. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE MWSL STRUCTURE. SPREADER BAR WITH SUFFICIENT CABLE IS REQUIRED FOR SAFETY AND REDUCTION OF DAMAGE TO CONCRETE STRUCTURE
D. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS FOR STRUCTURE ASSEMBLY
E. CONTRACTOR TO PROVIDE AND INSTALL ALL EXTERNAL CONNECTING PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. INVERT OF OUTLET PIPE MUST BE FLUSH WITH OUTLET BAY FLOOR. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE WALLS (PIPES CANNOT INTRUDE BEYOND FLUSH). ALL PIPES SHALL BE SEALED PER MANUFACTURER'S STANDARD CONNECTION DETAIL
F. CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ALL RISERS AND CASTINGS, UNLESS SHIPPED CAST INTO TOP SLAB. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE, UNLESS SPECIFIED OTHERWISE
G. CONTRACTOR TO SUPPLY AND INSTALL INLET PROTECTION BAR IF REQUIRED BY LOCAL JURISDICTION
H. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE MWSL MEDIA BAY FROM CONSTRUCTION-RELATED EROSION RUNOFF
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J. CONTACT CONTECH MAINTENANCE AND FIELD OPERATIONS AT 513-645-7770 TO SCHEDULE ACTIVATION. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE
K. IT IS RECOMMENDED THAT ALL MWSL UNITS BE WATERED BY IRRIGATION LINES OR SPRINKLER SYSTEMS ON A REGULAR BASIS. IF DRIP OR SPRAY IRRIGATION SYSTEMS ARE TO BE USED, THEY ARE NOT SUPPLIED OR INSTALLED BY CONTECH

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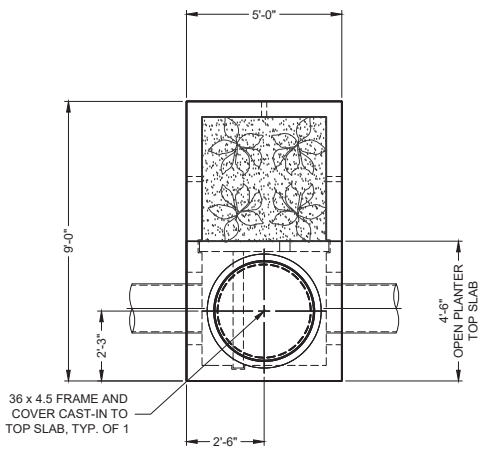
MARK	DATE	REVISION DESCRIPTION	BY

MODULAR WETLANDS MWSL0408OP - 823741-10
THE CAMBRIDGE SCHOOL
SAN DIEGO, CA
SITE DESIGNATION: UNIT 1

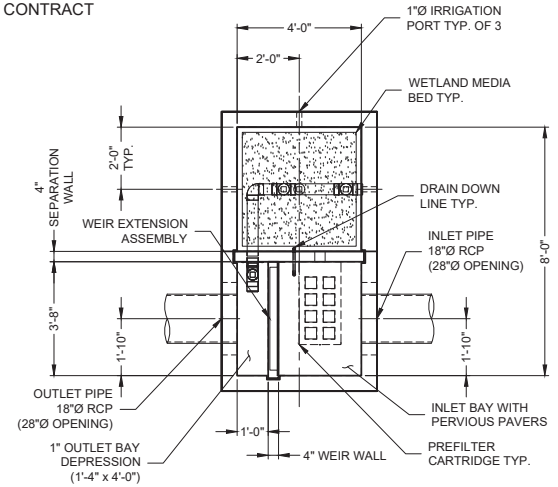
PROJECT No.:	SEQ. No.:	DATE:
823741	10	11/19/25
DESIGNED: BCH	DRAWN: BCH	
CHECKED: BCH	APPROVED: BCH	
SHEET NO.: 1 OF 2		

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PLAN VIEW



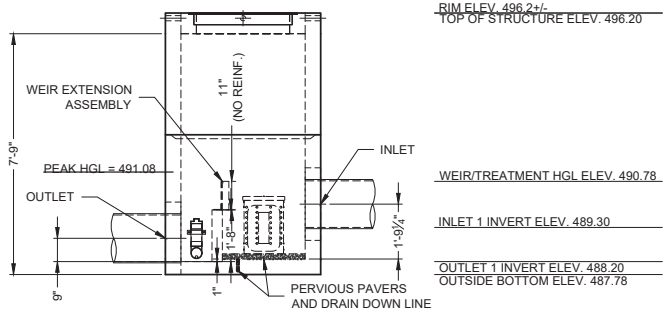
PLAN VIEW
TOP SLAB NOT SHOWN

SITE DESIGN DATA	
WATER QUALITY FLOW (CFS)	0.084
PEAK FLOW RATE (CFS)	2.00
RETURN PERIOD (YRS)	100
MAXIMUM POLLUTANT DENSITY (PREFILTER) (GPM/SF)	2.1
PREFILTER LOADING RATE (GPM/SF)	1.47
WETLAND MEDIA LOADING RATE (GPM/SF)	1.00
MEDIA OPERATING HEAD (FT)	2.47
SURFACE LOADING	PEDESTRIAN
GROUNDWATER ELEVATION*	488.2

*GROUNDWATER ELEVATION IS ASSUMED. EOR TO PROVIDE IF KNOWN

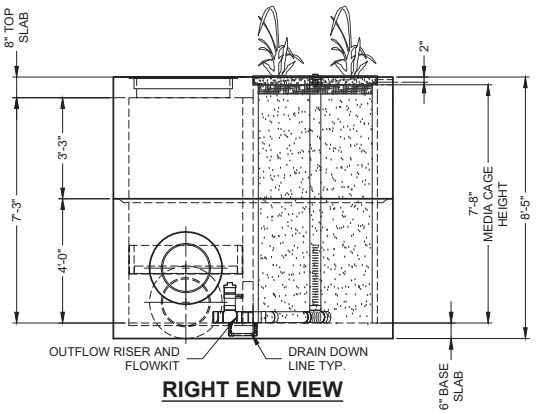
STRUCTURE DETAILS	
NUMBER OF DELIVERED PIECES (COMPLETEY ASSEMBLED - RISERS TO GRADE NOT NEEDED)	1
MAXIMUM FOOTPRINT	9.00' x 5.00'
DELIVERED HEAVIEST PICK*	22475 LB.
TOP SECTION WITH CASTING FRAMES CAST-IN	9450 LB.
BASE SECTION	10825 LB.
SEPARATION WALL	1500 LB.
WEIR WALL	300 LB.
INTERNAL COMPONENTS	400 LB.

* HEAVY PICK WEIGHT IS COMPRISED OF ALL PIECES COMPLETELY ASSEMBLED



ELEVATION VIEW*

*MEDIA CASTINGS, IF REQUIRED, NOT SHOWN



RIGHT END VIEW

RVRSD
6505 / 000000
LAYOUT 4
MWS-L-4-8-R
9.15 TS
0.86 TIW

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CONTECH
PROPOSAL
DRAWING

MODULAR WETLANDS MWSL0408OP - 823741-10
THE CAMBRIDGE SCHOOL
SAN DIEGO, CA
SITE DESIGNATION: UNIT 1

PROJECT No.:	SEQ. No.:	DATE:
823741	10	11/19/25
DESIGNED: BCH	DRAWN: BCH	
CHECKED: BCH	APPROVED: BCH	
SHEET NO.: 2 OF 2		

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THE CAMBRIDGE SCHOOL
SAN DIEGO, CA

PROPOSAL PACKAGE
MODULAR WETLANDS MWSL0824OP - 823741-15
SITE DESIGNATION: UNIT 2A

MATERIAL LIST (INCLUDED WITH STRUCTURE DELIVERY UNLESS NOTED OTHERWISE)

COUNT	DESCRIPTION	PART NUMBER	PROVIDED BY	INSTALLED BY
441.50 CF	WETLAND MEDIA (18 BAGS, 13.08 TONS)	BIO-WMEDIA	CONTECH	CONTRACTOR
1	MWSL0824 INTERNALS KIT	MWSINT082459586V	CONTECH	PRECASTER
6	DRAINDOWN ASSEMBLY	----	CONTECH	PRECASTER
1	SEALANT FOR JOINTS		PRECASTER	CONTRACTOR
4	30"Ø x 4" FRAME AND COVER, EJ #41600483, OR EQUIV.	325-000332	CONTECH	PRECASTER

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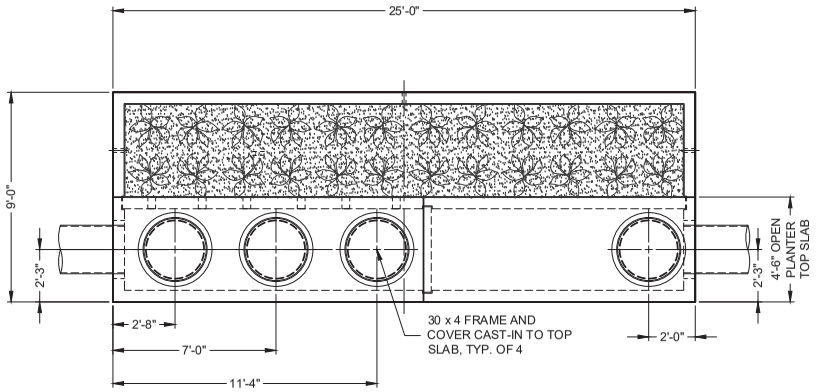
MARK	DATE	REVISION DESCRIPTION	BY

MODULAR WETLANDS MWSL0824OP - 823741-15
THE CAMBRIDGE SCHOOL
SAN DIEGO, CA
SITE DESIGNATION: UNIT 2A

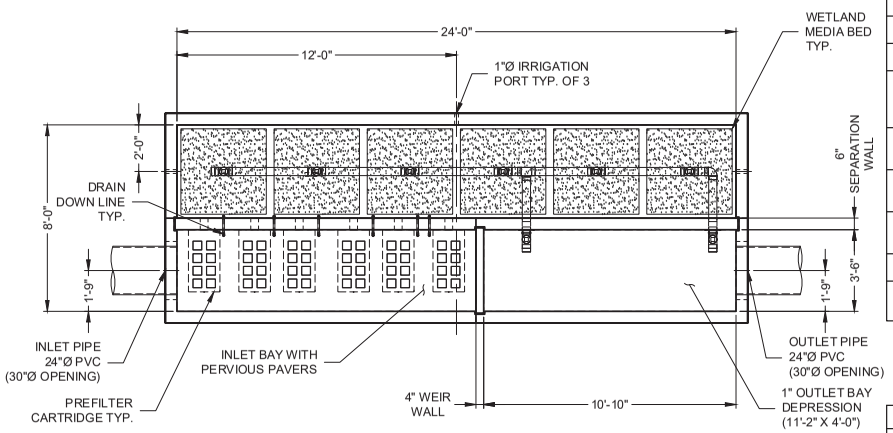
PROJECT No.:	SEQ. No.:	DATE:
823741	15	11/19/25
DESIGNED: BCH		DRAWN: BCH
CHECKED: BCH		APPROVED: BCH
SHEET NO.: 1 OF 2		

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PLAN VIEW



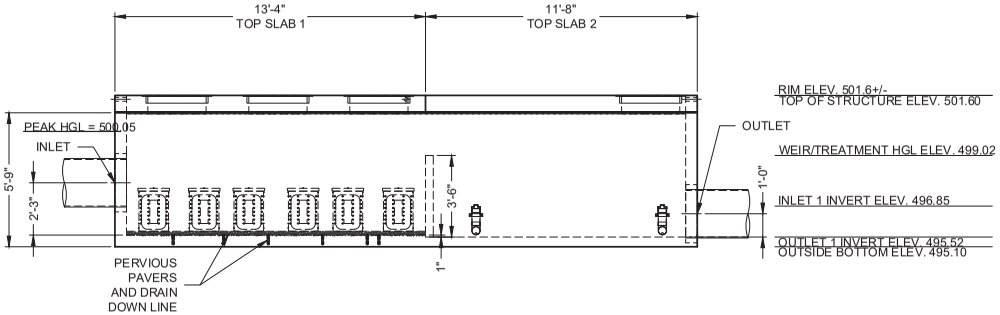
PLAN VIEW
TOP SLAB NOT SHOWN

SITE DESIGN DATA	
WATER QUALITY FLOW (CFS)	0.67
PEAK FLOW RATE (CFS)	12.20
RETURN PERIOD (YRS)	100
MAXIMUM POLLUTANT DENSITY (PREFILTER) (GPM/SF)	2.1
PREFILTER LOADING RATE (GPM/SF)	1.96
WETLAND MEDIA LOADING RATE (GPM/SF)	1.00
MEDIA OPERATING HEAD (FT)	3.29
SURFACE LOADING	PEDESTRIAN
GROUNDWATER ELEVATION*	495.52

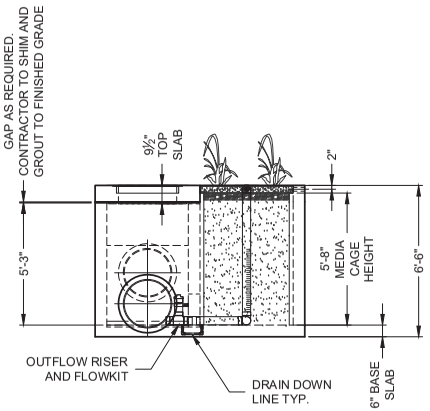
*GROUNDWATER ELEVATION IS ASSUMED. EOR TO PROVIDE IF KNOWN

STRUCTURE DETAILS	
NUMBER OF DELIVERED PIECES (RISERS TO GRADE NOT NEEDED)	3
MAXIMUM FOOTPRINT	9.00' x 25.00'
DELIVERED HEAVIEST PICK*	57050 LB.
TOP SLAB 1 WITH CASTING FRAMES CAST-IN	6650 LB.
TOP SLAB 2 WITH CASTING FRAMES CAST-IN	6225 LB.
BASE SECTION	44875 LB.
SEPARATION WALL	9450 LB.
WEIR WALL	625 LB.
INTERNAL COMPONENTS	2100 LB.

* HEAVY PICK WEIGHT IS COMPRISED OF BASE SECTION WITH WALLS AND INTERIOR COMPONENTS INSTALLED



ELEVATION VIEW*



RIGHT END VIEW

*MEDIA CASTINGS, IF REQUIRED, NOT SHOWN

RVRSD
6505 / 000000
LAYOUT 6
MWS-L-8-24-L
27.22 TS
4.87 TIW

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CONTECH
PROPOSAL
DRAWING

MODULAR WETLANDS MWSL0824OP - 823741-15
THE CAMBRIDGE SCHOOL
SAN DIEGO, CA
SITE DESIGNATION: UNIT 2A

PROJECT No.:	SEQ. No.:	DATE:
823741	15	11/19/25
DESIGNED: BCH		DRAWN: BCH
CHECKED: BCH		APPROVED: BCH
SHEET NO.: 2 OF 2		

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WETLANDS
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THE CAMBRIDGE SCHOOL
SAN DIEGO, CA

PROPOSAL PACKAGE
MODULAR WETLANDS MWSL0824OP - 823741-25
SITE DESIGNATION: UNIT 2B

MATERIAL LIST (INCLUDED WITH STRUCTURE DELIVERY UNLESS NOTED OTHERWISE)

COUNT	DESCRIPTION	PART NUMBER	PROVIDED BY	INSTALLED BY
441.50 CF	WETLAND MEDIA (18 BAGS, 13.08 TONS)	BIO-WMEDIA	CONTECH	CONTRACTOR
1	MWSL0824 INTERNALS KIT	MWSINT082459586V	CONTECH	PRECASTER
6	DRAINDOWN ASSEMBLY	----	CONTECH	PRECASTER
1	SEALANT FOR JOINTS		PRECASTER	CONTRACTOR
4	30"Ø x 4" FRAME AND COVER, EJ #41600483, OR EQUIV.	325-000332	CONTECH	PRECASTER

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3. MWSL STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C857, ASTM C918 AND ACI-318-14 LOAD FACTOR DESIGN METHOD
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C. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE MWSL STRUCTURE. SPREADER BAR WITH SUFFICIENT CABLE IS REQUIRED FOR SAFETY AND REDUCTION OF DAMAGE TO CONCRETE STRUCTURE
D. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS FOR STRUCTURE ASSEMBLY
E. CONTRACTOR TO PROVIDE AND INSTALL ALL EXTERNAL CONNECTING PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. INVERT OF OUTLET PIPE MUST BE FLUSH WITH OUTLET BAY FLOOR. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE WALLS (PIPES CANNOT INTRUDE BEYOND FLUSH). ALL PIPES SHALL BE SEALED PER MANUFACTURER'S STANDARD CONNECTION DETAIL
F. CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ALL RISERS AND CASTINGS, UNLESS SHIPPED CAST INTO TOP SLAB. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE, UNLESS SPECIFIED OTHERWISE
G. CONTRACTOR TO SUPPLY AND INSTALL INLET PROTECTION BAR IF REQUIRED BY LOCAL JURISDICTION
H. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE MWSL MEDIA BAY FROM CONSTRUCTION-RELATED EROSION RUNOFF
I. CONTRACTOR IS RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF THE SYSTEM. ACTIVATION OCCURS WHEN THE SITE IS FULLY STABILIZED WITH FINAL PAVEMENT INSTALLED AND SWEPT CLEAN OF CONSTRUCTION SEDIMENT, UNLESS SPECIFIED OTHERWISE
J. CONTACT CONTECH MAINTENANCE AND FIELD OPERATIONS AT 513-645-7770 TO SCHEDULE ACTIVATION. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE
K. IT IS RECOMMENDED THAT ALL MWSL UNITS BE WATERED BY IRRIGATION LINES OR SPRINKLER SYSTEMS ON A REGULAR BASIS. IF DRIP OR SPRAY IRRIGATION SYSTEMS ARE TO BE USED, THEY ARE NOT SUPPLIED OR INSTALLED BY CONTECH

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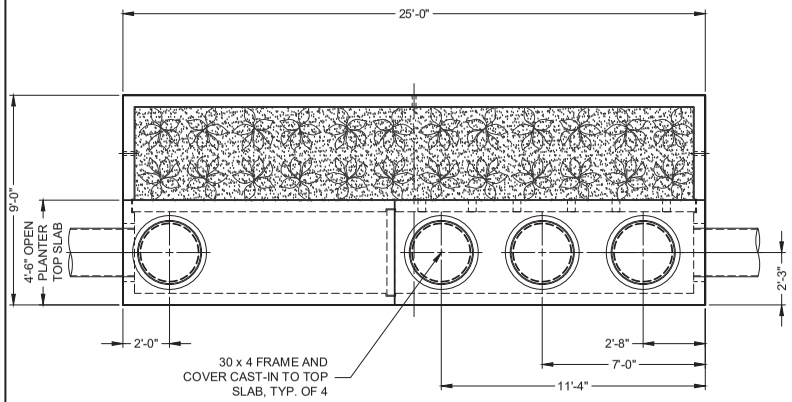
MARK	DATE	REVISION DESCRIPTION	BY

MODULAR WETLANDS MWSL0824OP - 823741-25
THE CAMBRIDGE SCHOOL
SAN DIEGO, CA
SITE DESIGNATION: UNIT 2B

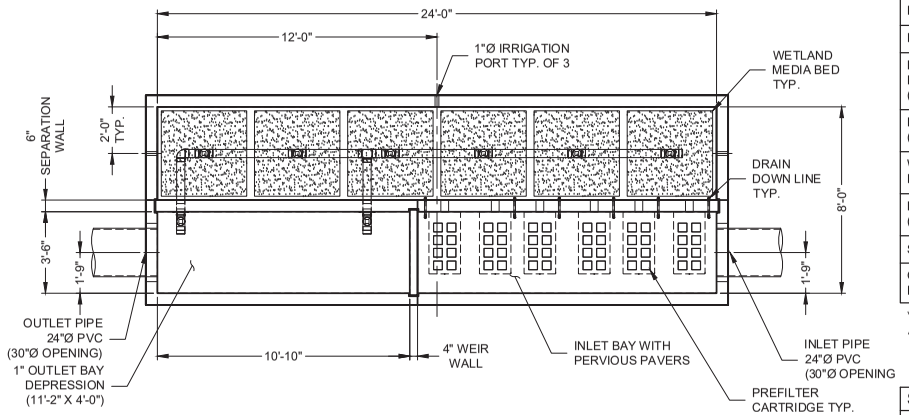
PROJECT No.:	SEQ. No.:	DATE:
823741	25	11/19/25
DESIGNED: BCH	DRAWN: BCH	
CHECKED: BCH	APPROVED: BCH	
SHEET NO.: 1 OF 2		

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PLAN VIEW



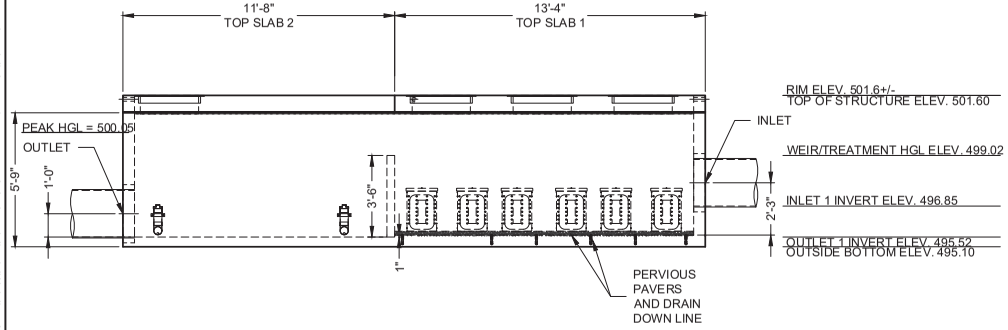
PLAN VIEW
TOP SLAB NOT SHOWN

SITE DESIGN DATA	
WATER QUALITY FLOW (CFS)	0.67
PEAK FLOW RATE (CFS)	12.20
RETURN PERIOD (YRS)	100
MAXIMUM POLLUTANT DENSITY (PREFILTER) (GPM/SF)	2.1
PREFILTER LOADING RATE (GPM/SF)	1.96
WETLAND MEDIA LOADING RATE (GPM/SF)	1.00
MEDIA OPERATING HEAD (FT)	3.29
SURFACE LOADING	PEDESTRIAN
GROUNDWATER ELEVATION*	495.52

*GROUNDWATER ELEVATION IS ASSUMED. EOR TO PROVIDE IF KNOWN

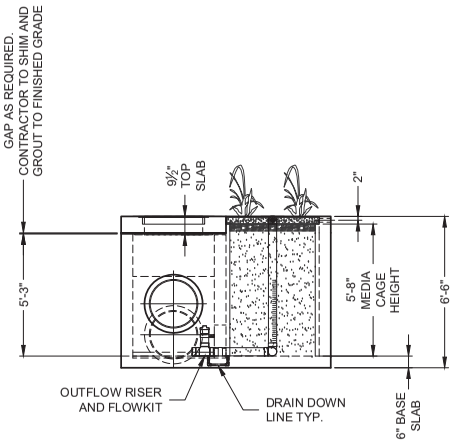
STRUCTURE DETAILS	
NUMBER OF DELIVERED PIECES (RISERS TO GRADE NOT NEEDED)	3
MAXIMUM FOOTPRINT	9.00' x 25.00'
DELIVERED HEAVIEST PICK*	57050 LB.
TOP SLAB 1 WITH CASTING FRAMES CAST-IN	6650 LB.
TOP SLAB 2 WITH CASTING FRAMES CAST-IN	6225 LB.
BASE SECTION	44875 LB.
SEPARATION WALL	9450 LB.
WEIR WALL	625 LB.
INTERNAL COMPONENTS	2100 LB.

* HEAVY PICK WEIGHT IS COMPRISED OF BASE SECTION WITH WALLS AND INTERIOR COMPONENTS INSTALLED



ELEVATION VIEW*

*MEDIA CASTINGS, IF REQUIRED, NOT SHOWN



RIGHT END VIEW

RVRSD
6505 / 000000
LAYOUT 6
MWS-L-8-24-R
27.22 TS
4.87 TIW

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CONTECH
PROPOSAL
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MODULAR WETLANDS MWSL0824OP - 823741-25
THE CAMBRIDGE SCHOOL
SAN DIEGO, CA
SITE DESIGNATION: UNIT 2B

PROJECT No.:	SEQ. No.:	DATE:
823741	25	11/19/25
DESIGNED: BCH		DRAWN: BCH
CHECKED: BCH		APPROVED: BCH
SHEET NO.: 2 OF 2		

\\QUIKRETE.NET\CONTECH\MER\LIN\PROJECT\ACTIVE\823700\823741\823741-25-MODULAR WETLANDS\DRAWINGS\823741-25-MWSL0824OP-CONFAB.DWG 11/19/2025 10:48 AM

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Attachment 2
Backup for PDP Hydromodification Control Measures

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Project Name: The Cambridge School

Indicate which Items are Included:

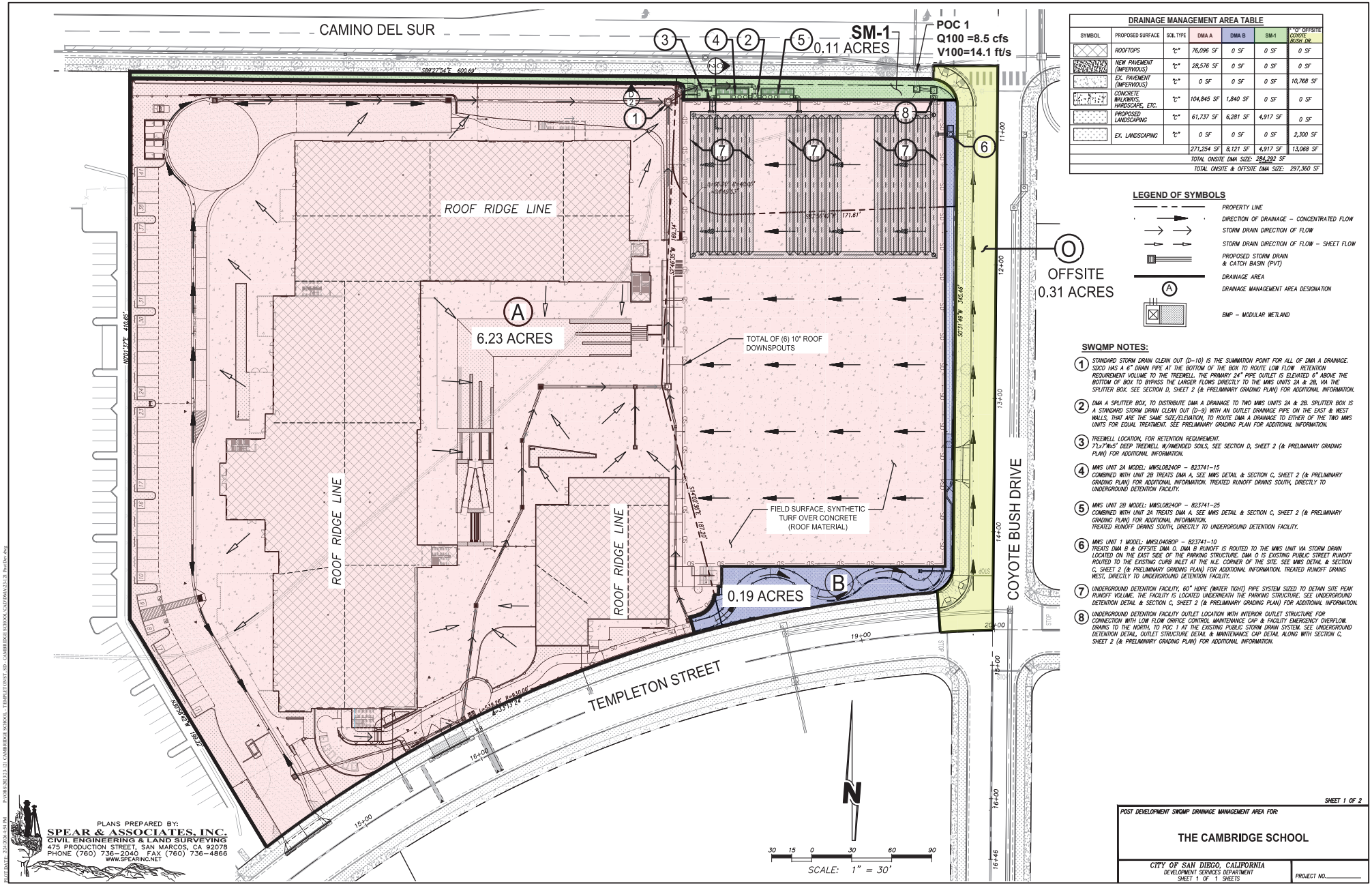
Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☑ Not Performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document

Project Name: The Cambridge School

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [x] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [ ] Critical coarse sediment yield areas to be protected OR provide a separate map showing that the project site is outside of any critical coarse sediment yield areas
- [x] Existing topography
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [x] Proposed design features and surface treatments used to minimize imperviousness
- [x] Point(s) of Compliance (POC) for Hydromodification Management
  Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- [x] Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail).



DRAINAGE MANAGEMENT AREA TABLE

SYMBOL	PROPOSED SURFACE	SOIL TYPE	DMA A	DMA B	SM-1	"O" OFFSITE COYOTE BUSH DR.
	ROOFTOPS	"C"	76,096 SF	0 SF	0 SF	0 SF
	NEW PAVEMENT (IMPERVIOUS)	"C"	28,576 SF	0 SF	0 SF	0 SF
	EX. PAVEMENT (IMPERVIOUS)	"C"	0 SF	0 SF	0 SF	10,768 SF
	CONCRETE WALKWAYS, HARDSCAPE, ETC.	"C"	104,845 SF	1,840 SF	0 SF	0 SF
	PROPOSED LANDSCAPING	"C"	61,737 SF	6,281 SF	4,917 SF	0 SF
	EX. LANDSCAPING	"C"	0 SF	0 SF	0 SF	2,300 SF
			271,254 SF	8,121 SF	4,917 SF	13,068 SF
			TOTAL ONSITE DMA SIZE: 284,292 SF			
			TOTAL ONSITE & OFFSITE DMA SIZE: 297,360 SF			

LEGEND OF SYMBOLS

- PROPERTY LINE
- DIRECTION OF DRAINAGE – CONCENTRATED FLOW
- STORM DRAIN DIRECTION OF FLOW
- STORM DRAIN DIRECTION OF FLOW – SHEET FLOW
- PROPOSED STORM DRAIN & CATCH BASIN (PVT)
- DRAINAGE AREA
- DRAINAGE MANAGEMENT AREA DESIGNATION
- BMP – MODULAR WETLAND

SWQMP NOTES:

1. STANDARD STORM DRAIN CLEAN OUT (D-10) IS THE SUMMATION POINT FOR ALL OF DMA A DRAINAGE. SDCO HAS A 6" DRAIN PIPE AT THE BOTTOM OF THE BOX TO ROUTE LOW FLOW RETENTION REQUIREMENT VOLUME TO THE TREEWELL. THE PRIMARY 24" PIPE OUTLET IS ELEVATED 6" ABOVE THE BOTTOM OF BOX TO BYPASS THE LARGER FLOWS DIRECTLY TO THE MWS UNITS 2A & 2B, VIA THE SPLITTER BOX. SEE SECTION D, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.
2. DMA A SPLITTER BOX, TO DISTRIBUTE DMA A DRAINAGE TO TWO MWS UNITS 2A & 2B. SPLITTER BOX IS A STANDARD STORM DRAIN CLEAN OUT (D-9) WITH AN OUTLET DRAINAGE PIPE ON THE EAST & WEST WALLS, THAT ARE THE SAME SIZE/ELEVATION, TO ROUTE DMA A DRAINAGE TO EITHER OF THE TWO MWS UNITS FOR EQUAL TREATMENT. SEE PRELIMINARY GRADING PLAN FOR ADDITIONAL INFORMATION.
3. TREEWELL LOCATION, FOR RETENTION REQUIREMENT. 7'Lx7'Wx5' DEEP TREEWELL W/AMENDED SOILS, SEE SECTION D, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.
4. MWS UNIT 2A MODEL: MWSL0824OP – 823741-15
COMBINED WITH UNIT 2B TREATS DMA A, SEE MWS DETAIL & SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION. TREATED RUNOFF DRAINS SOUTH, DIRECTLY TO UNDERGROUND DETENTION FACILITY.
5. MWS UNIT 2B MODEL: MWSL0824OP – 823741-25
COMBINED WITH UNIT 2A TREATS DMA A. SEE MWS DETAIL & SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.
TREATED RUNOFF DRAINS SOUTH, DIRECTLY TO UNDERGROUND DETENTION FACILITY.
6. MWS UNIT 1 MODEL: MWSL0408OP – 823741-10
TREATS DMA B & OFFSITE DMA O. DMA B RUNOFF IS ROUTED TO THE MWS UNIT VIA STORM DRAIN LOCATED ON THE EAST SIDE OF THE PARKING STRUCTURE. DMA O IS EXISTING PUBLIC STREET RUNOFF ROUTED TO THE EXISTING CURB INLET AT THE N.E. CORNER OF THE SITE. SEE MWS DETAIL & SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION. TREATED RUNOFF DRAINS WEST, DIRECTLY TO UNDERGROUND DETENTION FACILITY.
7. UNDERGROUND DETENTION FACILITY, 60" HDPE (WATER TIGHT) PIPE SYSTEM SIZED TO DETAIN SITE PEAK RUNOFF VOLUME. THE FACILITY IS LOCATED UNDERNEATH THE PARKING STRUCTURE. SEE UNDERGROUND DETENTION DETAIL & SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.
8. UNDERGROUND DETENTION FACILITY OUTLET LOCATION WITH INTERIOR OUTLET STRUCTURE FOR CONNECTION WITH LOW FLOW ORIFICE CONTROL MAINTENANCE CAP & FACILITY EMERGENCY OVERFLOW. DRAINS TO THE NORTH, TO POC 1 AT THE EXISTING PUBLIC STORM DRAIN SYSTEM. SEE UNDERGROUND DETENTION DETAIL, OUTLET STRUCTURE DETAIL & MAINTENANCE CAP DETAIL ALONG WITH SECTION C, SHEET 2 (& PRELIMINARY GRADING PLAN) FOR ADDITIONAL INFORMATION.

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CIVIL ENGINEERING & LAND SURVEYING
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PHONE (760) 736-2040 FAX (760) 736-4866
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PLOT DATE: 2/3/2020 4:54 PM P:\JOBS\2023\23-12 CAMBRIDGE SCHOOL - TEMPLE\CONST SD - CAMBRIDGE SCHOOL - CADD\MAS23-12 PreDev .dwg

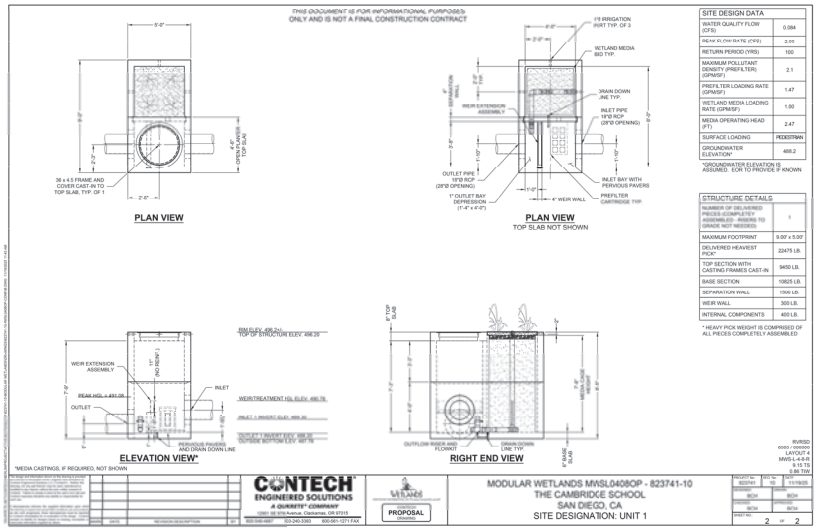
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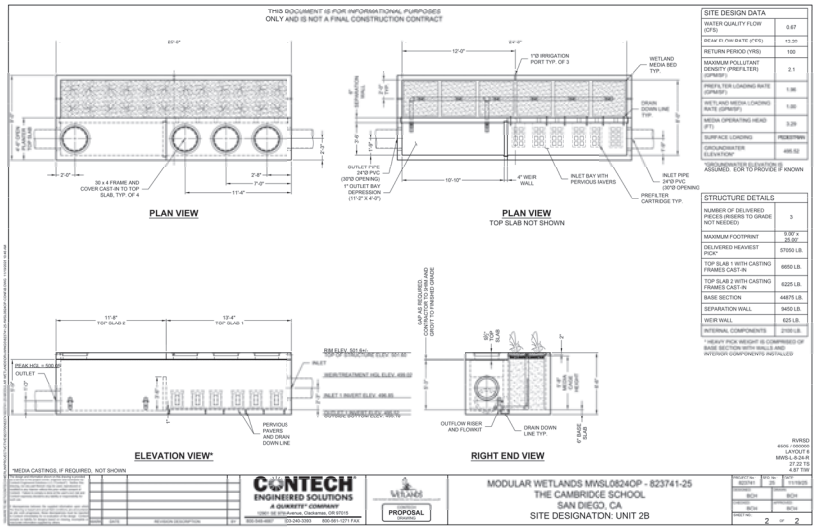
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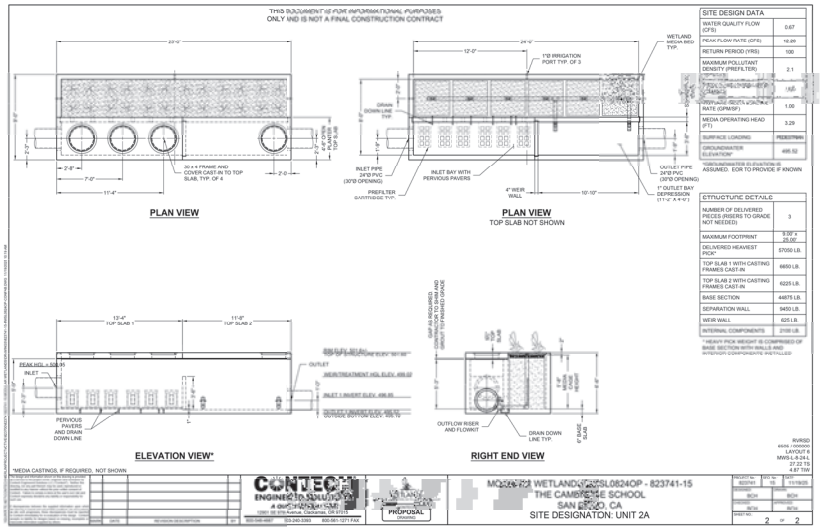
THE CAMBRIDGE SCHOOL

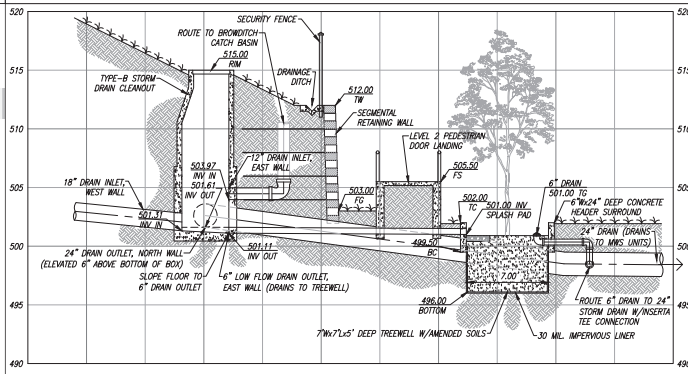
CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 1 OF 1 SHEETS

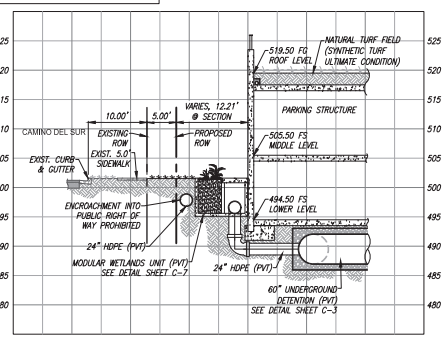
PROJECT NO._____

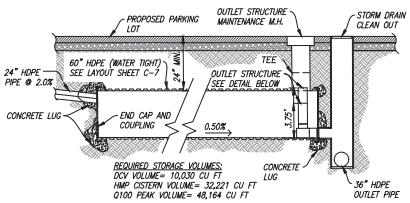


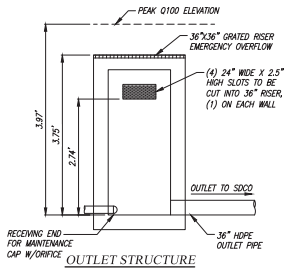


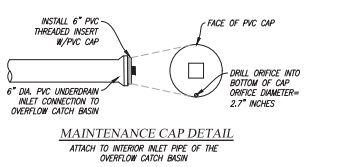












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POST DEVELOPMENT SWQMP DRAINAGE MANAGEMENT AREA FOR:

THE CAMBRIDGE SCHOOL

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 1 OF 1 SHEETS

PROJECT NO._____

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Camino Del Sur
Coyote Bush Dr & Camino Del Sur
Project Site
Nearest CCSYA

BMP Sizing Spreadsheet V3.0

Project Name:	Cambridge School
Project Applicant:	
Jurisdiction:	City of San Diego
Parcel (APN):	
Hydrologic Unit:	
Rain Gauge:	Oceanside
Total Project Area (sf):	292,443
Channel Susceptibility:	High

BMP Sizing Spreadsheet V3.0			
Project Name:	Cambridge School	Hydrologic Unit:	0
Project Applicant:	0	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	292,443
Parcel (APN):	0	Low Flow Threshold:	0.1Q2
BMP Name:	A	BMP Type:	Cistern
BMP Native Soil Type:	C	BMP Infiltration Rate (in/hr):	NA

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Volume	Volume (CF)
A	76,096	C	Flat	Roofs	1.0	0.14	10653
A	133,421	C	Flat	Concrete	1.0	0.14	18679
A	61,737	C	Flat	Landscape	0.1	0.14	864
B	1,840	C	Flat	Concrete	1.0	0.14	258
B	6,281	C	Flat	Landscape	0.1	0.14	88
Offsite O	10,768	C	Flat	Concrete	1.0	0.14	1508
Offsite O	2,300	C	Flat	Landscape	0.1	0.14	32
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	292,443					Minimum BMP Size	32082
						Proposed BMP Size*	32,221

* Assumes standard configuration

Standard Cistern Depth (Overflow Elevation)	9.0	ft
Provided Cistern Depth (Overflow Elevation)	2.74	ft
Minimum Required Cistern Footprint)		CF

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, April 2018. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V3.0			
Project Name:	Cambridge School	Hydrologic Unit:	0
Project Applicant:	0	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	292,443
Parcel (APN):	0	Low Flow Threshold:	0.1Q2
BMP Name	A	BMP Type:	Cistern

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
A	Oceanside	C	Flat	0.488	1.747	0.085	**1.26**
A	Oceanside	C	Flat	0.488	3.063	0.149	**2.21**
A	Oceanside	C	Flat	0.488	1.417	0.069	**1.02**
B	Oceanside	C	Flat	0.488	0.042	0.002	**0.03**
B	Oceanside	C	Flat	0.488	0.144	0.007	**0.10**
Offsite O	Oceanside	C	Flat	0.488	0.247	0.012	**0.18**
Offsite O	Oceanside	C	Flat	0.488	0.053	0.003	**0.04**

3.50	**0.328**	**4.83**	**2.48**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

Provide Hand Calc.	**0.000**	**0.00**	**0.000**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	Provide Hand Calculation

Orifice Sizing and Dewatering Times:

$Q = C_d \times A \times (2gh)^{1/2}$

	Basin A				
Orifice Dia. (in)=	**2.7**			**2.6**	
Orifice Dia. (ft)=	0.225			0.217	
A=	0.0398	(ft2)		0.0369	(ft2)
h=	2.74	(ft)	(peak elev)	0.1	(ft) (min. elev)
C_d=	0.6			0.6	
Q=	**0.317**	**(cfs)**		**0.056**	**(cfs)**
			Average Q =	**0.187**	

Underground Cistern Dewatering Times:

Total Volume =	32090	(c.f.)	**(Total HMP underground stored volume)**
Average Q =	0.187	(cfs)	
Dewatering time =	**48**	**(hours)**	

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Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: The Cambridge School

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3	Maintenance Agreement (Form DS-3247) (when applicable)	☑ Included ☐ Not applicable

OPERATION & MAINTENANCE (O&M) PLAN

1. Contents

1. PROJECT DESCRIPTION 1

2. OPERATION & MAINTENANCE (O&M) PLAN 1

3. Operation & Maintenance of BMP'S 1

A. Training 2
B. Landscaping 2
C. Irrigation System 5
D. Roof Drains 5
E. Trash Storage Areas 5
F. Storm Water Conveyance System Stenciling and Signing 6
G. Vector Control Owner Responsibilities 6
H. Structural BMP: Modular Wetlands 6

ATTACHMENTS

A1. Inspection & Maintenance Schedule

B1. Cost Estimate

C1. BMP Training Log

D1. Inspection & Maintenance Log

1. PROJECT DESCRIPTION

The project consists of developing a vacant lot with a private school parking structure landscaping, proprietary modular wetlands for stormwater treatment and underground detention to address hydromodification.

2. OPERATION & MAINTENANCE (O&M) PLAN

This document has been prepared in compliance with the San Diego Regional Water Quality Control Board requirements and in accordance with requirements set by the City. A Storm Water Quality Management Plan (SWQMP) has been prepared for the project. It identifies the specific Best Management Practices (BMPs) required for the project. Refer to this project's SWQMP for additional information on BMPs. Proper maintenance of the project BMP's is required for their intended and effective function. This O&M Plan provides operation and maintenance procedures for the BMPs designated in the SWQMP. It includes procedures to be followed for inspection and maintenance of the BMPs, instructions for documenting the work performed, record keeping, and outlining the requirement and procedures for training of personnel involved in the process.

3. Operation & Maintenance of BMP'S

It shall be the responsibility of the "Owner or Designated Responsible Party" to maintain and to train all employees for the maintenance and operation of all BMPs, to achieve the maximum pollutant reduction they are designed for, as addressed in the approved Project's SWQMP. The following schedule of O&M's must be followed to satisfy the Conditions of Concern and the Pollutants of Concern as addressed in the approved Project's SWQMP. This schedule shall include periodic inspections of all Source Control and Treatment Control BMP's. All maintenance records for training, inspection and maintenance shall be retained and provided to the city upon request.

The owner may also be required to provide to the City, as part of the maintenance and operation agreement an executed access easement that shall be binding on the land throughout the life of the project.

Responsible Party for O&M and For Training

The Cambridge School, Attn: Scott Kim
Mailing Adress: 12855 Black Mountain Road, San Diego, CA 92129
Phone: 858-484-3488
scottckim@gmail.com

The Designated Responsible Party will be responsible for ensuring that individuals involved in O&M activities, including but not limited to contractors and new owners, will be trained according to the training program herein, Additionally, upon any future sale of the property, the Owner will be responsible for ensuring that the new Designated Responsible Party is familiar with the contents

of the plan and the requirements for the routine inspection, routine and non-routine maintenance and record keeping tasks as described herein. All parties involved in the O&M activities will be required to read this plan.

A. Training

Personnel training is an important component of the implementation of this O&M Plan. The employee training program may consist of a meeting with any new owners, Designated Responsible Party or contractor/employees involved in the O&M activities to review the contents of this plan and to physically tour the facility to observe the BMPs and describe O&M requirements for each BMP. The Designated Responsible Party will implement the training program. All new contractors involved in landscape and/or facility maintenance at the site shall receive training within 30-days of hire and shall receive updated annual training. Maintenance contractor shall verify staff training annually.

The Designated Responsible Party shall be responsible for documenting all training activities and for maintaining records related to training. Forms for documentation of training are included in Attachment C1 of this plan. Training records must be shall be retained and provided to the city upon request.

B. Landscaping

Operational and maintenance needs include:

- Vegetation management to maintain adequate drainage and to limit habitat for mosquitoes, rodents and other disease-carrying vectors.
- Parking lot sweeping.
- Animal and vector control (any method to limit or eradicate the mammals, birds, insects or other arthropods which transmit disease pathogens).
- Periodic sediment removal to optimize performance.
- Trash, debris, grass trimmings, tree pruning, and leaf collection and removal to prevent obstruction of landscape areas so as not to prohibit their use as a BMP.
- Monitoring irrigation equipment.
- Removal of standing water, which may contribute to the development of aquatic plant communities or mosquito breeding areas.
- Preventive maintenance on sampling, flow measurement, and associated BMP equipment and structures.
- Erosion and structural maintenance to prevent the loss of soil and maintain the performance of all landscaping.

<u>Inspection Frequency</u>

The facility will be inspected and inspection visits will be completely documented:

- Once a month at a minimum.
- After every large storm (after every storm monitored or these storms with more than 0.50 inch of precipitation.)
- On a weekly basis during extended periods of wet weather.

Inspect for proper irrigation and fertilizer use, and ensure that all landscaped areas have minimum of 80% coverage.

Visual Inspection as part of landscape maintenance

- Inspect before and after the rainy season (Rainy season (Oct. 1 to April 30)).

Aesthetic Maintenance

The following activities will be included in the aesthetic maintenance program:

Grass Trimming: Trimming of grass will be done on all landscaped areas, around fences, at the inlet and outlet structures, and sampling structures.
Weed Control. Weeds will be removed through mechanical means. Herbicide shall not be used because these chemicals will impact the water quality monitoring.

Functional Maintenance

Functional maintenance has two components:

- Preventive maintenance
- Corrective maintenance

Preventive Maintenance

Preventive maintenance activities to be instituted for landscaped areas are:

- Grass Mowing: Vegetation seed, mix within the landscaped areas, are to be designed to be kept short to maintain adequate drainage and to limit the development of faunal habitats.
- Prohibitive dumping placards.
- Trash and Debris: During each inspection and maintenance visit to the site, debris and trash removal will be conducted to reduce the potential for inlet and outlet structures and other components from becoming clogged and inoperable during storm events.
- Sediment Removal: Sediment accumulation, as part of the operation and maintenance program at of landscaped areas, will be monitored once a month during the dry season, after every large storm (0.50 inch), and monthly during the wet season. Specifically, if sediment reaches a level at or near plant height, or could interfere with flow or operation, the sediment will be removed. If accumulation of debris or sediment is determined to be the cause of decline in design performance, prompt action (i.e., within ten working days) will be taken to restore the landscaped areas to design performance standards. Actions will include using additional fill and vegetation and/or removing accumulated sediment to correct channeling or ponding. Characterization and Appropriate disposal of sediment will comply with applicable local, county, state, or federal requirements. The landscaped areas will be re-graded, if the flow gradient has changed, and then replanted with sod.
- Removal of Standing Water: Standing water must be removed if it contributes to the development of aquatic plant communities or mosquito breeding areas.
- Fertilization and Irrigation: The vegetation seed mix is to been designed so that fertilization and irrigation is to be kept at a minimum.

- Elimination of Mosquito Breeding Habitats. The most effective mosquito control program is one that eliminates potential breeding habitats. All mosquitoes require a water source to lay their eggs, which in the hottest part of summer can hatch into larvae within a week.

Corrective Maintenance

Corrective maintenance is required on an emergency or non-routine basis to correct problems and to restore the intended operation and safe function of all landscaped areas.

Corrective maintenance activities include:
Removal of Debris and Sediment: Sediment, debris, and trash, which impede the hydraulic functioning of landscaping and prevent vegetative growth, will be removed and properly disposed. Temporary arrangements will be made for handling the sediments until a permanent arrangement is made. Vegetation will be re-established after sediment removal.
Structural Repairs: Once deemed necessary, repairs to structural components of landscaping will be done within 10 working days. Qualified individuals (i.e., the designers or contractors) will conduct repairs where structural damage has occurred.
Embankment and Slope Repairs: Once deemed necessary, damage to the embankments and slopes of landscaped areas will be repaired as soon as possible, and within 10 working days maximum.
Erosion Repair: Where a reseeding program has been ineffective, or where other factors have created erosive conditions (i.e., pedestrian traffic, concentrated flow, etc.), corrective steps will be taken to prevent loss of soil and any subsequent danger to the performance and use of landscaped areas as BMPs. There are a number of corrective actions than can be taken.
These include erosion control blankets, riprap, sodding, or reduced flow through the area. Designers or contractors will be consulted to address erosion problems if the solution is not evident.

Elimination of Animal Burrows

Animal burrows will be filled and steps taken to remove the animals if burrowing problems continue to occur (filling and compacting). If the problem persists, vector control specialists will be consulted regarding removal steps. This consulting is necessary as the threat of rabies in some areas may necessitate the animals being destroyed rather than relocated. If the BMP performance is affected, abatement will begin. Otherwise, abatement will be performed annually in September.
General Facility Maintenance: In addition to the above elements of corrective maintenance, general corrective maintenance will address the overall facility and its associated components. If corrective maintenance is being done to one component, other components will be inspected to see if maintenance is needed.

Maintenance Frequency
The Inspection & Maintenance Schedule included in enclosed Attachment A1 for all BMPs lists the schedule of maintenance activities to be implemented.

Debris and Sediment Disposal
Waste generated onsite is ultimately the responsibility of the Owner. Disposal of sediments, debris, and trash will comply with applicable local, county, state, and federal waste control programs.

Hazardous Waste
Suspected hazardous wastes will be analyzed to determine disposal options. Hazardous wastes generated onsite will be handled and disposed of according to applicable local, state, and federal regulations. A solid or liquid waste is considered a hazardous waste if it exceeds the criteria listed in the CCR, Title 22, Article 11.

C. Irrigation System

Inspection Frequency and Procedure

The Irrigation system shall be checked each week as a minimum. The following items shall be checked to insure that they are functioning properly:

- Shut-off devices
- Pressure drop sensors
- Moisture sensors
- All piping and sprinkler heads to insure there are no leaks and that proper water spread is maintained.
- All flow reducers.
- Check for overspray/runoff

D. Roof Drains

All roof drains shall be inspected Prior to August 31 of each year to ensure that they are clean and free from trash and in good repair. They shall be flushed and any leaks or damages piping shall be either replaced or repaired. Where roof drains flow onto grass areas splash structures and or rock rip-rap shall be maintained so the flow from the roof drains do not cause erosion or damage to the grass area. During the rain season roof drains shall be inspected weekly and after each rain storm to insure that there is no trash and or silt build up that will restrict the run-off flow from the roof. All trash and/or silt build up shall be removed immediately.

- It is not permissible to directly connect roof drains into a drain system.
- Roof drain downspouts shall discharge runoff to a landscaped area, and to allow the runoff to flow through landscape, prior to entering a private yard drain system.

E. Trash Storage Areas

All trash storage areas shall be inspected daily to insure that they are clean from trash. Also the following shall be inspected annually before and after the rainy season (Oct. 1 to April 30).

- Pavement is in good repair.
- Drainage will not run-off onto adjacent areas.
- That they remain screened or walled to prevent off-site transport of trash.
- That all lids are closed and/or awnings are in good repair to minimize direct precipitation.

F. Storm Water Conveyance System Stenciling and Signing

- Signage/stenciling are to be inspected for legibility and visual obstruction and shall be repaired and cleared of any obstruction within 5 working day of inspection.
- Inspection Frequency: Semi-annually, and monthly during rainy season.

G. Vector Control Owner Responsibilities

VECTOR MANAGEMET CONTROL REQUIREMENTS

Any method to limit or eradicate the mammals, birds, insects or other arthropods which transmit disease pathogens. Management of mosquitoes and other vectors in stormwater management structures, such as Bioretention Facilities and Best Management Practices, is critical for protecting public health.

In order to implement vector controls including minimizing the risk for mosquito-borne disease transmission, It is the responsibility of the Owner to regularly maintain the outlet structures and monitor the site after every storm event to ensure that the system (comprising of above and below ground storage facilities) is dewatered in less than 72 hours. Otherwise the owner will be required to implement a vector control plan in accordance with the county's Department of Public Health.

- Maintain all drainage inlets and outlets trash free; remove silt; make sure to clear any standing water after 72-hours of ponding.

Vector Control Resources:

1. F of San Diego vector educational brochures please reference the following website: http://www.sdcounty.ca.gov/deh/pests/vector_disease.html
2. Please contact the County of San Diego vector control program with specific questions or concerns.

H. Structural BMP: Modular Wetlands

Maintenance Guidelines for Modular Wetlands:

Maintenance Summary

- Remove Trash from Screening Device – at monthly maintenance intervals. (5 minute average service time).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 months. (10 minute average service time).
- Replace Cartridge Filter Media – average maintenance interval 12 months. (10-15 minute per cartridge average service time).
- Replace Drain Down Filter Media – average maintenance interval is 12 months. (5 minute average service time).
- Trim Vegetation – weekly as part of normal landscaping.

Maintenance Procedures:

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s). These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

(See more detailed information under Modular Wetlands Maintenance Guidelines)

CONTECH®
ENGINEERED SOLUTIONS

Modular Wetlands® Linear
Operation & Maintenance Manual



MODULAR WETLANDS®

MODULAR WETLANDS® LINEAR OPERATION & MAINTENANCE MANUAL

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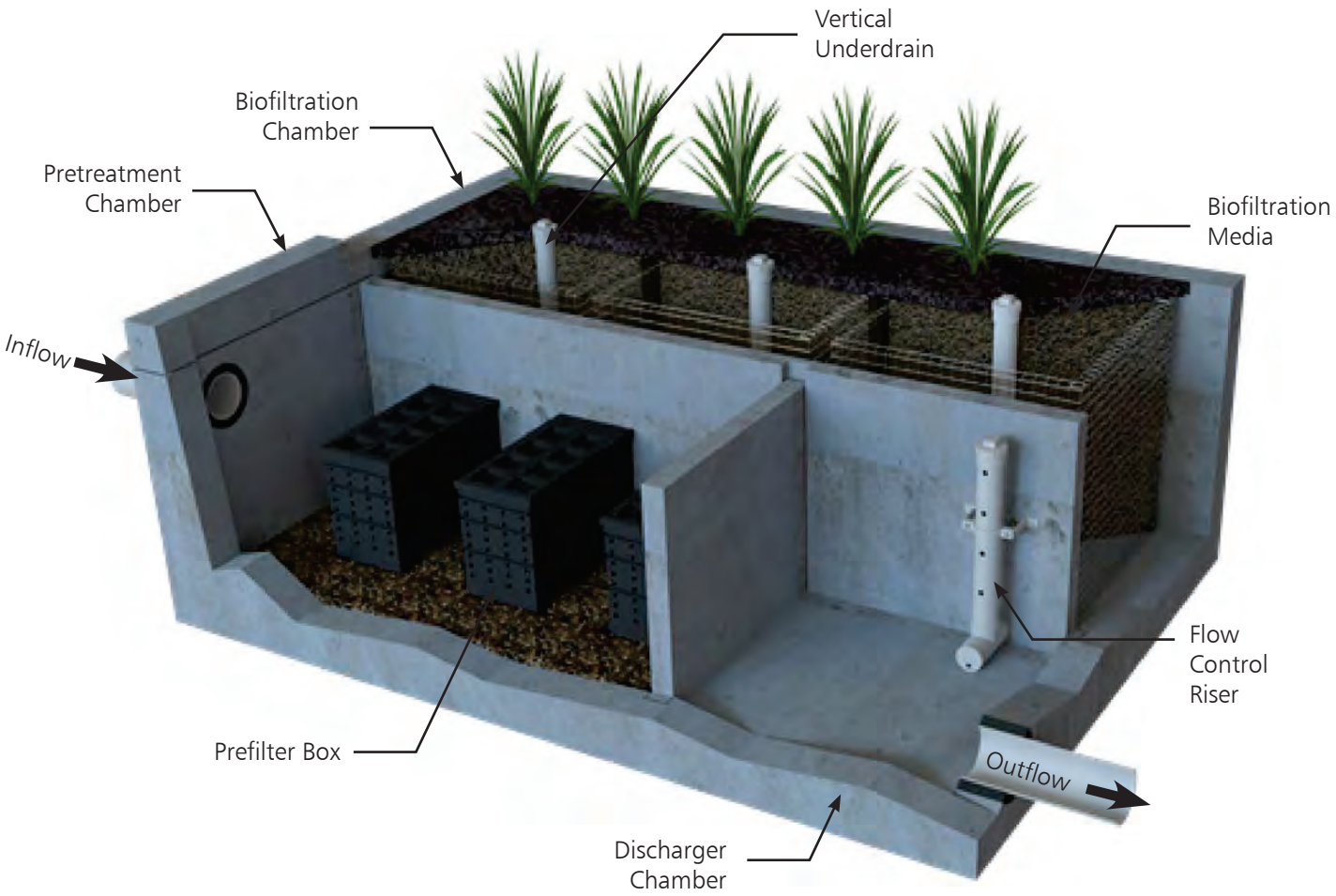
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OVERVIEW

The Modular Wetlands® Linear Biofilter is designed to remove high levels of trash, debris, sediments, nutrients, metals, and hydrocarbons. Its simple design allows for quick and easy installation. The system is housed in a standard precast structure and can be installed at various depths to meet site-specific conditions.

INTRODUCTION

This is the Modular Wetlands Linear Biofilter operation and maintenance manual. Before starting, read the instructions and equipment lists closely. It is important to follow all necessary safety procedures associated with state and local regulations. Some steps required confined space entry. Please contact Contech for more information on pre-authorized third party contractors who can provide installation services in your area. For a list of service providers in your area please visit: www.conteches.com/maintenance.



INSTRUCTIONS

INSPECTION SUMMARY

Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific loading conditions. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided.

- Inspect pre-treatment, biofiltration, and discharge chambers an average of once every six to twelve months. Varies based on site specific and local conditions.
- Average inspection time is approximately 15 minutes. Always ensure appropriate safety protocol and procedures are followed.

The following is a list of equipment required to allow for simple and effective inspection of the Modular Wetlands Linear:

- Modular Wetlands Linear Inspection Form
- Flashlight
- Manhole hook or appropriate tools to remove access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure
- Protective clothing and eye protection
- 7/16" open or closed ended wrench
- Large permanent black marker (initial inspections only - first year)

Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system

INSPECTION AND MAINTENANCE NOTES

1. Following maintenance and/or inspection, it is recommended that the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics, and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the biofiltration chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment.

INSPECTION PROCESS

1. Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other information (see inspection form).
2. Observe the inside of the system through the access covers. If minimal light is available and vision into the unit is impaired, utilize a flashlight to see inside the system and all of its chambers.
3. Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, biofiltration chamber, discharge chamber or outflow pipe. Write down any observations on the inspection form.
4. Through observation and/or digital photographs, estimate the amount of trash, debris accumulated in the pre-treatment chamber. Utilizing a tape measure or measuring stick, estimate the amount of sediment in this chamber. Record this depth on the inspection form.
5. Through visual observation, inspect the condition of the pre-filter cartridges. Look for excessive build-up of sediment on the cartridges, any build-up on the tops of the cartridges, or clogging of the holes. Record this information on the inspection form. The prefilter cartridges can be further inspected by removing the cartridge tops and assessing the color of the BioMediaGREEN filter cubes (requires entry into pre-treatment chamber - see notes previous notes regarding confined space entry). Record the color of the material. New material is a light green color. As the media becomes clogged, it will turn darker in color, eventually becoming dark brown or black. The closer to black the media is the higher percentage that the media is exhausted and is in need of replacement.



6. The biofiltration chamber is generally maintenance-free due to the system's advanced pre-treatment chamber. For units which have open planters with vegetation, it is recommended that the vegetation be inspected. Look for any plants that are dead or showing signs of disease or other negative stressors. Record the general health of the plants on the inspection form and indicate through visual observation or digital photographs if trimming of the vegetation is required.
7. The discharge chamber houses the orifice control structure, drain down filter (only in California - older models), and is connected to the outflow pipe. It is important to check to ensure the orifice is in proper operating conditions and free of any obstructions. It is also important to assess the condition of the drain down filter media which utilizes a block form of the BioMediaGREEN. Assess in the same manner as the cubes in the pre-filter cartridge as mentioned above. Generally, the discharge chamber will be clean and free of debris. Inspect the water marks on the side walls. If possible, inspect the discharge chamber during a rain event to assess the amount of flow leaving the system while it is at 100% capacity (pre-treatment chamber water level at peak HGL - top of bypass weir). The water level of the flowing water should be compared to the watermark level on the side walls, which is an indicator of the highest discharge rate the system achieved when initially installed. Record on the form if there is any difference in level from the watermark in inches.

NOTE: During the first few storms, the water level in the outflow chamber should be observed and a 6" long horizontal watermark line drawn (using a large permanent marker) at the water level in the discharge chamber while the system is operating at 100% capacity. The diagram below illustrates where the line should be drawn. This line is a reference point for future inspections of the system.

Water level in the discharge chamber is a function of flow rate and pipe size. Observation of the water level during the first few months of operation can be used as a benchmark level for future inspections. The initial mark and all future observations shall be made when the system is at 100% capacity (water level at maximum level in the pre-treatment chamber). If future water levels are below this mark when the system is at 100% capacity, this is an indicator that maintenance to the pre-filter cartridges may be needed.

8. Finalize the inspection report for analysis by the maintenance manager to determine if maintenance is required.





MAINTENANCE INDICATORS

Based upon the observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges
- Obstructions in the system or its inlet and/or outlet pipes
- Excessive accumulation of floatables in the pretreatment chamber in which the length and width of the chamber is fully impacted more than 18". See photo below.
- Excessive accumulation of sediment in the pretreatment chamber of more than 6" in depth.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. The following chart shows photos of the condition of the BioMediaGREEN contained within the pre-filter cartridges. When media is more than 85% clogged, replacement is required.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. When media is more than 85% clogged, replacement is required. The darker the BioMediaGREEN, the more clogged it is and in need of replacement.





INSPECTION PROCESS

- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter (California only - older models). The following photos show the condition of the BioMediaGREEN contained within the drain down filter. When media is more than 85% clogged, replacement is required.





- Overgrown vegetation.



- Water level in the discharge chamber during 100% operating capacity (pretreatment chamber water level at max height) is lower than the water mark by 20%.

MAINTENANCE SUMMARY

The time has come to maintain your Modular Wetlands® Linear. All necessary pre-maintenance steps must be carried out before maintenance occurs. Once traffic control has been set up per local and state regulations and access covers have been safely opened, the maintenance process can begin. It should be noted that some maintenance activities require confined space entry. All confined space requirements must be strictly followed before entry into the system. In addition, the following is recommended:

- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and cleaning equipment.
- Ensure traffic control is set up and properly positioned.
- Prepared pre-checks (OSHA, safety, confined space entry) are performed.

The following is a list of equipment to required for maintenance of the Modular Wetlands® Linear:

- Modular Wetlands Linear Maintenance Form
- Manhole hook or appropriate tools to access hatches and covers
- Protective clothing, flashlight, and eye protection
- 7/16" open or closed ended wrench
- Vacuum assisted truck with pressure washer
- Replacement BioMediaGREEN for pre-filter cartridges if required (order from one of Contech's Maintenance Team members at https://www.conteches.com/maintenance).

MAINTENANCE | PRETREATMENT CHAMBER

1. Remove access cover over pre-treatment chamber and position vacuum truck accordingly.
2. With a pressure washer, spray down pollutants accumulated on walls and pre-filter cartridges.
3. Vacuum out pre-treatment chamber and remove all accumulated pollutants including trash, debris, and sediments. Be sure to vacuum the floor until the pervious pavers are visible and clean.
4. If pre-filter cartridges require media replacement, continue to step 5. If not, replace access cover and move to step 11.









MAINTENANCE | PREFILTER CARTRIDGES

5. After successfully cleaning out the pre-treatment chamber (previous page) enter the pre-treatment chamber.
6. Unscrew the two bolts (circles shown below) holding the lid on each cartridge filter and remove lid.

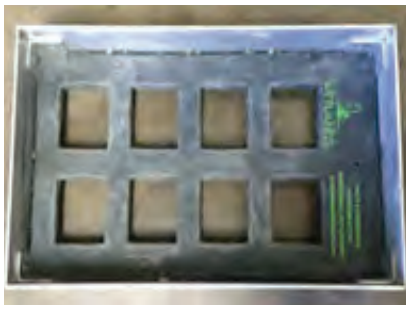




7. Place the vacuum hose over each individual media filter to suck out filter media.



8. Once filter media has been sucked out, use a pressure washer to spray down the inside of the cartridge and it's media cages. Remove cleaned media cages and place to the side. Once removed, the vacuum hose can be inserted into the cartridge to vacuum out any remaining material near the bottom of the cartridge.
9. Reinstall media cages and fill with new media from the manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. Utilize the manufacture-provided refilling tray and place on top of the cartridge. Fill the tray with new bulk media and shake down into place. Using your hands, lightly compact the media into each filter cage. Once the cages are full, remove the refilling tray and replace the cartridge top, ensuring bolts are properly tightened.



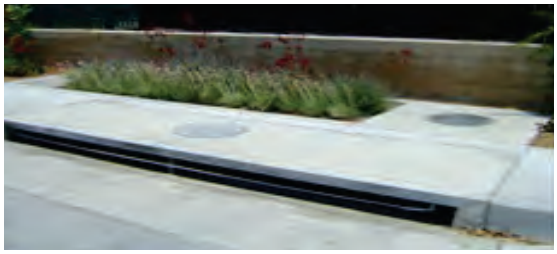




10. Exit the pre-treatment chamber. Replace access hatch or manhole cover.

MAINTENANCE | BIOFILTRATION CHAMBER

11. In general, the biofiltration chamber is maintenance-free with the exception of maintaining the vegetation. The Modular Wetlands Linear utilizes vegetation similar to surrounding landscape areas, therefore trim vegetation to match surrounding vegetation. If any plants have died, replace them with new ones.



12. Each vertical under drain on the biofiltration chamber has a removable (threaded cap) that can be taken off to check any blockages or root growth. Once removed, a jetting attachment can be used to clean out the under drain and orifice riser.
13. As with all biofilter systems, at some point the biofiltration media (WetlandMedia) will need to be replaced. Either because of physical clogging of sorptive exhaustion of the media ion exchange capacity (to remove dissolved metals and phosphorous). The general life of this media is 10 to 20 years based on site specific conditions and pollutant loading. Utilize the vacuum truck to vacuum out the media by placing the hose into the chamber. Once all the media is removed use the power washer to spray down all the netting on the outer metal cage. Inspect the netting for any damage or holes. If the netting is damaged it can be repaired or replaced with guidance by the manufacturer.
14. Contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new WetlandMedia. The quantity of media needed can be determined by providing the model number and unit depth. Media will be provided in super sacks for easy installation. Each sack will weigh between 1000 and 2000 lbs. A lifting apparatus (backhoe, boom truck, or other) is recommended to position the super sack over the biofiltration chamber. Fill the media cages up to the same level as the old media. Replant with vegetation.





MAINTENANCE | DISCHARGE CHAMBER

15. Remove access hatch or manhole cover over discharge chamber.
16. Enter chamber to gain access to the drain down filter. Unlock the locking mechanism and lift up drain down filter housing to remove used BioMediaGREEN filter block as shown below. *NOTE: Drain down filter is only found on units installed in California prior to 2023. If no drain down filter is present, skip steps 16 and 17.*





17. Insert a new BioMediaGREEN filter block and lock drain down filter housing back in place.
18. Replace access hatch or manhole cover over discharge chamber.

NOTES

CONTECH® ENGINEERED SOLUTIONS

Inspection Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

CONTECH®
ENGINEERED SOLUTIONS

Cleaning and Maintenance Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:



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ENGINEERED SOLUTIONS

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800-338-1122

WWW.CONTECHES.COM

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SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

Modular Wetlands Maintenance Guide 1/2023

ATTACHMENT "A1"
INSPECTION & MAINTENANCE SCHEDULE

PREVENTATIVE MAINTENANCE AND ROUTINE INSPECTION					
TYPE BMP	Routine Action	Maintenance Indicator	Maintenance Frequency	MAINTENANCE ACTIVITY	SITE-SPECIFIC REQUIREMENTS
Landscaping & irrigation	Proper irrigation & Fertilizer.	Less than 80% coverage	Each year as needed and once during rainy season (Oct. 1 to April 30)	Re-plant. Repair Irrigation system within 5-days.	All slopes and landscaped areas are to have a minimum coverage of 80%
Trash storage areas	Trash free and removal of silt	Visual Inspection	Daily inspection	Remove trash and silt Daily.	All trash storage areas to be free from trash and silt at all times. Dry Clean, No Power Wash.
Roof drain	Trash free and removal of silt, sedimentation & Debris	Silt build up of more than 1" no trash	Each year routinely as needed.	Remove all trash and silt and repair any damage to roof drains,	All Roof to be free from trash and silt and in good repair
Modular Wetland Systems	Remove Grate and Visually inspect	Inspect for trash, sediment and debris.	30 days prior to October 1st each year and every 6 months.	Remove Trash, sediment and Debris. Trim vegetation weekly	Replace Media Filter at 12 month intervals. See more detailed information above under Modular Wetland Bioretentions
Storm Water Conveyance system Stenciling & Signing	Must be legible at all times and have a clear view.	Fading of paint or illegible letters or	Semi-annually each year & monthly during rainy season	Repaint stenciling and/or replace signs	Appies to all stenciling and signs
Outlet Structures	Must be kept functional at all times. Clear Clogged outlets and Standing Water.	Silt, debris, trash accumulation, Ponding Water	Weekly during rainy season or within 24 hours prior to rain forecasts.	Silt, debris, trash accumulation and repair any structural damage to the outlet structures.	All outlet structures shall be kept functional at all times.

ATTACHMENT "B1"

Annual Estimate to Maintain all BMPs	Annual	10-Year
Landscaping Maintenance of landscaping and bio-filters is already included in the property management responsibilities. Additional cost:	$400	$4,000
Irrigation System: Inspection and maintenance of the irrigation system is already included in the property management responsibilities, Additional cost:	$100	$1,000
Modular Wetland Systems Maintenance & Filter Replacement	$900	$9,000
Roof Drains: Roof drain inspection and maintenance is already included in the property management responsibilities.		
Training: Once a year & training of new employees within their first week of employment.	$100	$1,000
Stormdrain Signage (As needed or every 2 years)	$100	$1,000
Trash Storage Areas: Inspection of trash storage area & maintenance to those areas is already included in the property management responsibilities. Additional cost:	$50	$500
Total Estimated Annual Cost to Maintain BMPs	$1,650	$16,500

ATTACHMENT "C1"

BMP TRAINING LOG			
Date MO/Day/Yr	**Type of Training**	**Personnel Trained**	**Trainer**

ATTACHMENT "D1"

INSPECTION AND MAINTENANCE LOG				
BMP TYP & LOCATION	DATE M/D/Y	Name of Person Inspecting	Description of BMP Condition/ Description repair required if any	Date Repair made and Description repair made and by whom

Project Name: The Cambridge School

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Attachment 3: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☑ Vicinity map
- ☑ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☑ BMP and HMP location and dimensions
- ☑ BMP and HMP specifications/cross section/model
- ☑ Maintenance recommendations and frequency
- ☑ LID features such as (permeable paver and LS location, dim, SF).

The City of SAN DIEGO

RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO AND
WHEN RECORDED MAIL TO:

_____

_____

_____ _____

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSORS PARCEL NUMBER:	PROJECT NUMBER:
_____	_____	_____

This agreement is made by and between the City of San Diego, a municipal corporation [City] and _____

_____,

the owner or duly authorized representative of the owner [Property Owner] of property located at

_____

(PROPERTY ADDRESS)

and more particularly described as: _____

_____

(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): _____.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): _____.

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): _____.

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's SWQMP and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) _____.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): _____

_____
(Owner Signature)

_____
(Print Name and Title)

_____
(Company/Organization Name)

_____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

_____
(City Control Engineer Signature)

_____
(Print Name)

_____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDGMENTS PER CIVIL CODE SEC. 1180 ET.SEQ.

Reset Button Page 2

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

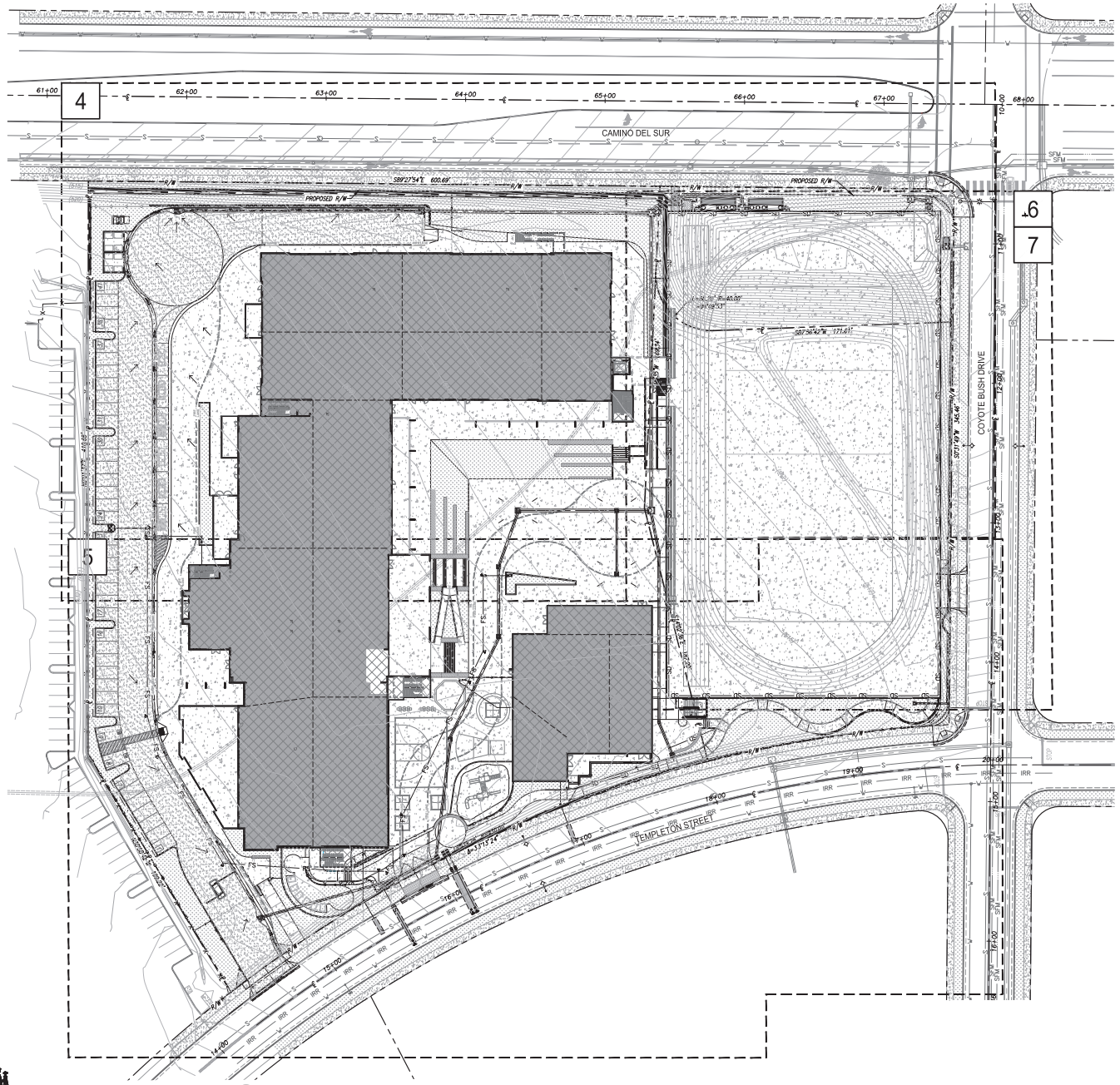
This is the cover sheet for Attachment 4.

Project Name: The Cambridge School

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- [x] Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- [x] The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- [x] Details and specifications for construction of structural BMP(s)
- [x] Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- [x] How to access the structural BMP(s) to inspect and perform maintenance
- [x] Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- [x] Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- [x] Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- [x] Recommended equipment to perform maintenance
- [ ] When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- [x] Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- [x] All BMPs must be fully dimensioned on the plans
- [x] When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.



LEGEND OF SYMBOLS

- PROPERTY LINE
- LIMIT OF GRADING
- STREET CENTERLINE
- EXISTING WATER LINE
- EXISTING SEWER LINE
- EXISTING STORM DRAIN
- EXISTING STORMWATER CATCH BASIN
- EXISTING STORMWATER CLEANOUT
- EXISTING CURB & GUTTER
- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING SPOT ELEVATIONS
- PROPOSED SPOT ELEVATIONS
- DIRECTION OF DRAINAGE FLOW
- PROPOSED STORM DRAIN
- PROPOSED STORMWATER CATCH BASIN
- PROPOSED CURB & GUTTER
- PROPOSED WATER LINE (PVT)
- PROPOSED IRRIGATION LINE (PVT)
- PROPOSED "NO TURN ON RED" SIGN

BENCHMARK

BRASS PLUG IN TOP OF CURB RETURN NORTHWEST CORNER INTERSECTION CAMINO DEL SUR AND COYOTE BUCH DRIVE PER CITY OF SAN DIEGO VERTICAL BENCHBOOK.
ELEVATION: 497.65
DATUM: MSL

BASIS OF BEARINGS

THE GRID BEARING BETWEEN CITY OF SAN DIEGO SURVEY CONTROL STATIONS 375 AND 376 PER RECORD OF SURVEY MAP NO. 14492, I.E. NORTH 18°59'25" EAST

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN DIEGO, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCELS 1 AND 2 OF PARCEL MAP NO. 21605, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY JULY 25, 2018 AS FILE NO. 2018-7002267, OFFICIAL RECORDS.

ASSESSOR'S PARCEL NO.

678-690-70-00, 678-690-71-00 & 678-690-72-00

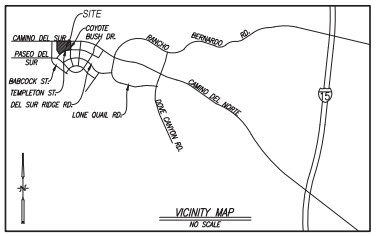
GRADING QUANTITIES

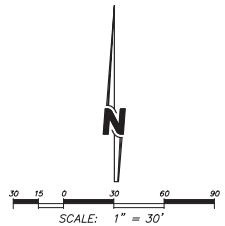
GRADED AREA _____ 6.52 [ACRES] MAX. CUT DEPTH 17.0' [FT]
CUT QUANTITIES _____ 41,700 [CYD] MAX CUT SLOPE RATIO (2:1MAX) 2:1
FILL QUANTITIES _____ 37,100 [CYD] MAX. FILL DEPTH 12.0' [FT]
IMPORT/EXPORT _____ 4,600 [CYD] MAX FILL SLOPE RATIO (2:1MAX) 2:1

THIS PROJECT PROPOSES TO EXPORT 4,600 CUBIC YARDS OF MATERIAL FROM THIS SITE. ALL EXPORT MATERIAL SHALL BE DISCHARGED TO A LEGAL DISPOSAL SITE. THE APPROVAL OF THIS PROJECT DOES NOT ALLOW PROCESSING AND SALE OF THE MATERIAL. ALL SUCH ACTIVITIES REQUIRE A SEPARATE CONDITIONAL USE PERMIT.

SHEET INDEX

COVER SHEET & KEY MAP ..... SHEET 1
EXISTING CONDITIONS SITE PLAN ..... SHEET 2
CIVIL SITE SECTIONS & DETAILS ..... SHEET 3
SITE UPPER LEVEL PRELIMINARY GRADING PLAN ..... SHEET 4-5
SITE MIDDLE & LOWER LEVEL PARKING STRUCTURE ..... SHEET 6
SITE UNDER GROUND DETENTION AT PARKING STRUCTURE ..... SHEET 7
SITE SIGHT DISTANCE STUDY ..... SHEET 8





PLANS PREPARED BY:
SPEAR & ASSOCIATES, INC.
CIVIL ENGINEERING & LAND SURVEYING
475 PRODUCTION STREET, SAN MARCOS, CA 92078
PHONE (760) 736-2040 FAX (760) 736-4866
WWW.SPEARINC.NET

REGISTERED PROFESSIONAL ENGINEER — DAVID R. SPEAR — No. 85413 — CIVIL — STATE OF CALIFORNIA

The Cambridge School

12855 Black Mountain Road
San Diego, CA 92129

The Cambridge School - CUP

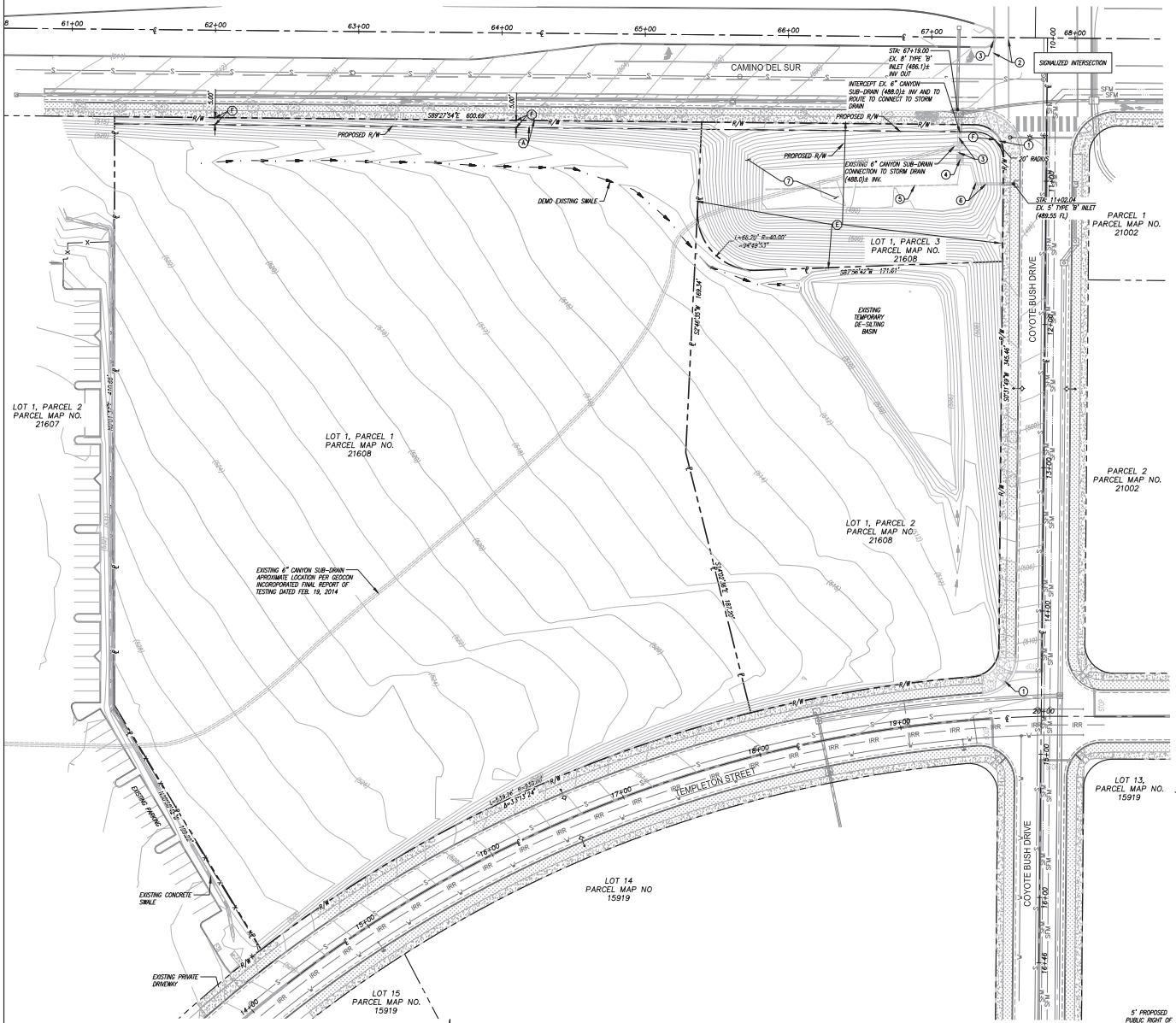
0 Templeton Street
San Diego, CA 92127

Date	Issued For
11/30/2023	CUP Submittal
2/16/2025	CUP Submittal
8/19/2025	CUP Submittal
2/27/2026	CUP Submittal

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11750 Sorrento Valley Rd
Suite 100
San Diego, California
92121 USA
(858) 398-3800
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PRELIMINARY GRADING PLAN COVER SHEET

C-1



EXISTING EASEMENTS

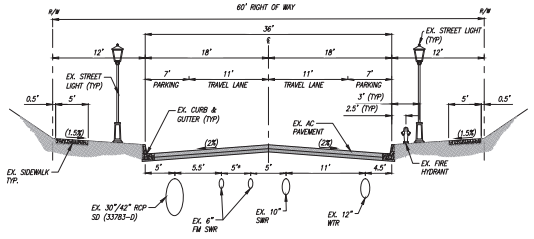
- #6 (A) AN EASEMENT FOR GENERAL UTILITIES RECORDED JUNE 16, 2011 AS DOC. NO. 2011-030712
- #7 (B) AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS RECORDED MARCH 1, 2013 AS DOC. NO. 2310-0135264 (NON-PLOTTABLE)
- #8 (C) AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS RECORDED MARCH 21, 2013 AS DOC. NO. 2013-0180571 (NON-PLOTTABLE)
- #9 (D) AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS RECORDED NOVEMBER 15, 2013 AS DOC. NO. 2013-0676664 (NON-PLOTTABLE)
- #12 (E) AN EASEMENT FOR DRAINAGE RECORDED AUGUST 10, 2018 AS DOC. NO. 2018-0329740 (PRIVATE EASEMENT PROPOSED TO BE VACATED)

PROPOSED DEDICATIONS

- (F) PROPOSED PUBLIC RIGHT OF WAY DEDICATION TO CITY OF SAN DIEGO

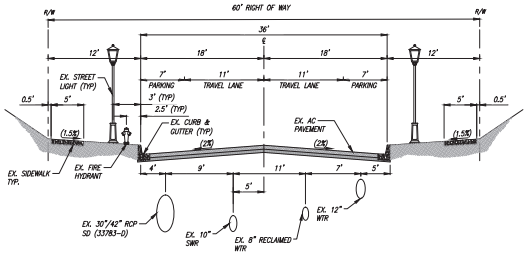
DEMOLITION NOTES

1. EXISTING PEDESTRIAN RAMP TO BE REMOVED AND REPLACED.
2. EXISTING CROSSWALK TO BE REMOVED AND REPLACED.
3. PORTION OF MEDIAN TO BE REMOVED AND REPLACED.
4. DEMO. EXISTING TYPE 'B' INLET PIPE AND STORM DRAIN.
5. DEMO. EXISTING TYPE 'I' INLET.
6. DEMO. EXISTING 4" PERFORATED PIPE.
7. DEMO. EXISTING STORMDRAIN PIPE AND HEADWALL.
8. DEMO. EXISTING STORM WATER BASIN.

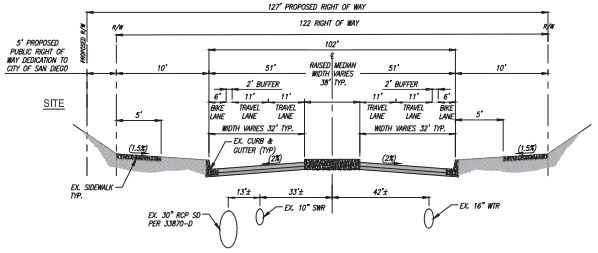


* EX. DUAL FORCE MAINS

TYPICAL STREET SECTION COYOTE BUSH DRIVE
TYPICAL SECTION LOOKING NORTH
NOT-TO-SCALE



TYPICAL STREET SECTION TEMPLETON
TYPICAL SECTION LOOKING EAST
NOT-TO-SCALE



TYPICAL STREET SECTION CAMINO DEL SUR
TYPICAL SECTION LOOKING WEST
NOT-TO-SCALE

PLANS PREPARED BY:
SPEAR & ASSOCIATES, INC.
CIVIL ENGINEERING & LAND SURVEYING
475 PRODUCTION STREET, SAN MARCOS, CA 92078
PHONE (760) 736-2040 FAX (760) 736-4866
WWW.SPEARINC.NET

REGISTERED PROFESSIONAL ENGINEER — CHRISTOPHER R. ZEISLER — No. 85413 — CIVIL — STATE OF CALIFORNIA

N

30 15 0 30 60 90

SCALE: 1" = 30'

The Cambridge School

12655 Black Mountain Road
San Diego, CA 92129

The Cambridge School - CUP

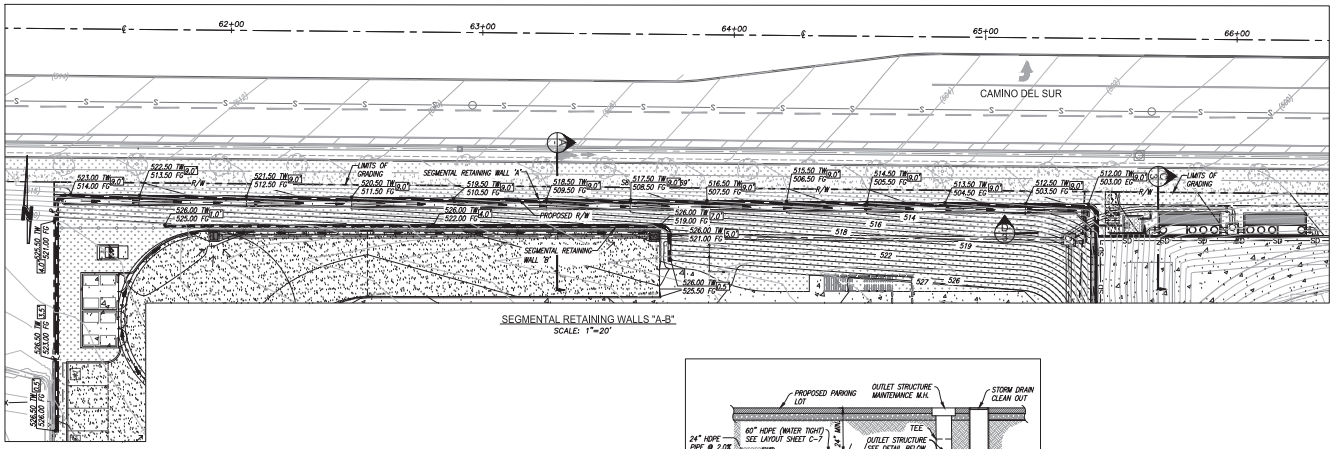
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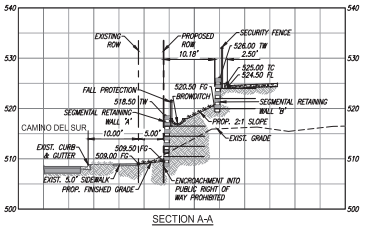
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San Diego, California
92121 USA
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EXISTING CONDITIONS SITE PLAN

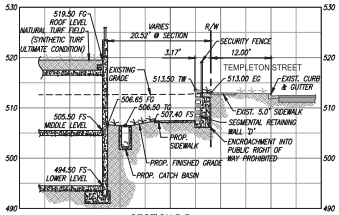
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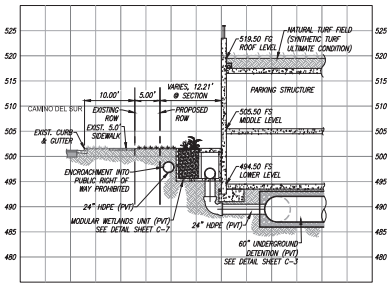
SEGMENTAL RETAINING WALLS "A-B"
SCALE: 1"=20'



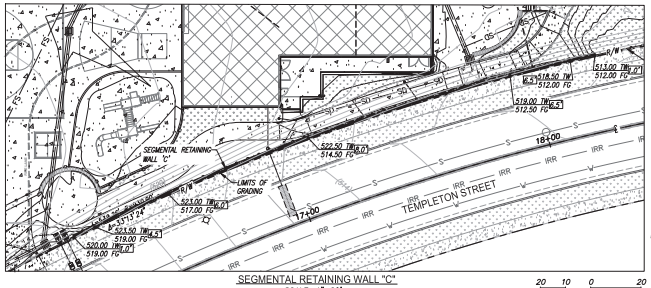
SECTION A-A
SCALE: 1"=10'



SECTION B-B
SCALE: 1"=10'

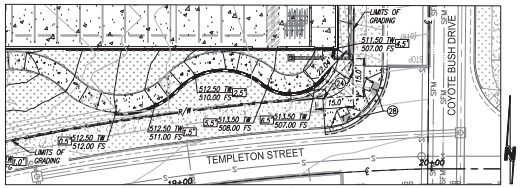


SECTION C-C
SCALE: 1"=10'



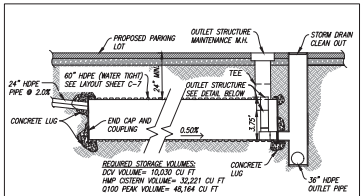
SEGMENTAL RETAINING WALL "C"
SCALE: 1"=20'

20 10 0 20
SCALE: 1" = 20'

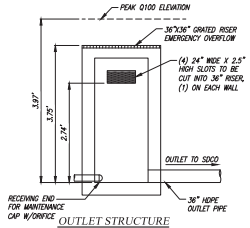


SEGMENTAL RETAINING WALL "D"
SCALE: 1"=20'

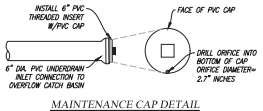
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SCALE: 1" = 20'



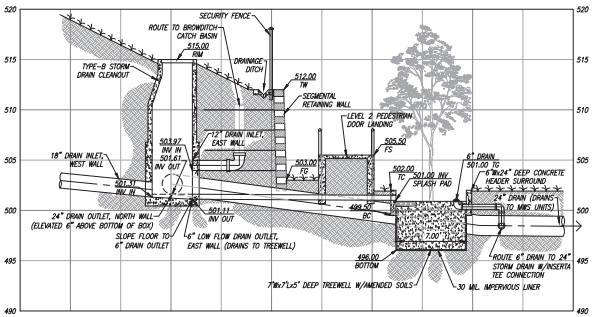
UNDERGROUND DETENTION
DETAIL FOR DETENTION PIPE SYSTEM BY ADVANCED DRAINAGE SYSTEMS, INC.
NO SCALE



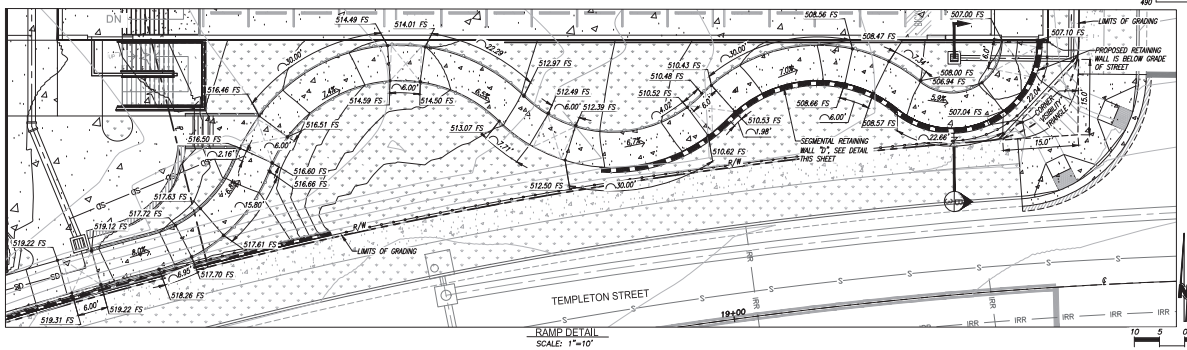
OUTLET STRUCTURE
INSIDE UNDERGROUND DETENTION
NO SCALE



MAINTENANCE CAP DETAIL
ATTACH TO INTERIOR INLET PIPE OF THE OVERFLOW CATCH BASIN

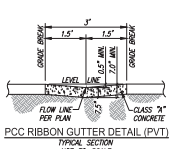


SECTION D-D
SCALE: 1"=5'



RAMP DETAIL
SCALE: 1"=10'

10 5 0 10
SCALE: 1" = 10'



PCC RIBBON GUTTER DETAIL (PVT)
TYPICAL SECTION
NOT-TO-SCALE

The Cambridge School

12855 Black Mountain Road
San Diego, CA 92129

The Cambridge School - CUP

0 Templeton Street
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HED

11760 Sorrento Valley Rd
Suite 100
San Diego, California
92121 USA

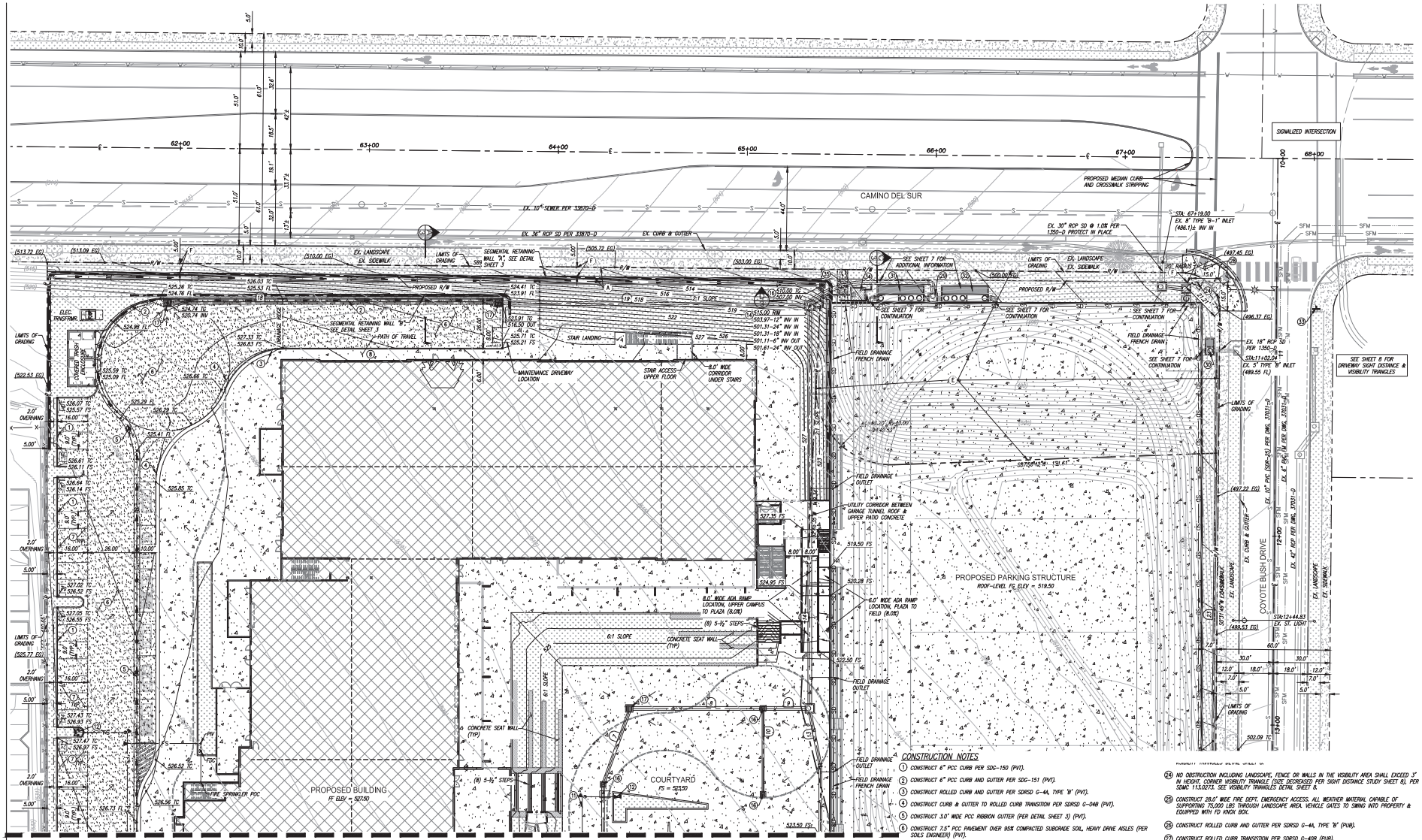
(858) 398-3800

WWW.HED.DESIGN

CIVIL SITE SECTIONS & DETAILS

C-3

PLANS PREPARED BY:
SPEAR & ASSOCIATES, INC.
CIVIL ENGINEERING & LAND SURVEYING
475 PRODUCTION STREET, SAN MARCOS, CA 92078
PHONE (760) 736-2040 FAX (760) 736-4866
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CONSTRUCTION NOTES

1. CONSTRUCT 6" PCC CURB PER SDG-150 (PVT).
2. CONSTRUCT 6" PCC CURB AND GUTTER PER SDG-151 (PVT).
3. CONSTRUCT ROLLED CURB AND GUTTER PER SDRSD G-4A, TYPE 'B' (PVT).
4. CONSTRUCT CURB & GUTTER TO ROLLED CURB TRANSITION PER SDRSD G-04B (PVT).
5. CONSTRUCT 3.0' WIDE PCC RIBBON GUTTER (PER DETAIL SHEET 3) (PVT).
6. CONSTRUCT 7.5" PCC PAVEMENT OVER 95% COMPACTED SUBGRADE SOIL, HEAVY DRIVE AISLES (PER SOILS ENGINEER) (PVT).
7. CONSTRUCT 6.5" PCC PAVEMENT OVER 95% COMPACTED SUBGRADE SOIL, PARKING STALLS (PER SOILS ENGINEER) (PVT).
8. CONSTRUCT 4.0' MIN. WIDE P.C.C. SIDEWALK PER SDG-155 (PVT).
9. SAWCUT, REMOVE EX. SIDEWALK, CURB & GUTTER. CONSTRUCT DRIVEWAY PER SDG-163. (MATCH EXISTING PAVEMENT, SIDEWALK, CURB & GUTTER) (PUB).
10. INSTALL 8" FIRE SERVICE ASSEMBLY W/BACKFLOW DEVICE PER (PVT).
11. INSTALL 8" PVC CL-150 FIRE SERVICE PER SDW-105 (PVT).
12. INSTALL 6" FIRE HYDRANT ASSEMBLY PER SDW-104 (PVT).
13. TRENCH RESURFACING PER SDG-107, TYPE 1 (PUB).
14. CONSTRUCT TYPE-B SDCO PER D-10 (PVT).
15. SIGHT DISTANCE LINE PER CITY OF SAN DIEGO STREET DESIGN MANUAL SECTION 6.1.3(B) IN CONFORMANCE WITH AASHTO STANDARDS. ON THE STREET SIDE OF THE LINE, IMPROVEMENTS EXCEEDING 36 INCHES IN HEIGHT PROHIBITED. ANY LANDSCAPE SHALL BE MAINTAINED AT A HEIGHT BELOW 36 INCHES. STREET PARKING WITHIN THE LIMITS OF THE CURB LINE SHALL BE PROHIBITED.
16. 24"X24" PRECAST CATCH BASIN PER OLD CASTLE (PVT).
17. 36"X36" PRECAST CATCH BASIN PER OLD CASTLE (PVT).
18. INSTALL 6" SEWER LINE (PVT).
19. INSTALL 8" PVC CL-150 FIRE SERVICE (PUB).
20. INSTALL 1" IRRIGATION SERVICE (PUB).
21. INSTALL 2" WATER SERVICE (PUB).
22. INSTALL 6" SEWER LINE (PVT).
23. NO OBSTRUCTION INCLUDING LANDSCAPE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT. 10'x10' VISIBILITY TRIANGLE ON BOTH SIDES OF DRIVEWAY, PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET B.
24. NO OBSTRUCTION INCLUDING LANDSCAPE, FENCE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3" IN HEIGHT. CORNER VISIBILITY TRIANGLE (SIZE DECREASED PER SIGHT DISTANCE STUDY SHEET 8), PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET A.
25. CONSTRUCT 28.0' WIDE FIRE DEPT. EMERGENCY ACCESS. ALL WEATHER MATERIAL CAPABLE OF SUPPORTING 75,000 LBS THROUGH LANDSCAPE AREA. VEHICLE GATES TO SWING INTO PROPERTY & EQUIPPED WITH FD KNOX BOX.
26. CONSTRUCT ROLLED CURB AND GUTTER PER SDRSD G-4A, TYPE 'B' (PUB).
27. CONSTRUCT ROLLED CURB TRANSISTION PER SDRSD G-04B (PUB).
28. REMOVE AND REPLACE EXISTING CURB RAMPS W/TYPE 'A' DUAL CURB RAMPS PER SDG-134.
29. CONSTRUCT TYPE-A SDCO PER D-9, W/24" OUTLET PIPES ON EAST & WEST WALLS, AT SAME ELEVATION, TO SPLIT OUTLET DRAINAGE TO EITHER MWS UNIT 2A & UNIT 2B (PVT).
30. PROPOSED MODULAR WETLAND MODEL: MWSL04O8OP--823741--010, UNIT 1. SEE DETAILS, SHEET 7.
31. PROPOSED MODULAR WETLAND MODEL: MWSL08240P--823741--15, UNIT 2A. SEE DETAILS, SHEET 7.
32. PROPOSED MODULAR WETLAND MODEL: MWSL08240P--823741--25, UNIT 2B. SEE DETAILS, SHEET 7.
33. PROPOSED "NO TURN ON RED" SIGN, CALTRANS SIGN NO. R13A (CA).
34. CONSTRUCT 7'Wx7'Lx5' DEEP TREERELL W/AMENDED SOILS (RETENTION REQUIREMENT). TREE PER CITY OF SAN DIEGO BMP MANUAL: HETEROMELES ARBUTIFOLIA – TOYON, 25' CANOPY (AT MATURITY), 290 CU FT VOLUME CREDIT, SEE SECTION D-D ON SHEET 3 AND LANDSCAPE PLANS FOR ADDITIONAL INFORMATION.
35. CONSTRUCT CONCRETE STAIRWAY & LANDINGS FOR PEDESTRIAN EGRESS DOOR, FROM PARKING STRUCTURE, MIDDLE LEVEL.

EXISTING EASEMENTS

- #6 (A) AN EASEMENT FOR GENERAL UTILITIES RECORDED JUNE 16, 2011 AS DOC. NO. 2011–030712
- #7 (B) AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS RECORDED MARCH 1, 2013 AS DOC. NO. 2310–0135264 (NON–PLOTTABLE)
- #8 (C) AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS RECORDED MARCH 21, 2013 AS DOC. NO. 2013–0160571 (NON–PLOTTABLE)
- #9 (D) AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS RECORDED NOVEMBER 15, 2013 AS DOC. NO. 2013–0676664 (NON–PLOTTABLE)
- #12 (E) AN EASEMENT FOR DRAINAGE RECORDED AUGUST 10, 2018 AS DOC. NO. 2018–0329740 (PRIVATE EASEMENT PROPOSED TO BE VACATED)

PROPOSED DEDICATIONS

- (F) PROPOSED PUBLIC RIGHT OF WAY DEDICATION TO CITY OF SAN DIEGO

STORM DRAIN LINE DATA TABLE			
SYM	LENGTH	BEARING	DESCRIPTION
7	42.74'	N19°36'53"E	18" HDPE @ 1.00%
8	95.04'	N90°00'00"E	24" HDPE @ 1.00%
9	95.04'	N90°00'00"E	24" HDPE @ 1.00%
10	45.43'	S00°00'04"W	18" HDPE @ 5.17%
13	28.57'	N11°15'00"W	18" HDPE @ 0.50%
14	209.20'	N00°00'00"E	24" HDPE @ 5.28%
18	175.10'	N89°59'58"E	18" HDPE @ 2.42%
19	161.32'	S89°27'55"E	18" HDPE @ 9.41%
21	22.43'	S89°13'22"E	18" HDPE @ 5.21%
23	206.69'	N00°31'49"E	12" PVC @ 1.25%
24	3.00'	N90°00'00"E	24" HDPE @ 1.00%

20 10 0 20 40 60

SCALE: 1" = 20'

WATER AND SEWER NOTES:

1. ALL ON–SITE WATER AND SEWER FACILITIES SHOWN ON THE DRAWING ARE PRIVATE AND SHALL BE DESIGNED TO MEET THE REQUIREMENTS OF THE CALIFORNIA UNIFORM PLUMBING CODE AND SHALL BE REVIEWED AS PART OF THE BUILDING PERMIT PLAN CHECK.
2. ALL PROPOSED PUBLIC WATER AND SEWER FACILITIES, MUST BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH ESTABLISHED CRITERIA IN THE MOST CURRENT EDITION OF THE CITY OF SAN DIEGO WATER AND SEWER FACILITY DESIGN GUIDELINES AND CITY REGULATIONS, STANDARDS AND PRACTICES PERTAINING THERETO.
3. IF A 3" OR LARGER WATER METER IS REQUIRED FOR THIS PROJECT, THE OWNER/PERMITTEE SHALL CONSTRUCT THE NEW METER AND PRIVATE BACKFLOW DEVICE ON SITE, ABOVE GROUND, WITHIN AN ADEQUATELY SIZED WATER EASEMENT, IN A MANNER SATISFACTORY TO THE PUBLIC UTILITIES DEPARTMENT AND THE CITY ENGINEER.
4. ALL WATER SERVICES TO THE SITE, INCLUDING DOMESTIC, IRRIGATION, AND FIRE WILL REQUIRE PRIVATE, ABOVE GROUND, BACK FLOW PREVENTION DEVICES (BFPDS). BFPDS ARE TYPICALLY LOCATED ON PRIVATE PROPERTY, IN LINE WITH THE SERVICE AND IMMEDIATELY ADJACENT TO THE RIGHT–OF–WAY. THE PUBLIC UTILITIES DEPARTMENT WILL NOT PERMIT THE REQUIRED BFPDS TO BE LOCATED BELOW GRADE OR WITHIN THE STRUCTURE.
5. NO TREES OR SHRUBS EXCEEDING THREE FEET IN HEIGHT AT MATURITY SHALL BE INSTALLED WITHIN TEN FEET OF ANY SEWER AND FIVE FEET OF ANY WATER FACILITIES.

NOTE:
THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/APPLICANT TO ENSURE THAT THE CURRENT STORM WATER PERMANENT BMP DESIGN STANDARDS ARE INCORPORATED INTO THE PROJECT.

NOTE:
ENCROACHMENT MAINTENANCE REMOVAL AGREEMENT (EMRA) WILL BE REQUIRED FOR ALL PRIVATE IMPROVEMENTS WITHIN THE ROW.

PLANS PREPARED BY:
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475 PRODUCTION STREET, SAN MARCOS, CA 92078
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REGISTERED PROFESSIONAL ENGINEER — DAVID R. SPEAR — No. 85413 — CIVIL — STATE OF CALIFORNIA

The Cambridge School

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San Diego, CA 92129

The Cambridge School - CUP

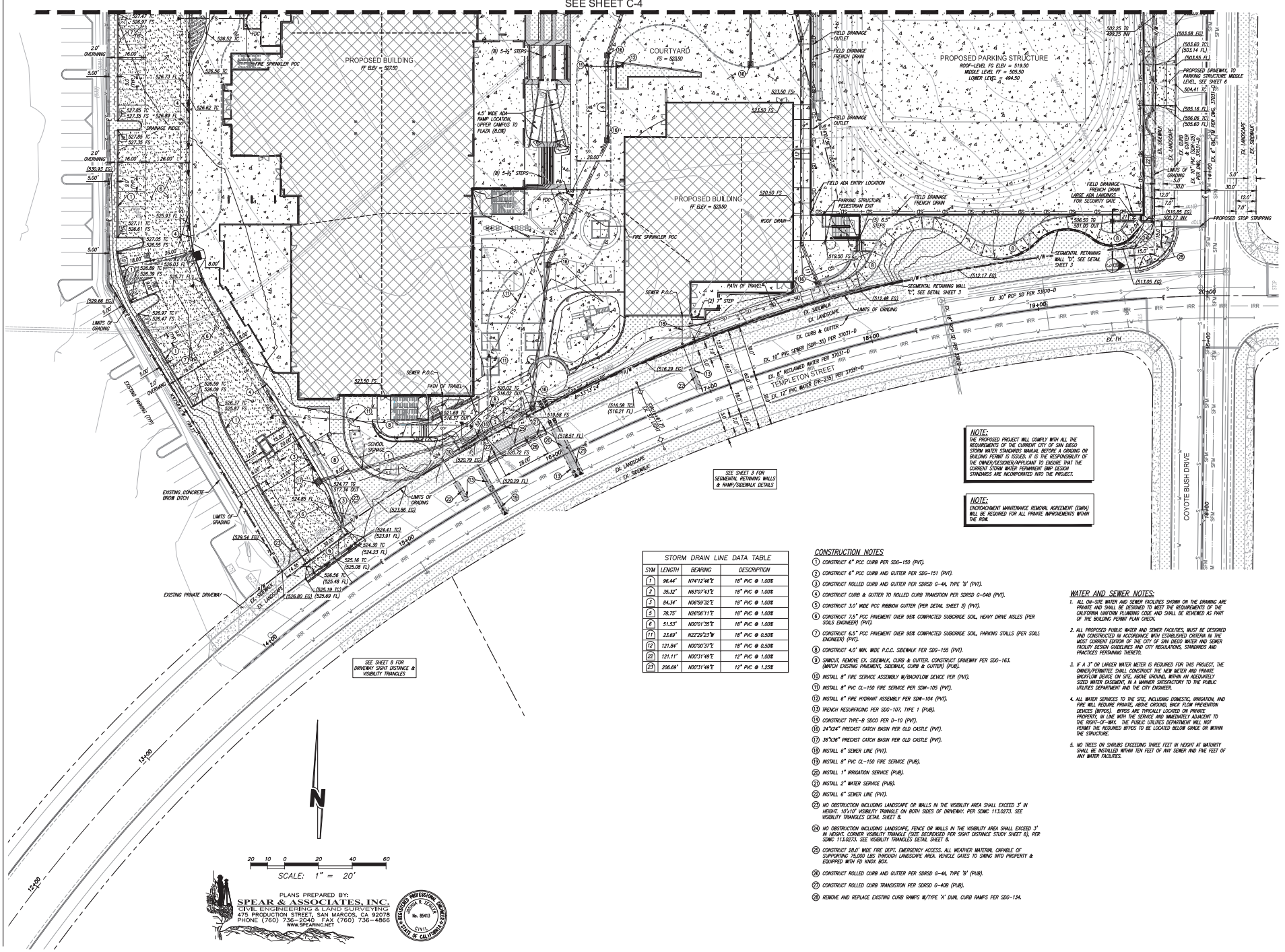
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92121 USA
(858) 398-3800
WWW.HED.DESIGN

PRELIMINARY GRADING PLAN SHEET

C-4



STORM DRAIN LINE DATA TABLE			
SYM	LENGTH	BEARING	DESCRIPTION
1	96.44'	N74°12'46"E	18" PVC @ 1.00%
2	35.32'	N63°07'43"E	18" PVC @ 1.00%
3	84.34'	N06°59'32"E	18" PVC @ 1.00%
5	78.75'	N26°06'11"E	18" PVC @ 1.00%
6	51.53'	N00°01'35"E	18" PVC @ 1.00%
11	23.69'	N22°29'23"W	18" PVC @ 0.50%
12	121.84'	N00°00'37"E	18" PVC @ 0.50%
22	121.11'	N00°31'49"E	12" PVC @ 1.00%
23	206.69'	N00°31'49"E	12" PVC @ 1.25%

NOTE:
THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/APPLICANT TO ENSURE THAT THE CURRENT STORM WATER PERMANENT BMP DESIGN STANDARDS ARE INCORPORATED INTO THE PROJECT.

NOTE:
ENCROACHMENT MAINTENANCE REMOVAL AGREEMENT (EMRA) WILL BE REQUIRED FOR ALL PRIVATE IMPROVEMENTS WITHIN THE ROW.

CONSTRUCTION NOTES

1. CONSTRUCT 6" PCC CURB PER SDC-150 (PVT).
2. CONSTRUCT 6" PCC CURB AND GUTTER PER SDC-151 (PVT).
3. CONSTRUCT ROLLED CURB AND GUTTER PER SDRSD G-4A, TYPE 'B' (PVT).
4. CONSTRUCT CURB & GUTTER TO ROLLED CURB TRANSITION PER SDRSD G-04B (PVT).
5. CONSTRUCT 3.0' WIDE PCC RIBBON GUTTER (PER DETAIL SHEET 3) (PVT).
6. CONSTRUCT 7.5" PCC PAVEMENT OVER 95% COMPACTED SUBGRADE SOIL, HEAVY DRIVE AISLES (PER SOILS ENGINEER) (PVT).
7. CONSTRUCT 6.5" PCC PAVEMENT OVER 95% COMPACTED SUBGRADE SOIL, PARKING STALLS (PER SOILS ENGINEER) (PVT).
8. CONSTRUCT 4.0' MIN. WIDE P.C.C. SIDEWALK PER SDC-155 (PVT).
9. SAWCUT, REMOVE EX. SIDEWALK, CURB & GUTTER. CONSTRUCT DRIVEWAY PER SDC-163. (MATCH EXISTING PAVEMENT, SIDEWALK, CURB & GUTTER) (PUB).
10. INSTALL 8" FIRE SERVICE ASSEMBLY W/BACKFLOW DEVICE PER (PVT).
11. INSTALL 8" PVC CL-150 FIRE SERVICE PER SDW-105 (PVT).
12. INSTALL 6" FIRE HYDRANT ASSEMBLY PER SDW-104 (PVT).
13. TRENCH RESURFACING PER SDC-107, TYPE 1 (PUB).
14. CONSTRUCT TYPE-B SDCO PER D-10 (PVT).
16. 24"X24" PRECAST CATCH BASIN PER OLD CASTLE (PVT).
17. 36"X36" PRECAST CATCH BASIN PER OLD CASTLE (PVT).
18. INSTALL 6" SEWER LINE (PVT).
19. INSTALL 8" PVC CL-150 FIRE SERVICE (PUB).
20. INSTALL 1" IRRIGATION SERVICE (PUB).
21. INSTALL 2" WATER SERVICE (PUB).
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23. NO OBSTRUCTION INCLUDING LANDSCAPE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT. 10'x10' VISIBILITY TRIANGLE ON BOTH SIDES OF DRIVEWAY. PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET 8.
24. NO OBSTRUCTION INCLUDING LANDSCAPE, FENCE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT. CORNER VISIBILITY TRIANGLE (SIZE DECREASED PER SIGHT DISTANCE STUDY SHEET 8), PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET 8.
25. CONSTRUCT 28.0' WIDE FIRE DEPT. EMERGENCY ACCESS. ALL WEATHER MATERIAL CAPABLE OF SUPPORTING 75,000 LBS THROUGH LANDSCAPE AREA. VEHICLE GATES TO SWING INTO PROPERTY & EQUIPPED WITH FD KNOX BOX.
26. CONSTRUCT ROLLED CURB AND GUTTER PER SDRSD G-4A, TYPE 'B' (PUB).
27. CONSTRUCT ROLLED CURB TRANSISTION PER SDRSD G-40B (PUB).
28. REMOVE AND REPLACE EXISTING CURB RAMPS W/TYPE 'A' DUAL CURB RAMPS PER SDC-134.

WATER AND SEWER NOTES:

1. ALL ON-SITE WATER AND SEWER FACILITIES SHOWN ON THE DRAWING ARE PRIVATE AND SHALL BE DESIGNED TO MEET THE REQUIREMENTS OF THE CALIFORNIA UNIFORM PLUMBING CODE AND SHALL BE REVIEWED AS PART OF THE BUILDING PERMIT PLAN CHECK.
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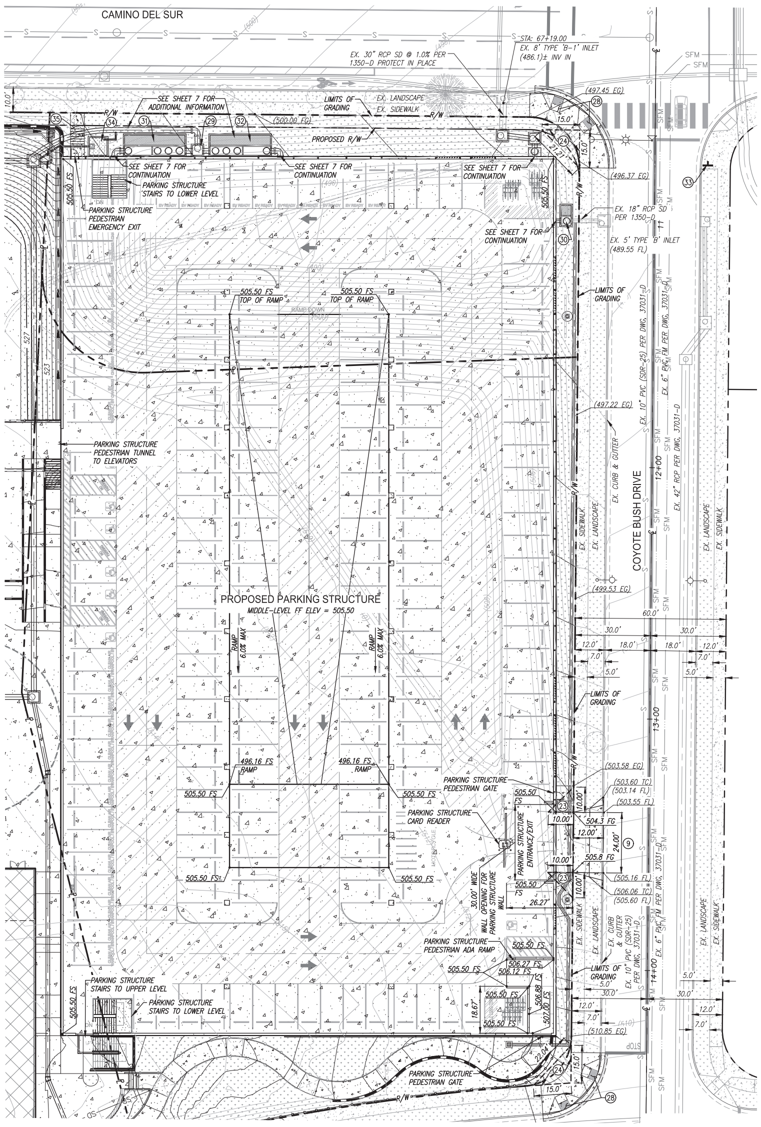
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Date	Issued For
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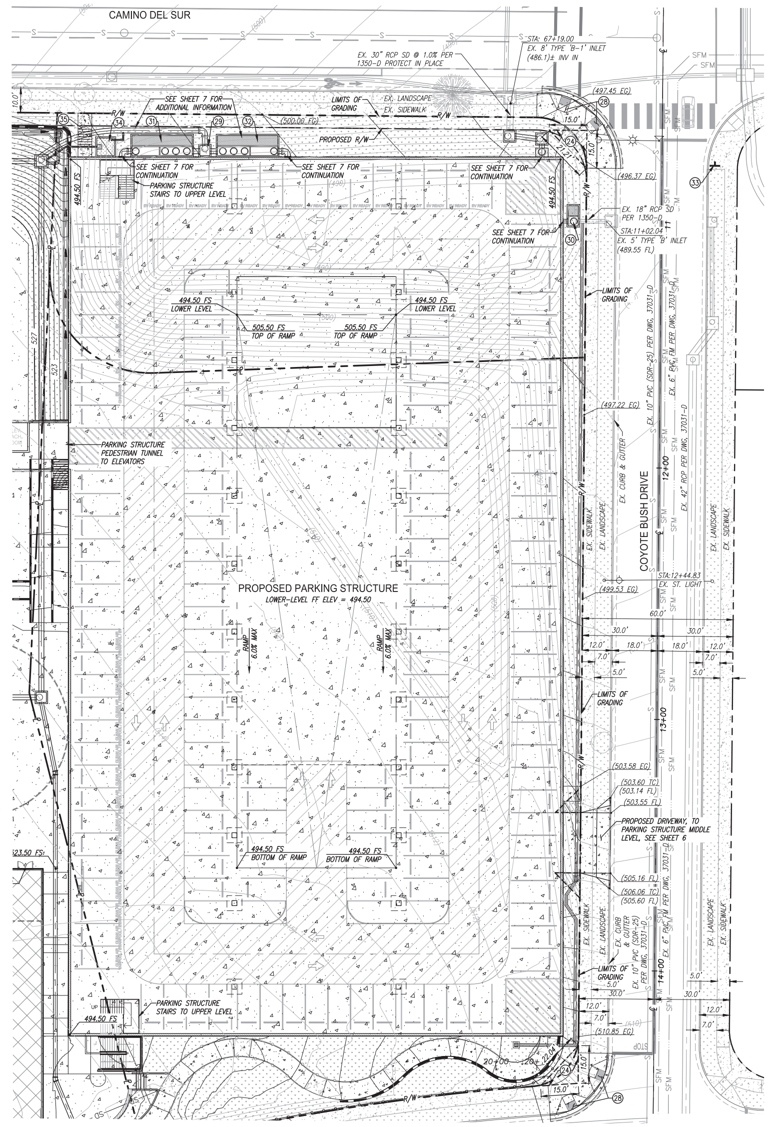
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San Diego, California
92121 USA
(858) 398-3800
WWW.HED.DESIGN

PRELIMINARY GRADING PLAN SHEET

C-5



SITE MIDDLE LEVEL PARKING STRUCTURE
SCALE: 1"=20'



SITE LOWER LEVEL PARKING STRUCTURE
SCALE: 1"=20'

CONSTRUCTION NOTES

(9) SAWCUT, REMOVE EX. SIDEWALK, CURB & GUTTER. CONSTRUCT DRIVEWAY PER SDG-163. (MATCH EXISTING PAVEMENT, SIDEWALK, CURB & GUTTER) (PUB).

(23) NO OBSTRUCTION INCLUDING LANDSCAPE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT. 10'x10' VISIBILITY TRIANGLE ON BOTH SIDES OF DRIVEWAY. PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET 8.

(24) NO OBSTRUCTION INCLUDING LANDSCAPE, FENCE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT. CORNER VISIBILITY TRIANGLE (SIZE DECREASED PER SIGHT DISTANCE STUDY SHEET 8), PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET 8.

(28) REMOVE AND REPLACE EXISTING CURB RAMPS W/TYPE 'A' DUAL CURB RAMPS PER SDG-134.

(30) PROPOSED MODULAR WETLAND MODEL: MWSL04080P-823741-010, **UNIT 1.** SEE DETAILS, SHEET 7.

(31) PROPOSED MODULAR WETLAND MODEL: MWSL08240P-823741-15, **UNIT 2A.** SEE DETAILS, SHEET 7.

(32) PROPOSED MODULAR WETLAND MODEL: MWSL08240P-823741-25, **UNIT 2B.** SEE DETAILS, SHEET 7.

(33) PROPOSED "NO TURN ON RED" SIGN, CALTRANS SIGN NO. R13A (CA).

(34) CONSTRUCT 7'Wx7'Lx5' DEEP TREEWELL W/AMENDED SOILS (RETENTION REQUIREMENT). TREE PER CITY OF SAN DIEGO BMP MANUAL: HETEROMELES ARBUTIFOLIA – TOYON, 25' CANOPY (AT MATURITY), 290 CU FT VOLUME CREDIT, SEE SECTION D-D ON SHEET 3 AND LANDSCAPE PLANS FOR ADDITIONAL INFORMATION.

(35) CONSTRUCT CONCRETE STAIRWAY & LANDINGS FOR PEDESTRIAN EGRESS DOOR, FROM PARKING STRUCTURE, MIDDLE LEVEL.

NOTE:
THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/APPLICANT TO ENSURE THAT THE CURRENT STORM WATER PERMANENT BMP DESIGN STANDARDS ARE INCORPORATED INTO THE PROJECT.

NOTE:
ENCROACHMENT MAINTENANCE REMOVAL AGREEMENT (EMRA) WILL BE REQUIRED FOR ALL PRIVATE IMPROVEMENTS WITHIN THE ROW.

20 10 0 20 40 60
SCALE: 1" = 20'

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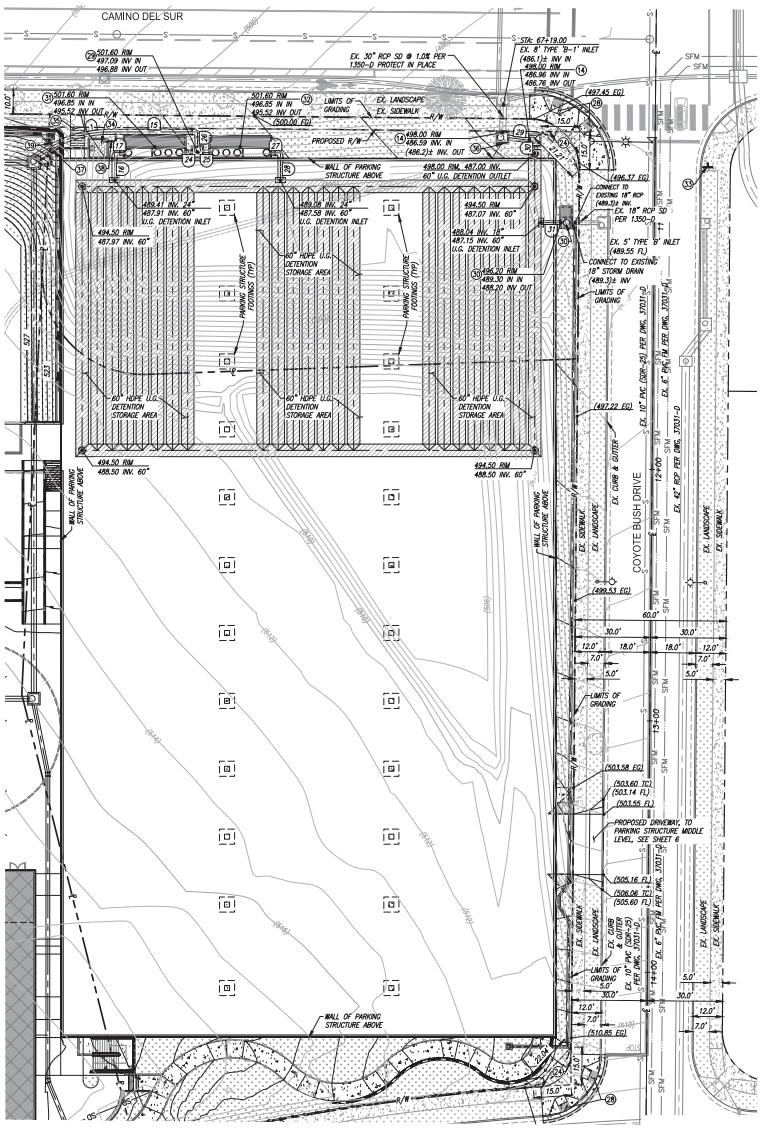
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SITE MIDDLE & LOWER LEVEL PARKING STRUCTURE

C-6



SITE UNDER GROUND DETENTION AT PARKING STRUCTURE

SCALE: 1"=20'

20 10 0 20 40 60

SCALE: 1" = 20'

STORM DRAIN LINE DATA TABLE			
SYM	LENGTH	BEARING	DESCRIPTION
15	34.75'	N90°00'00"E	24" HDPE @ 1.00%
16	10.92'	S00°00'00"E	24" HDPE @ 54.14%
17	4.00'	N90°00'00"W	24" HDPE @ 5.00%
26	6.00'	S00°00'00"E	24" HDPE @ 1.00%
27	4.00'	S90°00'00"E	24" HDPE @ 5.00%
28	10.92'	S00°00'00"E	24" HDPE @ 57.17%
29	8.86'	S82°44'50"E	36" HDPE @ 2.00%
30	1.64'	S00°00'00"E	36" HDPE @ 2.00%
31	7.97'	N90°00'00"W	18" HDPE @ 2.00%

STORM DRAIN CURVE DATA TABLE				
SYM	LENGTH	RADIUS	DELTA	DESCRIPTION
1	32.58'	50.00	Δ=37°19'45"	24" HDPE @ 12.62%

CONSTRUCTION NOTES

(14) CONSTRUCT TYPE-B SDCO PER D-10 (PVT).

(24) NO OBSTRUCTION INCLUDING LANDSCAPE, FENCE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT. CORNER VISIBILITY TRIANGLE (SIZE DECREASED PER SIGHT DISTANCE STUDY SHEET 8), PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET 8.

(28) REMOVE AND REPLACE EXISTING CURB RAMPS W/TYPE 'A' DUAL CURB RAMPS PER SDG-134.

(29) CONSTRUCT TYPE-A SDCO PER D-9, W/24" OUTLET PIPES ON EAST & WEST WALLS, AT SAME ELEVATION, TO SPLIT OUTLET DRAINAGE TO EITHER MWS UNIT 2A & UNIT 2B (PVT).

(30) PROPOSED MODULAR WETLAND MODEL: MWSL04080P-823741-010, UNIT 1. SEE DETAILS, SHEET 7.

(31) PROPOSED MODULAR WETLAND MODEL: MWSL08240P-823741-15, UNIT 2A. SEE DETAILS, SHEET 7.

(32) PROPOSED MODULAR WETLAND MODEL: MWSL08240P-823741-25, UNIT 2B. SEE DETAILS, SHEET 7.

(34) CONSTRUCT 7'Wx7'Lx5' DEEP TREEWELL W/AMENDED SOILS (RETENTION REQUIREMENT). TREE PER CITY OF SAN DIEGO BMP MANUAL: HETEROMELES ARBUTIFOLIA – TOYON, 25' CANOPY (AT MATURITY), 290 CU FT VOLUME CREDIT, SEE SECTION D-D ON SHEET 3 AND LANDSCAPE PLANS FOR ADDITIONAL INFORMATION.

(35) CONSTRUCT CONCRETE STAIRWAY & LANDINGS FOR PEDESTRIAN EGRESS DOOR, FROM PARKING STRUCTURE, MIDDLE LEVEL.

(36) INTERCEPT EX. 6" CANYON SUB-DRAIN (488.0)± INV AND TO ROUTE TO CONNECT TO STORM DRAIN.

(37) CONSTRUCT 6" PVC DRAIN PIPE @ 0.50% MINIMUM, TO DRAIN FROM SDCO TO OUTLET AT THE SPLASH PAD INSIDE TREEWELL. SEE SECTION D-D, SHEET 3.

(38) CONSTRUCT 6" PVC DRAIN PIPE @ 0.50% MINIMUM, WITH 6" ATRIUM GRATE OVERFLOW DRAIN INSIDE TREEWELL. CONNECT OUTLET TO 24" HDPE W/INSERTA-TEE CONNECTION. SEE SECTION D-D, SHEET 3.

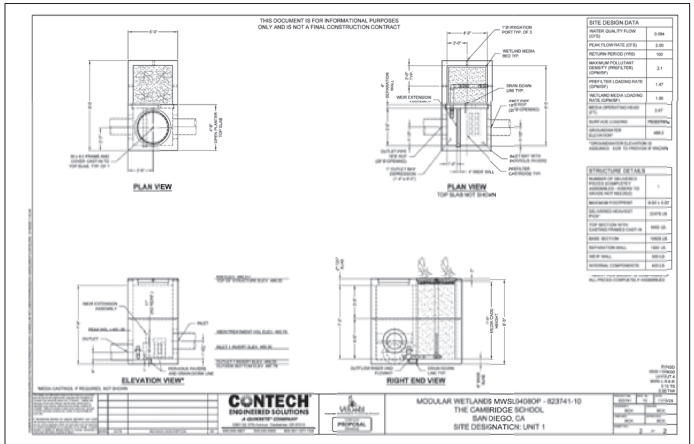
(39) CONSTRUCT 12" HDPE @ 1.0% MINIMUM, BROWDITCH CATCH BASIN CONNECTION TO SDCO.

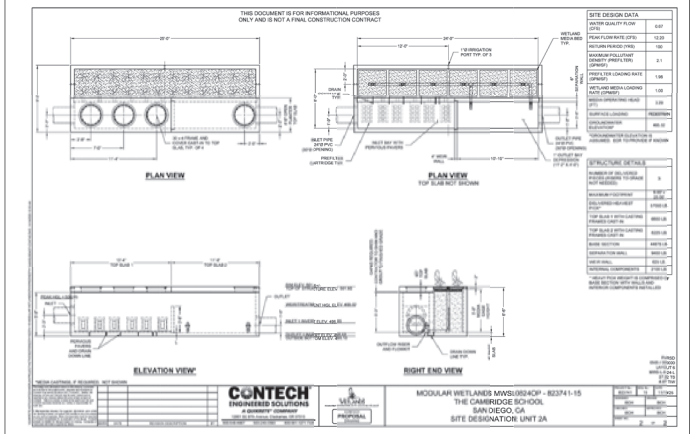
NOTE:
THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/APPLICANT TO ENSURE THAT THE CURRENT STORM WATER PERMANENT BMP DESIGN STANDARDS ARE INCORPORATED INTO THE PROJECT.

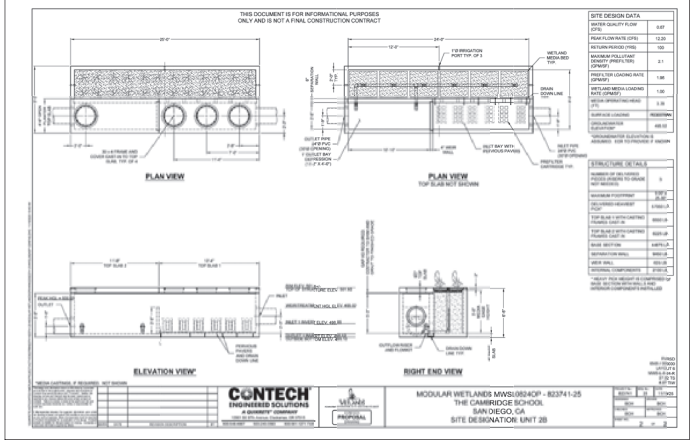
NOTE:
ENCROACHMENT MAINTENANCE REMOVAL AGREEMENT (EMRA) WILL BE REQUIRED FOR ALL PRIVATE IMPROVEMENTS WITHIN THE ROW.

PLANS PREPARED BY:
SPEAR & ASSOCIATES, INC.
CIVIL ENGINEERING & LAND SURVEYING
475 PRODUCTION STREET, SAN MARCOS, CA 92078
PHONE (760) 736-2040 FAX (760) 736-4866
WWW.SPEARINC.NET

REGISTERED PROFESSIONAL ENGINEER — DAVID R. SPEAR — No. 85413 — CIVIL — STATE OF CALIFORNIA







The Cambridge School

12855 Black Mountain Road
San Diego, CA 92129

The Cambridge School - CUP

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San Diego, CA 92127

Date	Issued For
11/30/2023	CUP Submittal
2/10/2025	CUP Submittal
8/19/2025	CUP Submittal
2/27/2026	CUP Submittal

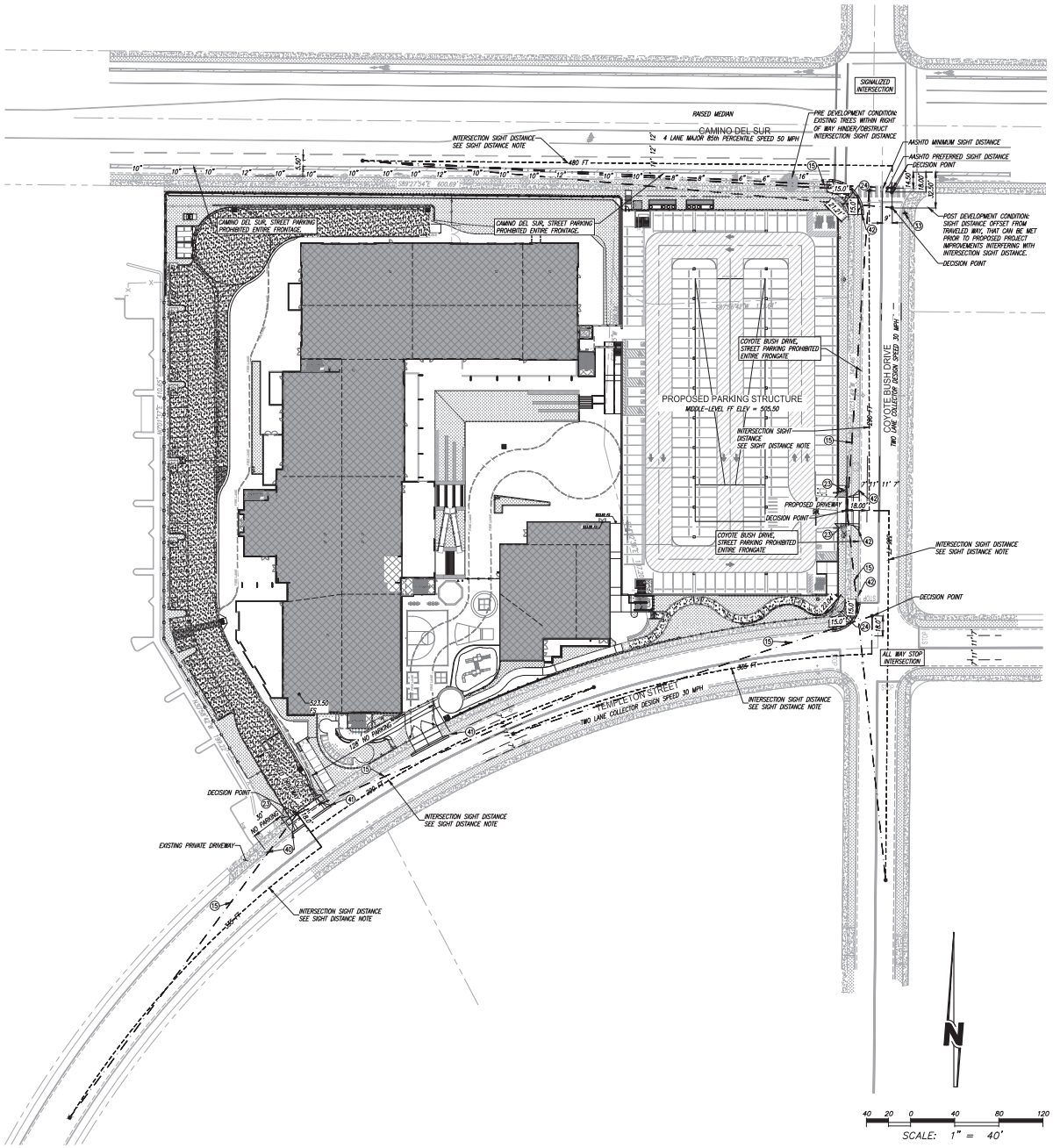
HED
11750 Sorrento Valley Rd
Suite 100
San Diego, California
92121 USA

(858) 398-3800

WWW.HED.DESIGN

SITE UNDER GROUND DETENTION AT PARKING STRUCTURE

C-7



LEGEND

SYMBOL	BOTANIC NAME	COMMON NAME	TRUNK DIAMETER
	PLANTUS RACEMOSA	LONDON PLANE TREE	*SEE PLAN VIEW
	SCHINUS MOLLE	CALIFORNIA PEPPER	*SEE PLAN VIEW

* THE TRUNK DIAMETER WAS MEASURED IN 2023 FOR THE SURVEY OF THIS PROPERTY. DIAMETER IS SUBJECT TO CHANGE



PROPOSED NO TURN ON RED SIGN R10-11A

CONSTRUCTION NOTES

(15) SIGHT DISTANCE LINE PER CITY OF SAN DIEGO STREET DESIGN MANUAL SECTION 6.1.3(B) IN CONFORMANCE WITH AASHTO STANDARDS. ON THE STREET SIDE OF THE LINE, IMPROVEMENTS EXCEEDING 36 INCHES IN HEIGHT PROHIBITED. ANY LANDSCAPE SHALL BE MAINTAINED AT A HEIGHT BELOW 36 INCHES. STREET PARKING WITHIN THE LIMITS OF THE CURB LINE SHALL BE PROHIBITED.

(23) NO OBSTRUCTION INCLUDING LANDSCAPE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT. 10'x10' VISIBILITY TRIANGLE ON BOTH SIDES OF DRIVEWAY. PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET 8.

(24) NO OBSTRUCTION INCLUDING LANDSCAPE, FENCE OR WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT. CORNER VISIBILITY TRIANGLE (SIZE DECREASED PER SIGHT DISTANCE STUDY SHEET 8), PER SDMC 113.0273. SEE VISIBILITY TRIANGLES DETAIL SHEET 8.

(33) PROPOSED "NO TURN ON RED" SIGN, CALTRANS SIGN NO. R13A (CA).

(40) CURB ADJACENT TO PROPOSED DRIVEWAY TO BE PAINTED RED "NO PARKING" FOR 30' ON THE WEST SIDE OF THE DRIVEWAY.

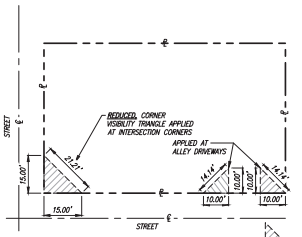
(41) CURB ADJACENT TO PROPOSED DRIVEWAY TO BE PAINTED RED "NO PARKING" FOR 128' ON THE EAST SIDE OF THE DRIVEWAY.

(42) CURBS ADJACENT TO PROPOSED DRIVEWAY TO BE PAINTED RED "NO PARKING" FOR THE ENTIRE LENGTH OF CURB ON COYOTE BUSH, ALONG PROJECT FRONTAGE.

SIGHT DISTANCE NOTE:

FOR 30MPH DESIGN SPEED
MINIMUM INTERSECTION SIGHT DISTANCE FOR RIGHT TURN PER AASHTO = 290 FT.
MINIMUM INTERSECTION SIGHT DISTANCE FOR LEFT TURN PER AASHTO = 335 FT.

FOR 50MPH DESIGN SPEED
MINIMUM INTERSECTION SIGHT DISTANCE FOR RIGHT TURN PER AASHTO = 480 FT.



VISIBILITY TRIANGLES DETAIL
NOT-TO-SCALE

PLANS PREPARED BY:
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2/27/2026	CUP Submittal

HED
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Suite 100
San Diego, California
92121 USA
(858) 398-3800
WWW.HED.DESIGN

INTERSECTION SIGHT DISTANCE AND VISIBILITY TRIANGLES

C-8

Attachment 5
Drainage Report

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

CEQA HYDROLOGY & HYDRAULIC REPORT

DATED: 2/11/26

For

The Cambridge School

PRJ-1109086

Prepared for:
The Cambridge School, Attn: Scott Kim
Mailing Adress: 12855 Black Mountain Road, San Diego, CA 92129
Phone: 858-484-3488
scottckim@gmail.com

Project Location:
Corner of Coyote Bush Dr & Camino del Sur, San Diego, CA 92127

APN: 678-690-70-00, 678-690-71-00, 678-690-72-00

Prepared By:
SPEAR & ASSOCIATES, INC.
CIVIL ENGINEERING AND LAND SURVEYING
457 Production Street
San Marcos, CA 92078
Phone: (760) 736-2040

Danny Abada, PE



DECLARATION OF RESPONSIBLE CHARGE

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

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



2/11/26

Danny Abada
REGISTERED CIVIL ENGINEER
Spear & Associates Inc.

DATE



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I. INTRODUCTION

This hydrology report was prepared for The Cambridge School located at the corner of Coyote Bush Dr & Camino del Sur, San Diego, CA 92127. The total site encompasses approximately 6.53 acres.

The site is currently undeveloped, and it was previously graded and is mostly bare. The existing topography slopes in a northeasterly direction with elevations ranging from approximately 528 to 497.

The project consists of developing a vacant lot with a private school parking structure landscaping, proprietary modular wetlands for stormwater treatment and underground detention to address hydromodification.

The site drains northeasterly towards and existing detention basin located at the northeast corner of the site. Additionally, 0.30 acres of offsite runoff from Coyote Bush Drive drain into the northeast corner of the site. The entire runoff then drains to a headwall connecting to an existing 24" RCP. The runoff is then directed approximately 1.69 miles through public stormdrains to the San Dieguito River, then 7.9 miles to the Pacific Ocean

A "Drainage Study for Camino Del Sur South Half Phase II Northerly Drainage Areas, Addendum 5 Dated 4/24/2013, Job Number 15009-H" Has calculations for assumed developed conditions showing Q100= 22.52 cfs and Q25 = 8.5 cfs exiting the site.

The development will maintain existing drainage patterns. Post development runoff will be directed to proprietary modular wetlands for stormwater treatment and underground detention to address hydromodification located at the northeast corner of the site. They will mitigate onsite and offsite runoff. The outlet flows will be directed to the same drainage system as in pre-development. The proposed peak runoff exiting the site will not be increased from the peak Q100 and Q25 runoffs from the above-mentioned Rick Engineering Hydrology Report. (Refer to Node 7123.40 to Node 7123.0 Q100 = 22.52 cfs of that report). (See report excerpts for the Q100 and Q25 and also the full report in attachment D.

We have used the County of San Diego Hydrology Manual to determine the run-off from the site for the 100yr and 25yr flows. Based on the soil hydrologic group map of the County Hydrology Manual, the project soil uniformly consists of type C across all sub areas. Peak flow rates were calculated using the rational method. Times of concentrations were calculated using the Manning's equation to obtain velocities using average overland flow rates. Detention Basins were modeled with Rathydro and Hydrocad.

In order to comply with detention basin conjunctive use of flood control and HMP, section 6.2.7 of the County Hydraulic Manual, the basin was modeled with a ponded the water quality volume at the overflow riser's first surface outlet at time = 0; before initiating the 100-year simulation

Water quality will be addressed with biofiltration basins to treat the projects anticipated and expected pollutants. Refer to the Storm Water Quality Management Plan for more detailed information.

II. DISCUSSION/CONCLUSION

Calculated proposed total peak outlets from the site Q100 = 8.5 cfs and Q25 = 7.1 cfs. Post development peak flows, flow volumes and velocities for the 100yr and 25yr events will not exceed pre-development rates with reduced site imperviousness, an efficient site design,

maximizing onsite times of concentration and onsite underground detention. No increased negative impact to any adjacent properties is anticipated from this development.

No increased peak runoff flow into the existing stormdrain system is anticipated as a result of this development.

The project will not conduct activities that would trigger a Clean Water Act Section 401 or 404 Certification.

This project will not significantly alter existing drainage patterns along the site or divert runoff from existing conditions. Total post development peak runoff from the site will not exceed the pre-development rates. The proposed onsite biofiltration basins, proprietary modular wetland and underground detention are designed to address pollutant and hydromodification controls.

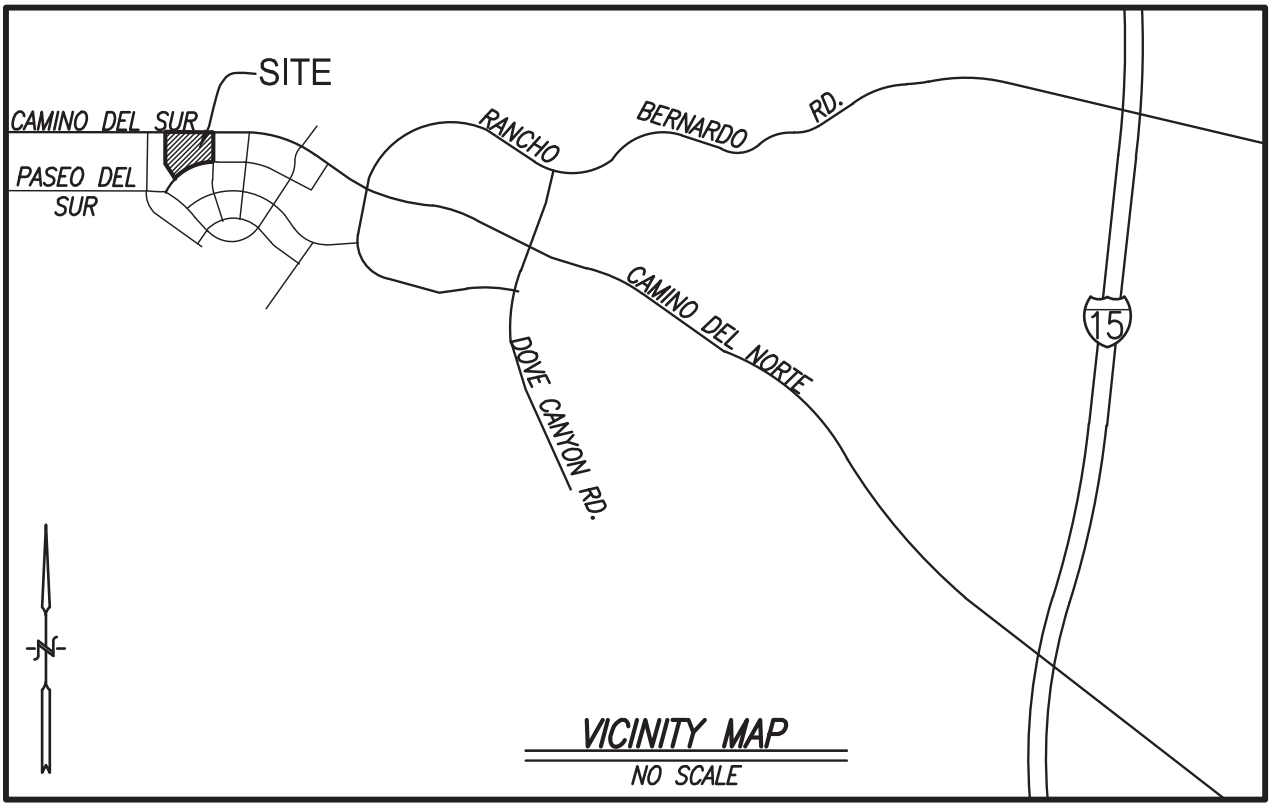
The proposed post development source control and treatment control BMPs, as shown in the stormwater quality management plan, will protect water quality and mitigate water quality objectives to the maximum extent practicable prior to discharging offsite.

Summary of flow rates

	Q100-yr cfs	***Outlet V100-yr ft/s***
Pre-Dev. Total	9.6	14.8
Post-Dev. Total w/Onsite Det. @ POC 1	8.5	14.1

Note: The Post Development outflow flow rate @ (POC 1 Q100 = 8.5 cfs, V100 = 14.1 ft/s) is lower than Rick Engineering Hydrology Study Job No 15009-H @ (POC 1 Q100= 22.52 cfs, V100= 18.9). Also the post development Q25 = 7.1 cfs is lower than "Rick's report showing Q25 = 8.5 cfs." See attachment D for excerpts from that study.

ATTACHMENT A


SITE
CAMINO DEL SUR
PASEO DEL SUR
RANCHO
BERNARDO
RD.
CAMINO DEL NORTE
DOVE CANYON RD.
15
N
VICINITY MAP
NO SCALE

ATTACHMENT B

Post-Development **Rational Method, 100yr Event**

REACH	TC	C	A	CA	∑CA	P_6	I	Q cfs	Q cfs w/Det Basin
Area A1	6.3	0.76	4.5	3.42	3.42	2.80	6.36	**21.7**	
Area A2	8.7	0.76	1.73	1.31	1.31	2.80	5.16	**6.8**	
Area B	6.9	0.44	0.19	0.08	0.08	2.80	5.99	**0.5**	
Area SM-1	5	0.3	0.11	0.03	0.03	2.80	7.38	**0.2**	
Offsite O	5	0.79	0.31	0.24	0.24	2.80	7.38	**1.8**	
Total Confluence	6.3					2.80	6.36	**28.8**	**8.5**

Confluence Junction Equation 3.4.2 (Total Site Area)

(Shortest Tc)

DMA	SM-1		O		A1		B		A2	
	T_1 =	5.00	T_2 =	5.00	T_3 =	6.30	T_4 =	6.9	T_5 =	8.70
	I_1 =	7.38	I_2 =	7.38	I_3 =	6.36	I_4 =	5.99	I_5 =	5.16
	Q_1 =	0.2	Q_2 =	1.80	Q_3 =	21.70	Q_4 =	0.5	Q_5 =	6.80
	Q_{t1} =	23.5	Q_{t2} =	23.5	**Q_{t3} =**	**28.8**	Q_{t4} =	28.0	Q_{t5} =	26.2

Pre-Development

REACH	TC	C	A	CA	∑CA	P_6	I	Q cfs
Area A	11.3	0.30	6.53	1.96	1.96	2.80	4.36	**8.5**
Offsite O	5	0.79	0.31	0.24	0.24	2.80	7.38	**1.8**
Total Confluence	11.3				2.20	2.80	4.36	**9.6**

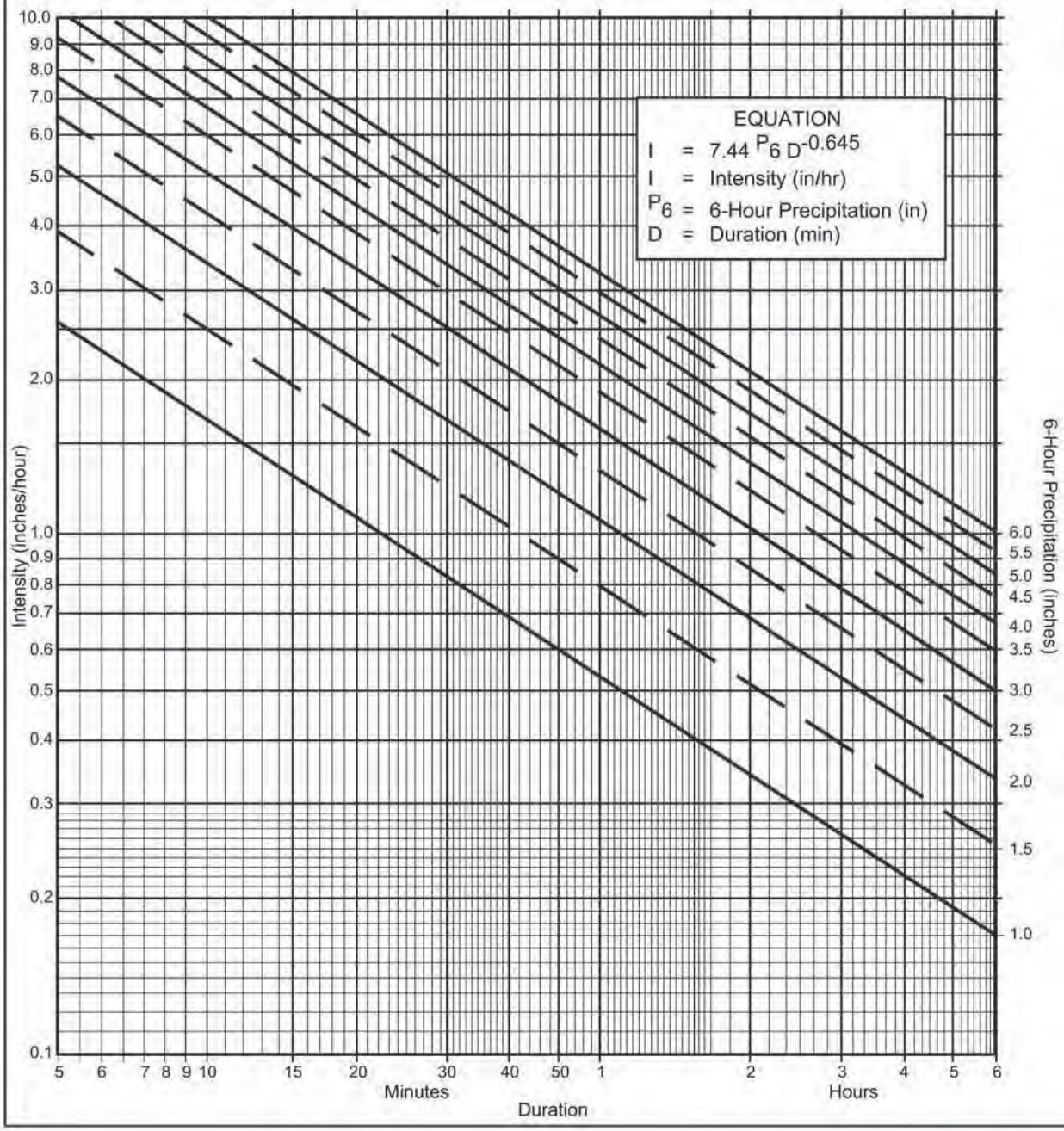
Post-Development **Rational Method, 25yr Event**

REACH	TC	C	A	CA	∑CA	P_6	I	**Q cfs**	**Q cfs w/Det Basin**
Area A1	6.3	0.76	4.5	3.42	3.42	2.21	5.02	**17.2**	
Area A2	8.7	0.76	1.73	1.31	1.31	2.21	4.07	**5.4**	
Area B	6.9	0.44	0.19	0.08	0.08	2.21	4.73	**0.4**	
Area SM-1	5	0.3	0.11	0.03	0.03	2.21	5.82	**0.2**	
Offsite O	5	0.79	0.31	0.24	0.24	2.21	5.82	**1.4**	
Total Confluence	6.3					2.21	5.02	**22.9**	**7.1**

Confluence Junction Equation 3.4.2 (Total Site Area)

(Shortest Tc)

DMA	SM-1		O		A1		B		A2	
	T_1 =	5.00	T_2 =	5.00	T_3 =	6.30	T_4 =	6.9	T_5 =	8.70
	I_1 =	5.82	I_2 =	5.82	I_3 =	5.02	I_4 =	4.73	I_5 =	4.07
	Q_1 =	0.2	Q_2 =	1.40	Q_3 =	17.20	Q_4 =	0.4	Q_5 =	5.40
	Q_{t1} =	18.6	Q_{t2} =	18.6	**Q_{t3} =**	**22.9**	Q_{t4} =	22.2	Q_{t5} =	20.8



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 2.80 in., P_{24} = 4.90, $\frac{P_6}{P_{24}}$ = 57 %(2)

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

(d) t_x = _____ min.

(e) I = _____ in./hr.

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

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

NOAA Atlas 14, Volume 6, Version 2
Location name: San Diego, California, USA*
Latitude: 33.0218°, Longitude: -117.1285°
Elevation: 499 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.116 (0.098-0.139)	0.147 (0.123-0.176)	0.187 (0.157-0.225)	0.221 (0.183-0.268)	0.268 (0.215-0.337)	0.304 (0.239-0.392)	0.343 (0.262-0.453)	0.383 (0.284-0.522)	0.439 (0.311-0.625)	0.483 (0.330-0.714)
10-min	0.167 (0.140-0.200)	0.210 (0.177-0.252)	0.268 (0.225-0.323)	0.317 (0.263-0.385)	0.384 (0.308-0.483)	0.436 (0.342-0.562)	0.491 (0.375-0.650)	0.549 (0.407-0.748)	0.629 (0.446-0.896)	0.693 (0.473-1.02)
15-min	0.201 (0.170-0.242)	0.254 (0.213-0.305)	0.324 (0.272-0.391)	0.383 (0.318-0.465)	0.464 (0.372-0.585)	0.528 (0.414-0.680)	0.594 (0.453-0.786)	0.664 (0.492-0.904)	0.760 (0.539-1.08)	0.838 (0.573-1.24)
30-min	0.281 (0.237-0.337)	0.354 (0.298-0.426)	0.453 (0.379-0.545)	0.534 (0.444-0.649)	0.647 (0.519-0.816)	0.736 (0.577-0.949)	0.829 (0.633-1.10)	0.926 (0.686-1.26)	1.06 (0.752-1.51)	1.17 (0.799-1.73)
60-min	0.417 (0.351-0.500)	0.525 (0.442-0.631)	0.671 (0.562-0.808)	0.792 (0.658-0.962)	0.959 (0.769-1.21)	1.09 (0.856-1.41)	1.23 (0.938-1.62)	1.37 (1.02-1.87)	1.57 (1.12-2.24)	1.73 (1.18-2.56)
2-hr	0.588 (0.495-0.705)	0.739 (0.621-0.888)	0.939 (0.787-1.13)	1.10 (0.919-1.34)	1.34 (1.07-1.68)	1.51 (1.19-1.95)	1.70 (1.30-2.25)	1.89 (1.40-2.58)	2.16 (1.53-3.08)	2.38 (1.62-3.51)
3-hr	0.712 (0.599-0.854)	0.894 (0.752-1.08)	1.14 (0.953-1.37)	1.34 (1.11-1.62)	1.61 (1.29-2.03)	1.83 (1.43-2.35)	2.05 (1.56-2.71)	2.28 (1.69-3.11)	2.60 (1.84-3.71)	2.86 (1.95-4.22)
6-hr	0.974 (0.820-1.17)	1.23 (1.03-1.47)	1.56 (1.31-1.88)	1.83 (1.52-2.23)	2.21 (1.77-2.78)	2.50 (1.96-3.22)	2.80 (2.14-3.71)	3.12 (2.31-4.25)	3.55 (2.52-5.06)	3.89 (2.66-5.76)
12-hr	1.32 (1.12-1.59)	1.67 (1.41-2.01)	2.13 (1.79-2.57)	2.51 (2.09-3.05)	3.03 (2.43-3.81)	3.43 (2.69-4.42)	3.84 (2.93-5.03)	4.26 (3.16-5.81)	4.85 (3.44-6.91)	5.31 (3.63-7.85)
24-hr	1.66 (1.47-1.93)	2.11 (1.86-2.45)	2.70 (2.38-3.14)	3.19 (2.78-3.74)	3.86 (3.26-4.66)	4.37 (3.62-5.38)	4.90 (3.97-6.18)	5.45 (4.30-7.05)	6.20 (4.71-8.34)	6.80 (4.99-9.44)
2-day	2.04 (1.79-2.36)	2.60 (2.29-3.01)	3.34 (2.94-3.88)	3.96 (3.45-4.63)	4.81 (4.06-5.81)	5.48 (4.54-6.74)	6.16 (4.99-7.77)	6.88 (5.43-8.90)	7.88 (5.98-10.6)	8.66 (6.36-12.0)
3-day	2.28 (2.01-2.64)	2.92 (2.58-3.39)	3.78 (3.32-4.40)	4.50 (3.92-5.27)	5.50 (4.65-6.64)	6.28 (5.21-7.74)	7.10 (5.75-8.94)	7.95 (6.28-10.3)	9.14 (6.94-12.3)	10.1 (7.41-14.0)
4-day	2.50 (2.20-2.89)	3.22 (2.83-3.73)	4.18 (3.67-4.85)	4.98 (4.34-5.83)	6.10 (5.16-7.37)	6.99 (5.79-8.60)	7.91 (6.40-9.96)	8.88 (7.01-11.5)	10.2 (7.77-13.8)	11.3 (8.31-15.7)
7-day	2.93 (2.59-3.40)	3.79 (3.34-4.40)	4.95 (4.35-5.75)	5.92 (5.16-6.92)	7.27 (6.15-8.78)	8.35 (6.92-10.3)	9.48 (7.68-11.9)	10.7 (8.42-13.8)	12.3 (9.36-16.6)	13.7 (10.1-19.0)
10-day	3.26 (2.87-3.77)	4.23 (3.73-4.90)	5.54 (4.87-6.44)	6.64 (5.79-7.77)	8.18 (6.91-9.88)	9.41 (7.80-11.6)	10.7 (8.66-13.5)	12.1 (9.51-15.6)	14.0 (10.6-18.8)	15.5 (11.4-21.6)
20-day	3.96 (3.50-4.59)	5.20 (4.58-6.03)	6.87 (6.03-7.98)	8.27 (7.21-9.68)	10.2 (8.65-12.4)	11.8 (9.79-14.5)	13.5 (10.9-17.0)	15.2 (12.0-19.7)	17.7 (13.4-23.8)	19.7 (14.5-27.4)
30-day	4.78 (4.22-5.54)	6.32 (5.57-7.32)	8.39 (7.37-9.75)	10.1 (8.83-11.9)	12.6 (10.6-15.2)	14.5 (12.0-17.9)	16.6 (13.4-20.9)	18.8 (14.8-24.3)	21.9 (16.6-29.4)	24.4 (17.9-33.9)
45-day	5.66 (4.99-6.55)	7.51 (6.62-8.70)	10.0 (8.79-11.6)	12.1 (10.6-14.2)	15.1 (12.7-18.2)	17.4 (14.4-21.4)	19.9 (16.1-25.1)	22.5 (17.8-29.1)	26.3 (19.9-35.3)	29.3 (21.5-40.7)
60-day	6.56 (5.78-7.59)	8.72 (7.68-10.1)	11.6 (10.2-13.5)	14.1 (12.3-16.5)	17.5 (14.8-21.2)	20.3 (16.8-25.0)	23.2 (18.8-29.2)	26.3 (20.7-34.0)	30.6 (23.2-41.2)	34.2 (25.1-47.5)

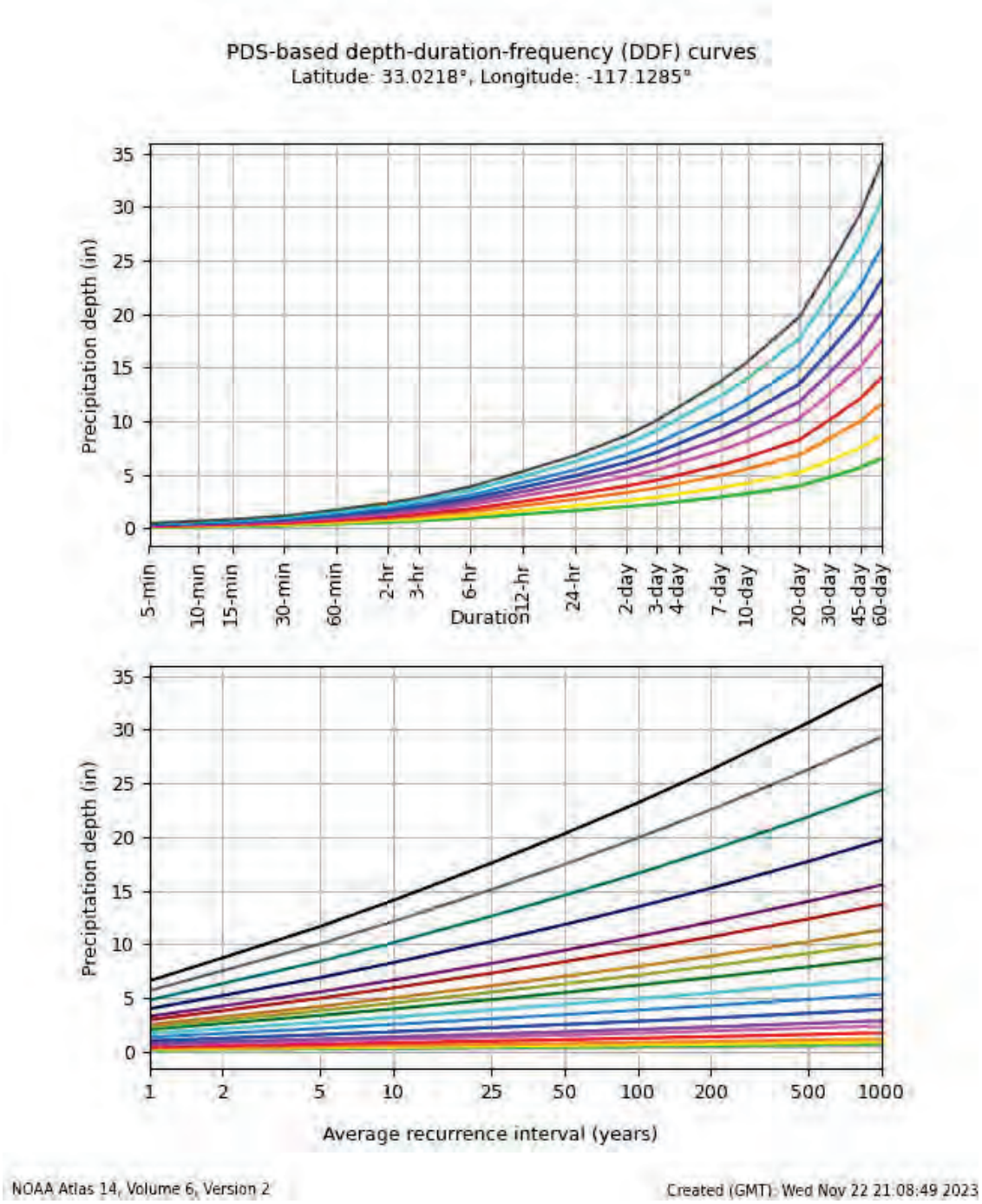
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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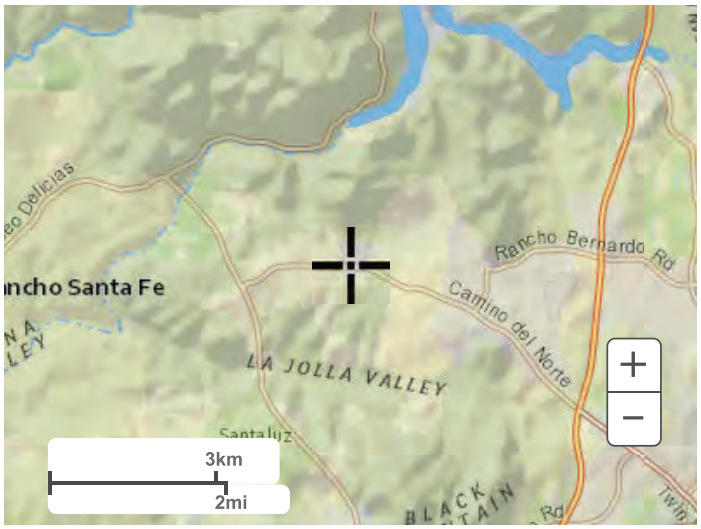
PF graphical



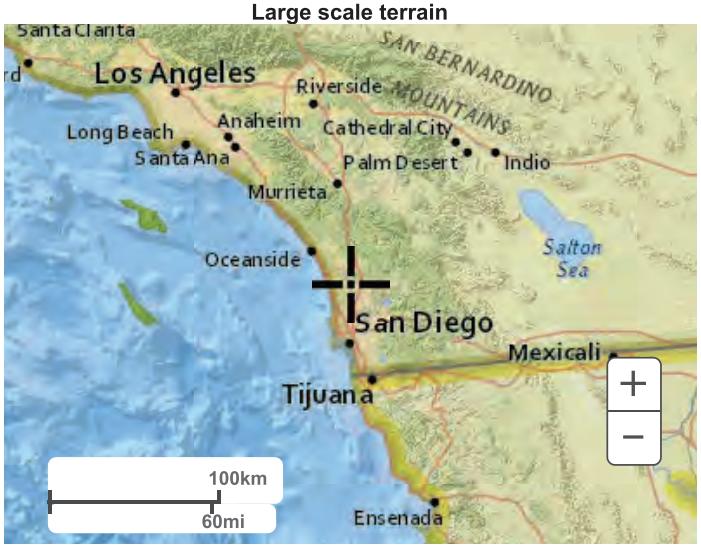
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Maps & aerials

Small scale terrain



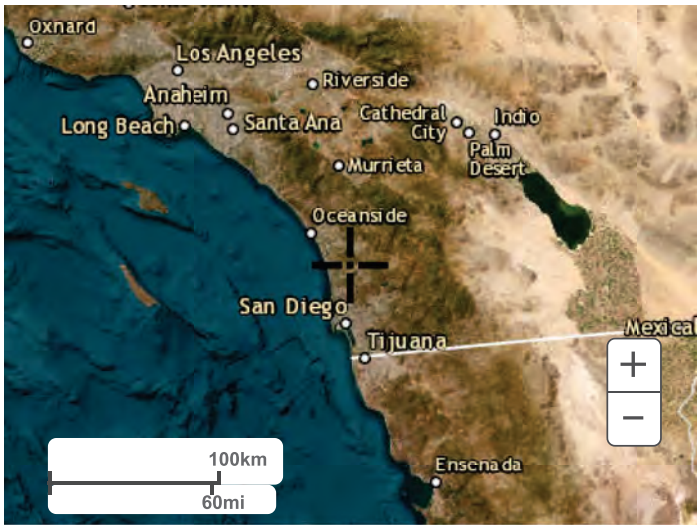
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

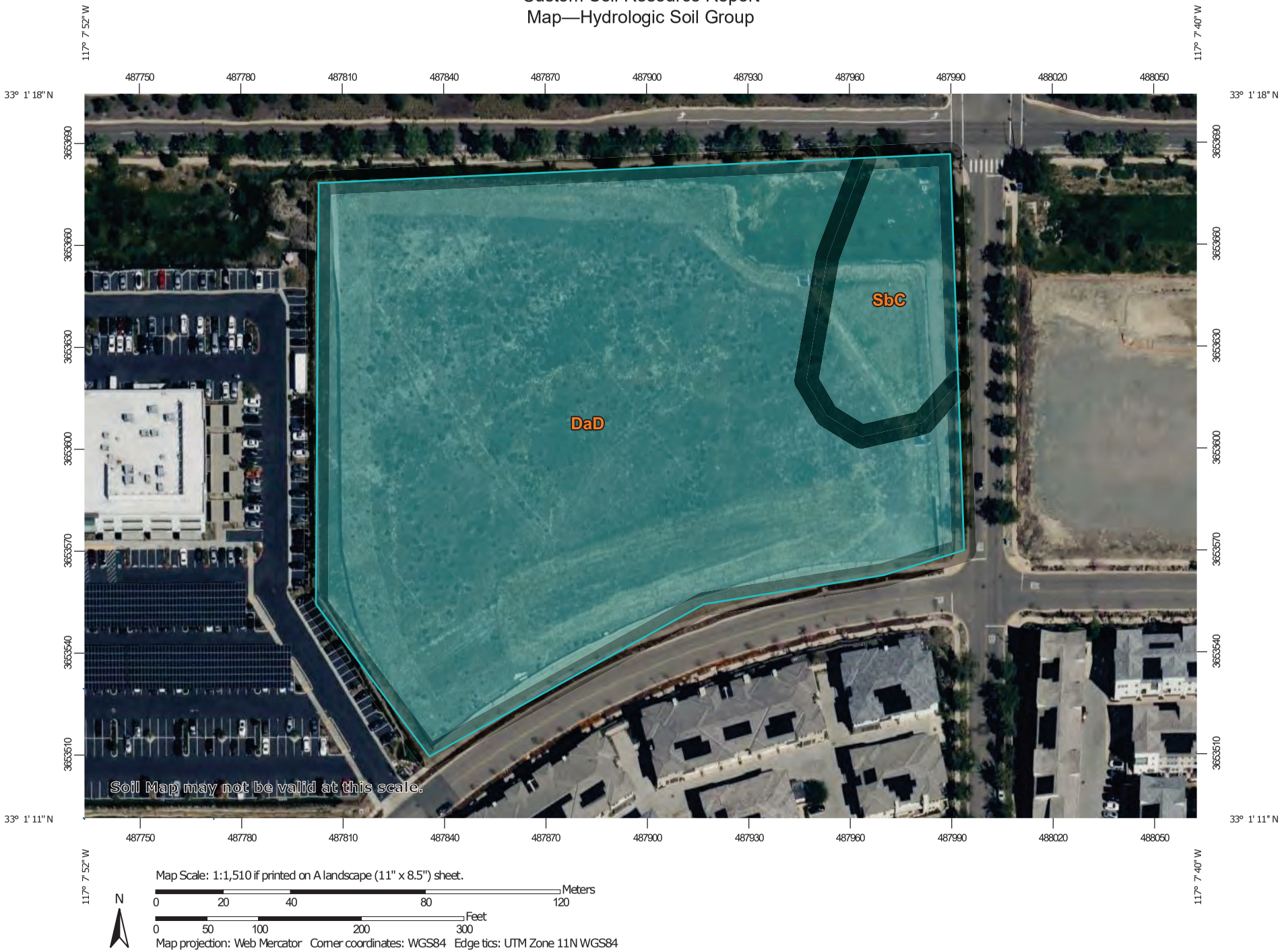
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Diego County Area, California



April 26, 2023

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:1,510 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 18, Sep 14, 2022

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

Date(s) aerial images were photographed: Mar 24, 2022—Apr 29, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DaD	Diablo clay, 9 to 15 percent slopes, warm MAAT	C	5.8	88.9%
SbC	Salinas clay loam, 2 to 9 percent slopes	C	0.7	11.1%
Totals for Area of Interest			**6.5**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service

Runoff Coefficient Adjustment

Post Development Area A

Total Area	271254	
Impervious	209517	77.24%

C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 77.24%
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.76

Post Development Area B

Total Area	8121	
Impervious	1840	22.66%

C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 22.66%
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.44

Post Development Area SM-1

Total Area	4917	
Impervious	0	0.00%

C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.00%
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.30

Pre & Post Development Area Offsite O

Total Area	13068	
Impervious	10768	82.40%

C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 82.40%
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.79

Time of Concentration

Location	Initial Average slope %	Initial L (ft)	**Initial Travel Time T (min)**	Add'l L (ft)	Average slope %	Notes	**Average Q Mannings Eq. V (ft/s)**	**Additional TC (travel time) T (min)**	**Total TC T (min)**
									(5 minutes min)
Pre Dev.									
Area A	5.5	100	8.16	435	3.5			3.1	11.3
Offsite O	7.5	100	2.85	275	4.2		2.83	1.6	5.0
Post Dev.									
Area A1	0.6	50	5.13	140	0.6		2.01	1.2	6.3
Area A2	0.6	50	5.13	275	0.6		1.3	3.5	8.7
Area B	8	100	5.94	90	5		1.56	1.0	6.9
Area SM-1	2.7	10	3.27						5.0

Initial Travel Time
(Figure 3-3)

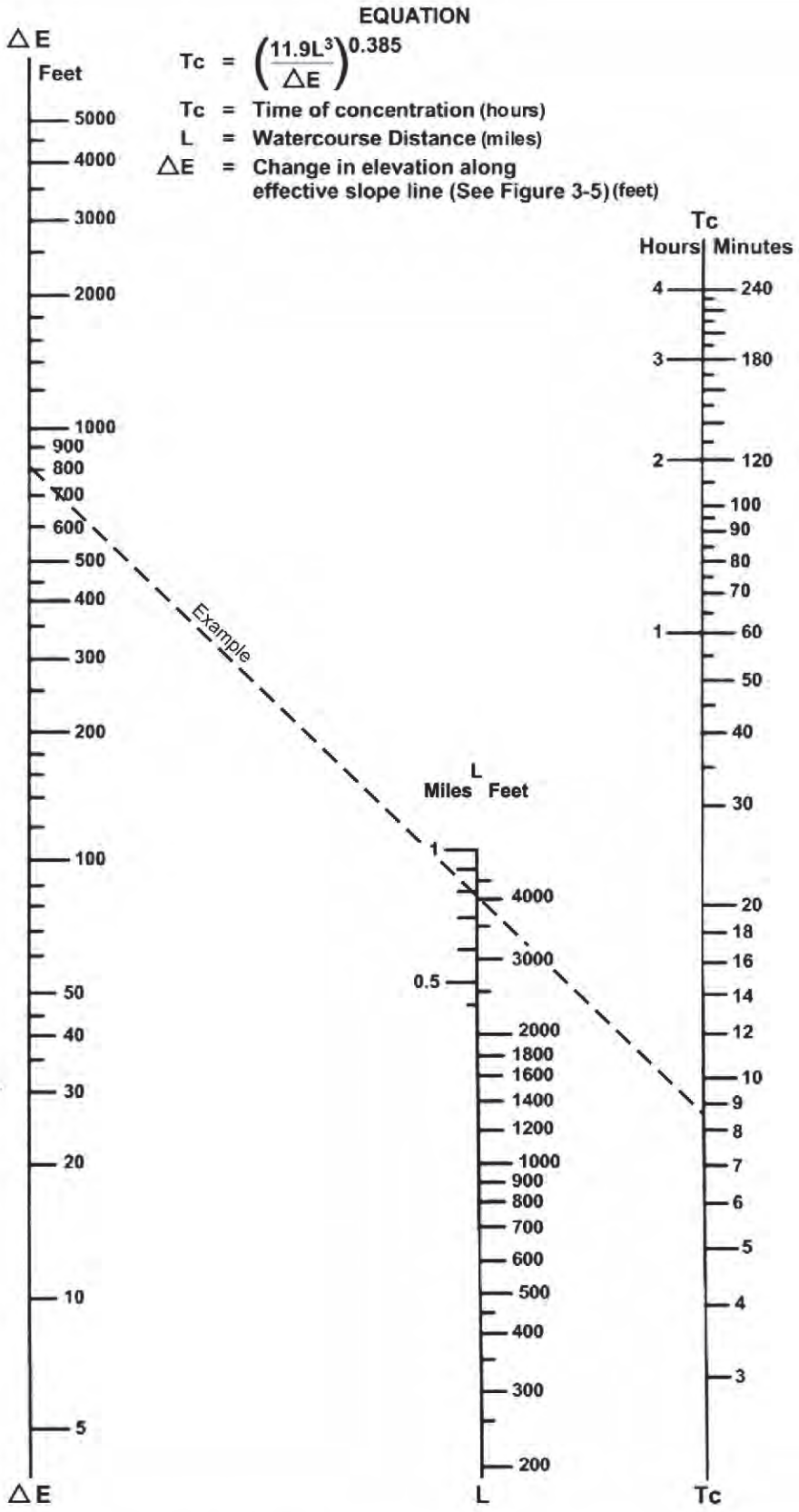
$$T_{min} = \frac{1.8(1.1-C)D^{1/2}}{S^{1/3}}$$

	Initial TC	Pre-Dev Onsite A	Offsite O	Post-Dev Area A1 & A2	Area B	SM-1
C =		0.3	0.79	0.76	0.44	0.3
D ft =		100	100	50	100	10
S % =		5.5	7.5	0.6	8	2.7
T =		**8.16**	**2.85**	**5.13**	**5.94**	**3.27**

Overland Flow (Pre-Development)
Kirpich Formula

$$T_{c\,min} = (11.9L^3/\Delta E)^{0.385}$$

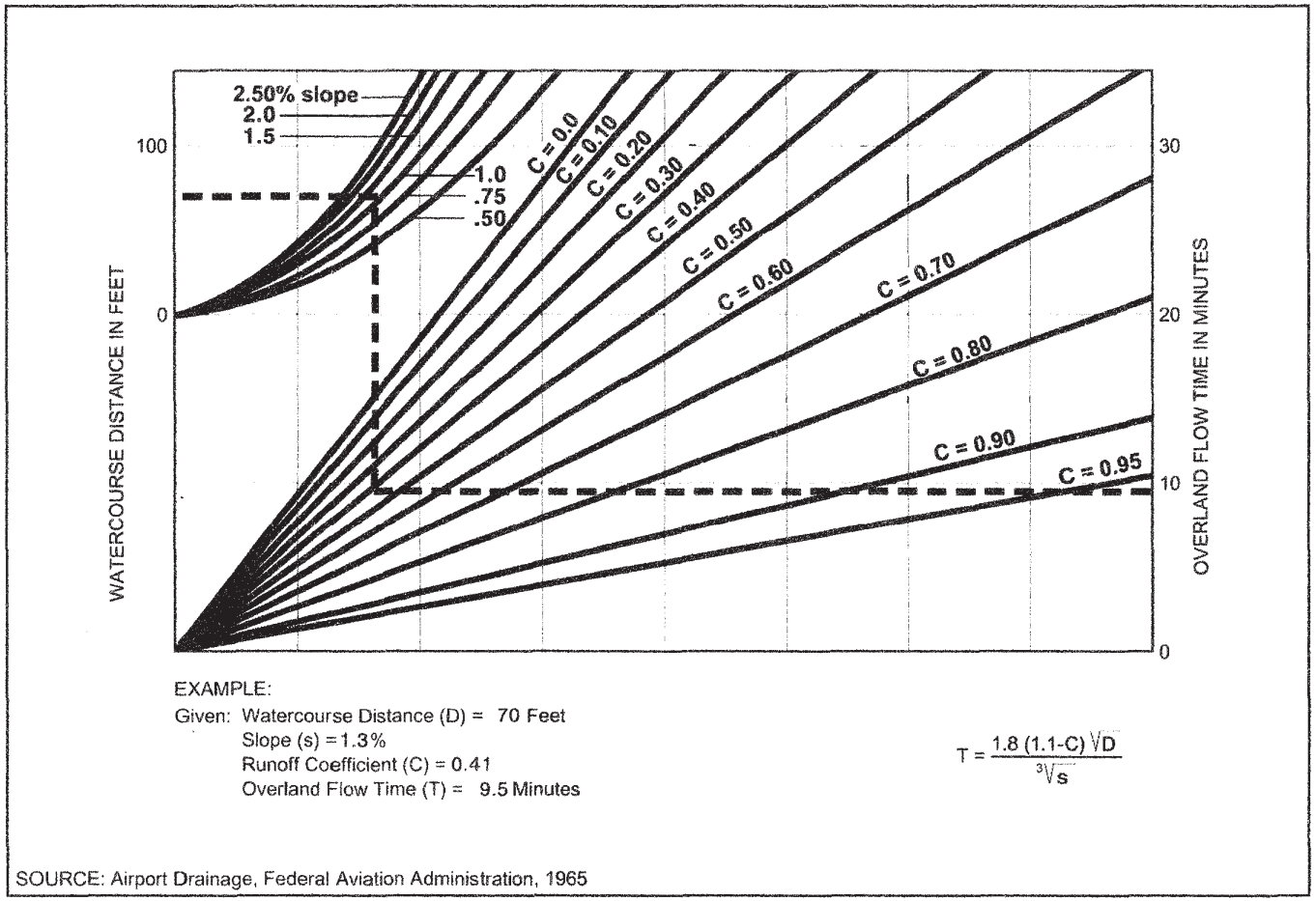
	Pre-Dev Area A
ΔE ft =	15
L Feet =	435
L miles =	0.082386
T hours =	0.05118
T min =	3.07



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds



EXAMPLE:
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE 3-3

Rational Formula - Overland Time of Flow Nomograph

Channel Report

Area A1 TC Flow Path V, Average Q

Gutter

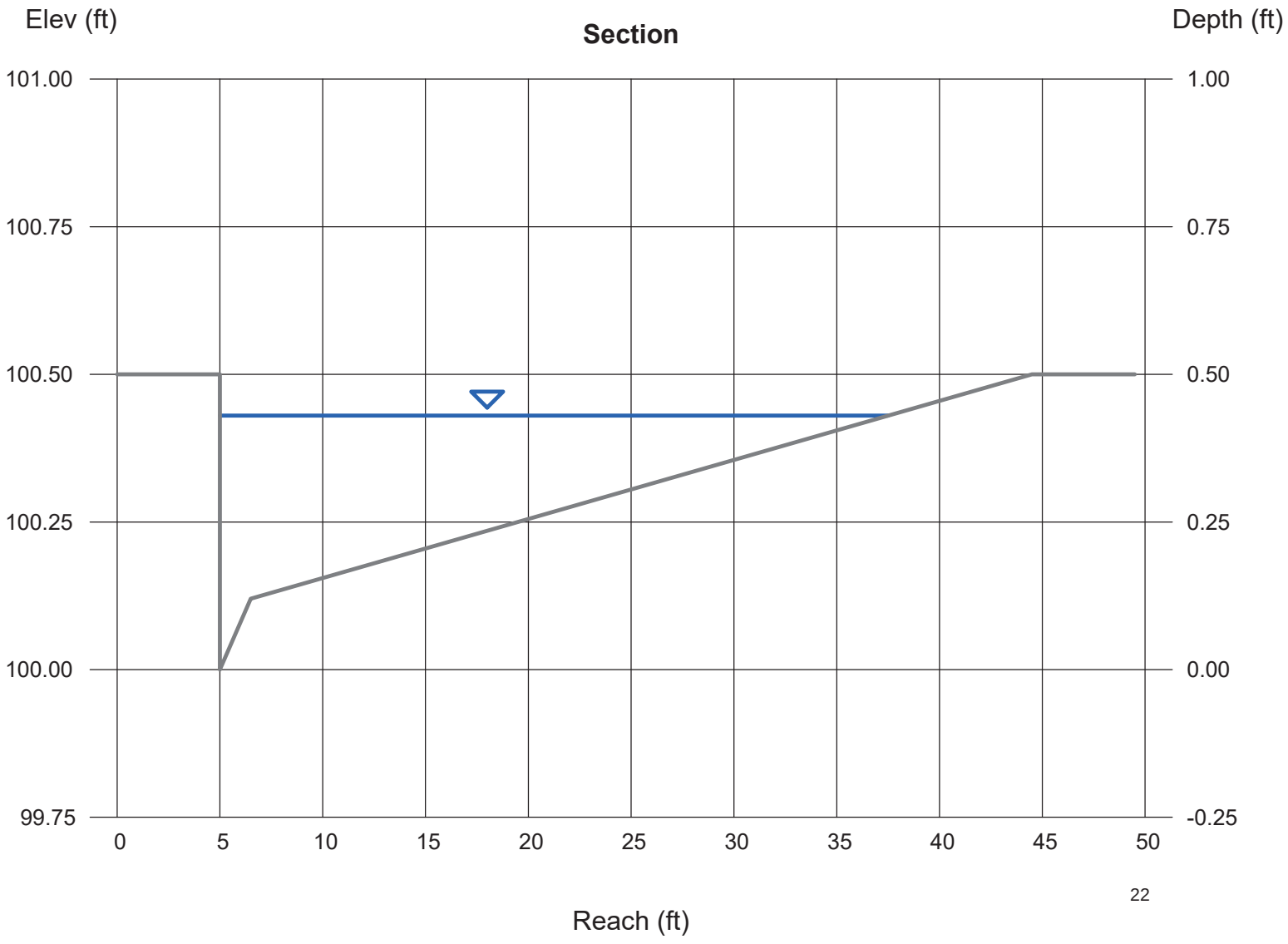
Cross Sl, Sx (ft/ft)	= 0.01
Cross Sl, Sw (ft/ft)	= 0.08
Gutter Width (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.016

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.80

Highlighted

Depth (ft)	= 0.43
Q (cfs)	= 10.80
Area (sqft)	= 5.36
Velocity (ft/s)	= 2.01
Wetted Perim (ft)	= 32.94
Crit Depth, Yc (ft)	= 0.42
Spread Width (ft)	= 32.50
EGL (ft)	= 0.49



Channel Report

Area A2 TC Flow Path V, Average Q

Triangular

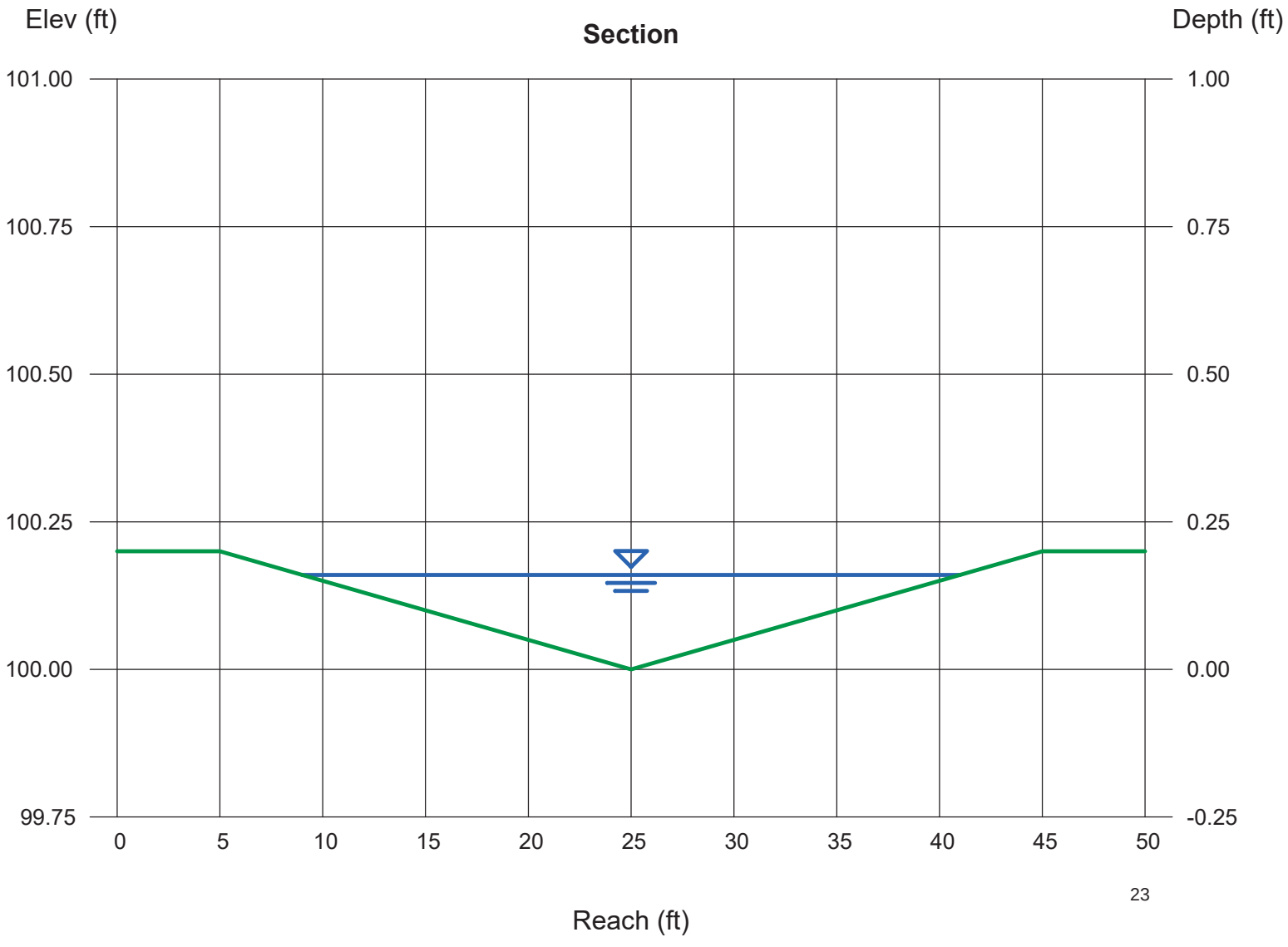
Side Slopes (z:1)	= 100.00, 100.00
Total Depth (ft)	= 0.20
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.016

Calculations

Compute by:	Known Q
Known Q (cfs)	= 3.40

Highlighted

Depth (ft)	= 0.16
Q (cfs)	= 3.400
Area (sqft)	= 2.56
Velocity (ft/s)	= 1.33
Wetted Perim (ft)	= 32.00
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 32.00
EGL (ft)	= 0.19



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Wednesday, Nov 22 2023

Area B TC Flow Path V, Average Q

Triangular

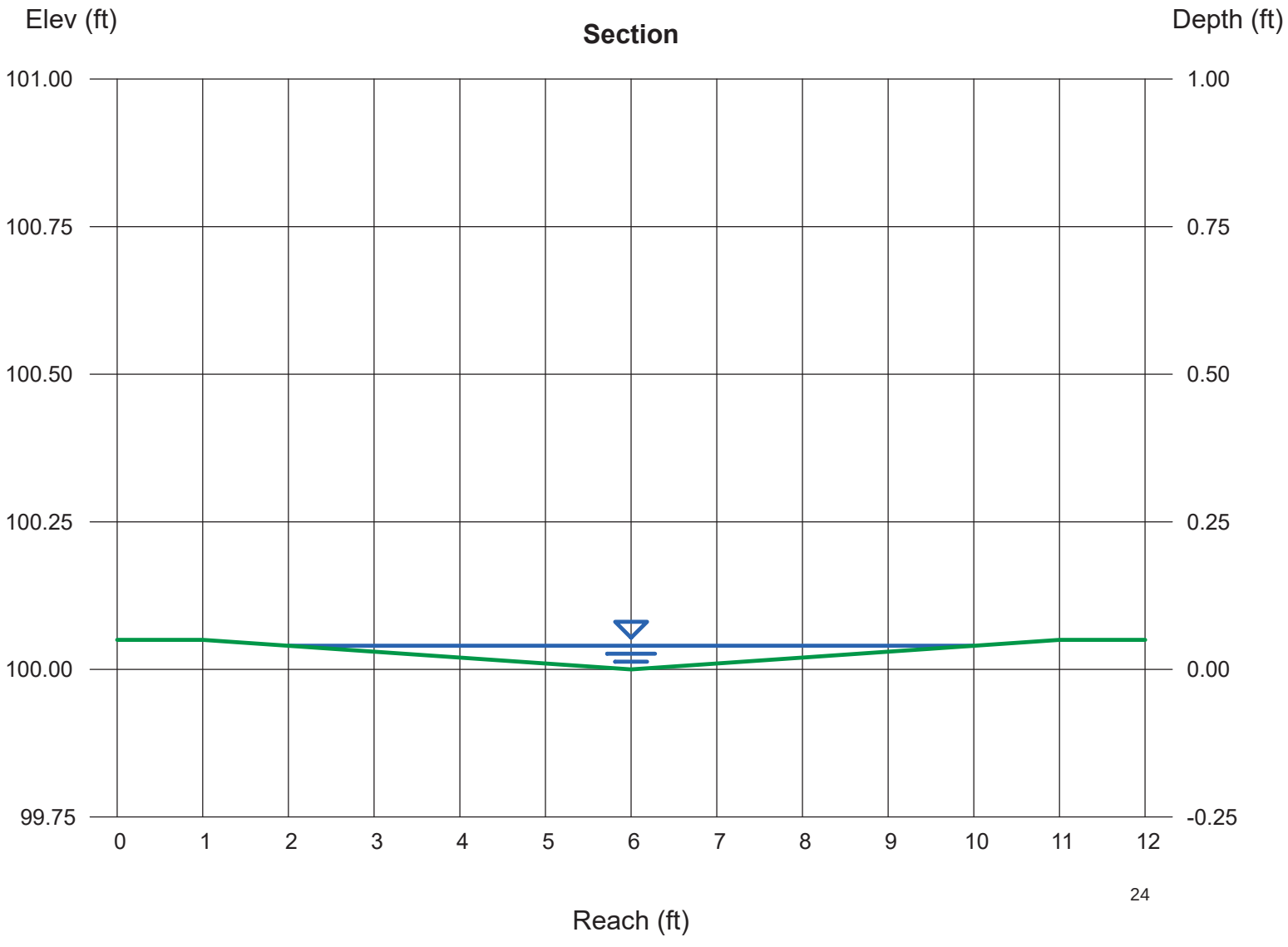
Side Slopes (z:1)	= 100.00, 100.00
Total Depth (ft)	= 0.05
Invert Elev (ft)	= 100.00
Slope (%)	= 8.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.25

Highlighted

Depth (ft)	= 0.04
Q (cfs)	= 0.250
Area (sqft)	= 0.16
Velocity (ft/s)	= 1.56
Wetted Perim (ft)	= 8.00
Crit Depth, Yc (ft)	= 0.05
Top Width (ft)	= 8.00
EGL (ft)	= 0.08



Channel Report

Area Offsite O TC Flow Path V, Average Q

Gutter

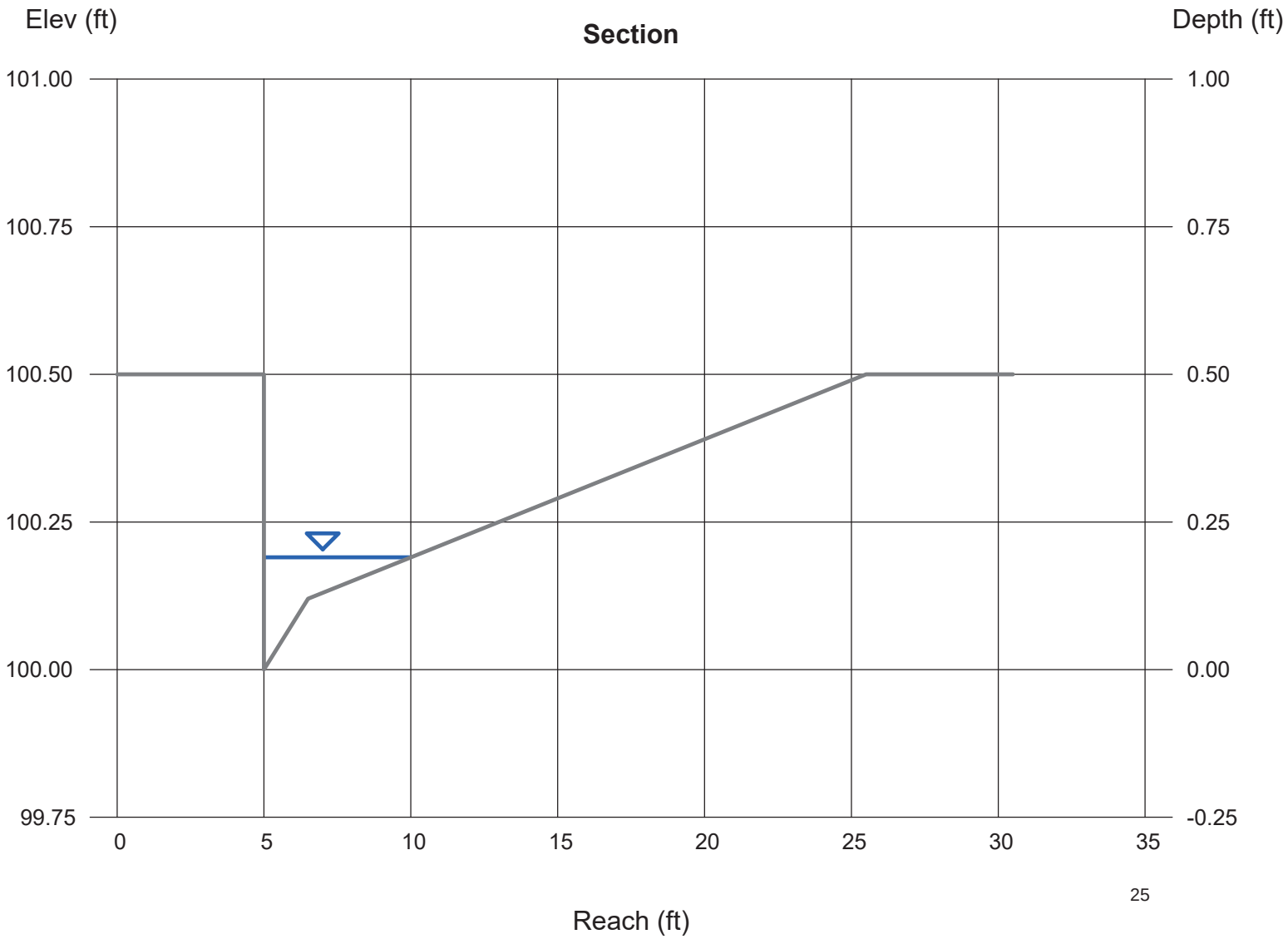
Cross Sl, Sx (ft/ft)	= 0.02
Cross Sl, Sw (ft/ft)	= 0.08
Gutter Width (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 4.20
N-Value	= 0.016

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.90

Highlighted

Depth (ft)	= 0.19
Q (cfs)	= 0.900
Area (sqft)	= 0.32
Velocity (ft/s)	= 2.83
Wetted Perim (ft)	= 5.20
Crit Depth, Yc (ft)	= 0.24
Spread Width (ft)	= 5.00
EGL (ft)	= 0.31



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Tuesday, Nov 28 2023

A2 Q100 Pipe flow

Circular

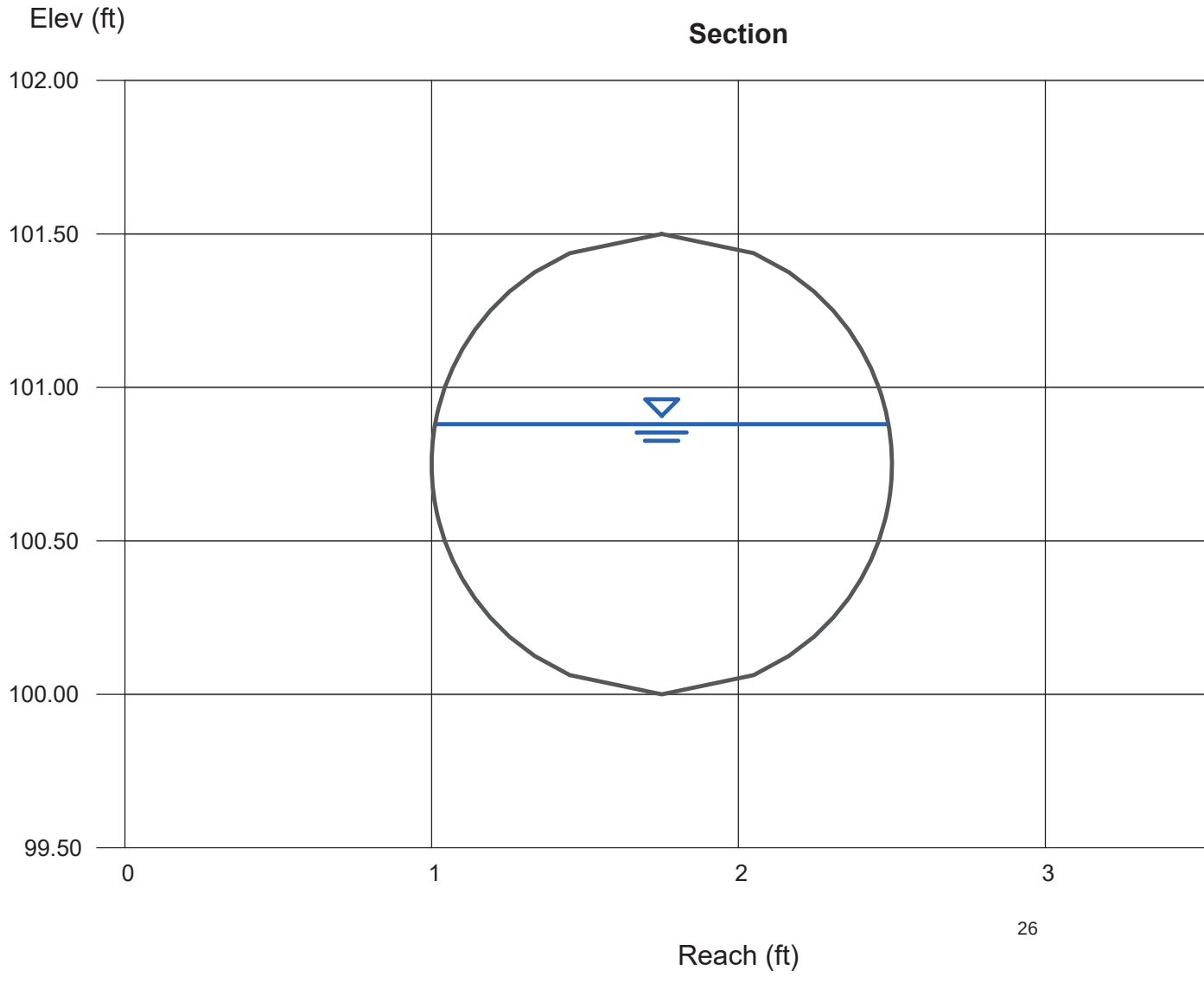
Diameter (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.80

Highlighted

Depth (ft)	= 0.88
Q (cfs)	= 6.800
Area (sqft)	= 1.08
Velocity (ft/s)	= 6.28
Wetted Perim (ft)	= 2.62
Crit Depth, Yc (ft)	= 1.01
Top Width (ft)	= 1.48
EGL (ft)	= 1.49



Channel Report

A1 & A2 Q100 into Underground Detention

Circular

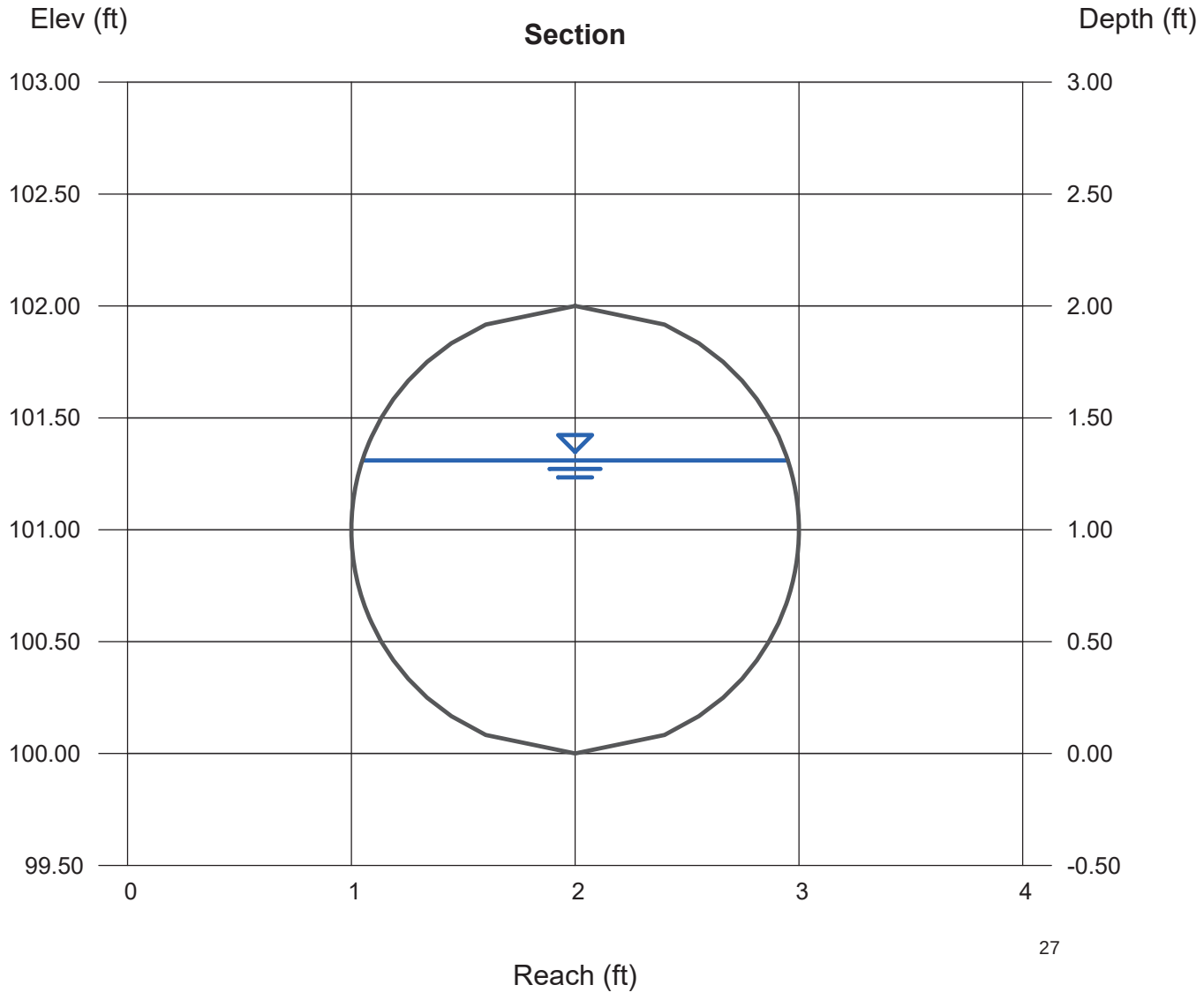
Diameter (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 24.40

Highlighted

Depth (ft)	= 1.31
Q (cfs)	= 24.40
Area (sqft)	= 2.19
Velocity (ft/s)	= 11.15
Wetted Perim (ft)	= 3.78
Crit Depth, Yc (ft)	= 1.75
Top Width (ft)	= 1.90
EGL (ft)	= 3.24



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Wednesday, Feb 5 2025

Total Onsite & Offsite Q100 UG Detention Outflow

Circular

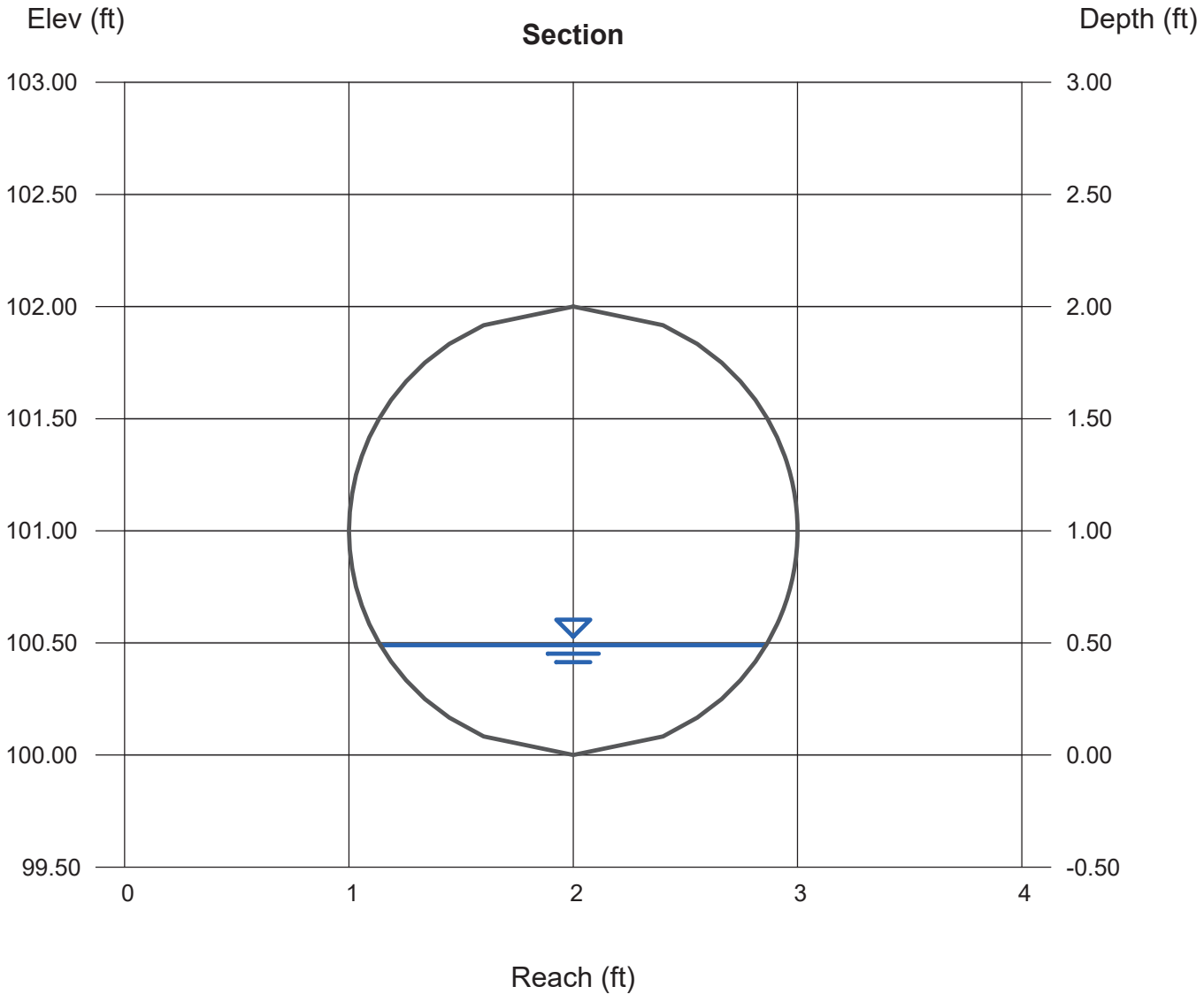
Diameter (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 8.70
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.50

Highlighted

Depth (ft)	= 0.49
Q (cfs)	= 8.500
Area (sqft)	= 0.60
Velocity (ft/s)	= 14.09
Wetted Perim (ft)	= 2.08
Crit Depth, Yc (ft)	= 1.04
Top Width (ft)	= 1.72
EGL (ft)	= 3.57



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Wednesday, Nov 29 2023

Total Q100 Onsite & Offsite Outflow Per Rick Eng. Study, Job # 15009

Circular

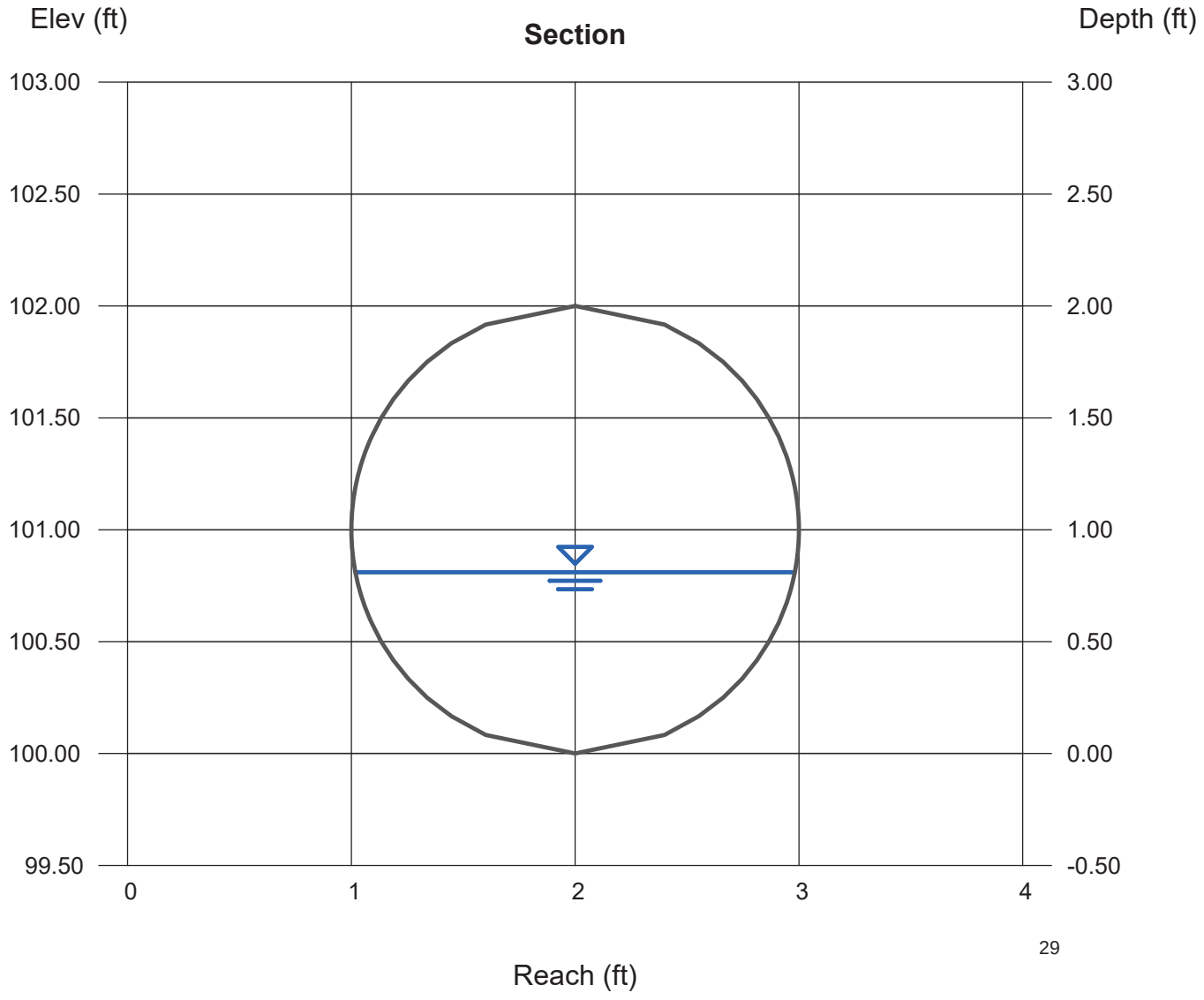
Diameter (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 8.70
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 22.52

Highlighted

Depth (ft)	= 0.81
Q (cfs)	= 22.52
Area (sqft)	= 1.19
Velocity (ft/s)	= 18.86
Wetted Perim (ft)	= 2.76
Crit Depth, Yc (ft)	= 1.69
Top Width (ft)	= 1.96
EGL (ft)	= 6.34



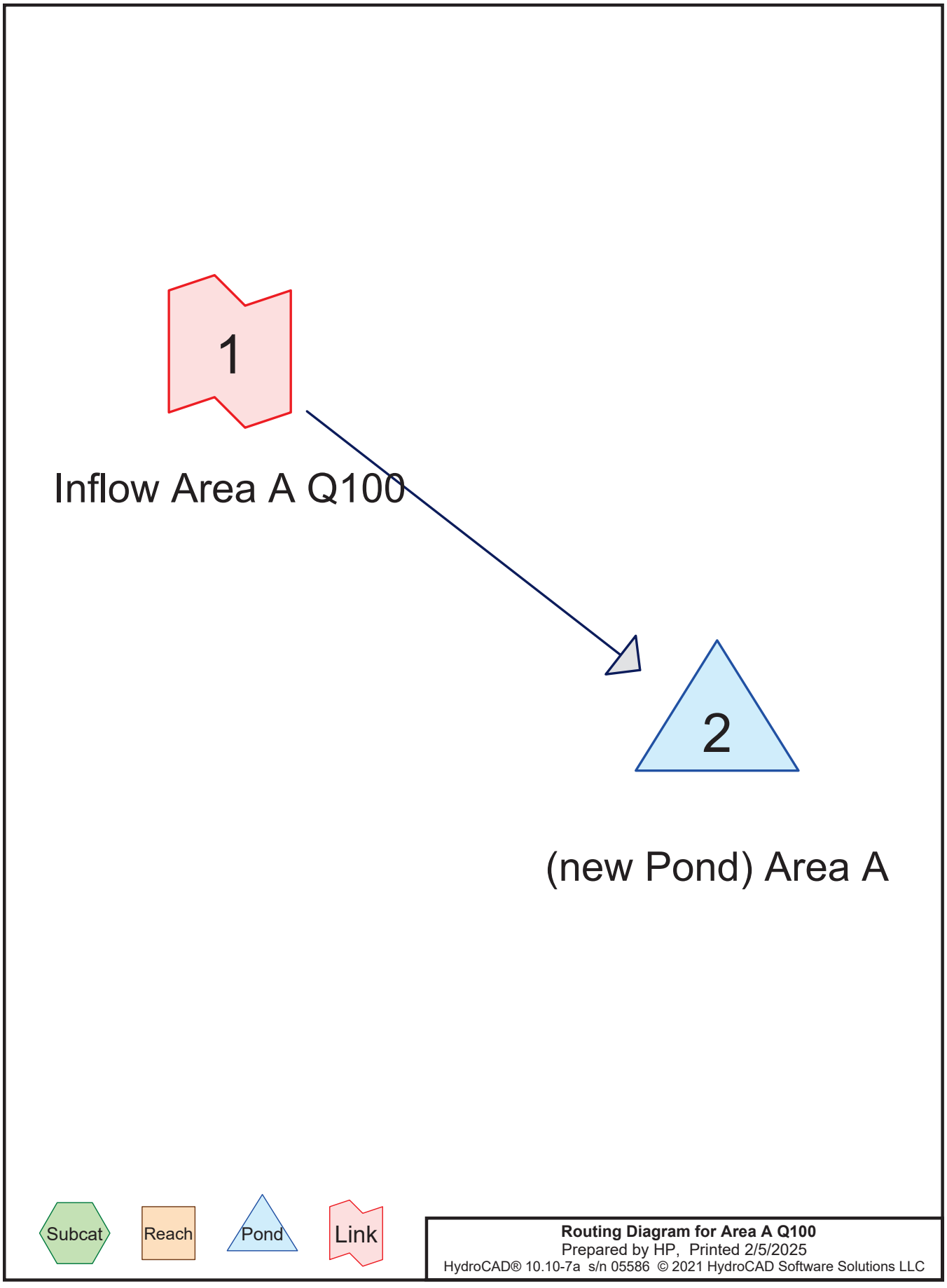
ATTACHMENT C

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/22/2023
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.8 INCHES
BASIN AREA 6.84 ACRES
RUNOFF COEFFICIENT 0.76
PEAK DISCHARGE 28.8 CFS

Onsite & Offsite Q100 Inflow

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.9
TIME (MIN) = 12	DISCHARGE (CFS) = 0.9
TIME (MIN) = 18	DISCHARGE (CFS) = 0.9
TIME (MIN) = 24	DISCHARGE (CFS) = 0.9
TIME (MIN) = 30	DISCHARGE (CFS) = 0.9
TIME (MIN) = 36	DISCHARGE (CFS) = 0.9
TIME (MIN) = 42	DISCHARGE (CFS) = 1
TIME (MIN) = 48	DISCHARGE (CFS) = 1
TIME (MIN) = 54	DISCHARGE (CFS) = 1
TIME (MIN) = 60	DISCHARGE (CFS) = 1
TIME (MIN) = 66	DISCHARGE (CFS) = 1
TIME (MIN) = 72	DISCHARGE (CFS) = 1.1
TIME (MIN) = 78	DISCHARGE (CFS) = 1.1
TIME (MIN) = 84	DISCHARGE (CFS) = 1.1
TIME (MIN) = 90	DISCHARGE (CFS) = 1.1
TIME (MIN) = 96	DISCHARGE (CFS) = 1.2
TIME (MIN) = 102	DISCHARGE (CFS) = 1.2
TIME (MIN) = 108	DISCHARGE (CFS) = 1.2
TIME (MIN) = 114	DISCHARGE (CFS) = 1.3
TIME (MIN) = 120	DISCHARGE (CFS) = 1.3
TIME (MIN) = 126	DISCHARGE (CFS) = 1.4
TIME (MIN) = 132	DISCHARGE (CFS) = 1.4
TIME (MIN) = 138	DISCHARGE (CFS) = 1.5
TIME (MIN) = 144	DISCHARGE (CFS) = 1.5
TIME (MIN) = 150	DISCHARGE (CFS) = 1.6
TIME (MIN) = 156	DISCHARGE (CFS) = 1.6
TIME (MIN) = 162	DISCHARGE (CFS) = 1.7
TIME (MIN) = 168	DISCHARGE (CFS) = 1.8
TIME (MIN) = 174	DISCHARGE (CFS) = 1.9
TIME (MIN) = 180	DISCHARGE (CFS) = 2
TIME (MIN) = 186	DISCHARGE (CFS) = 2.2
TIME (MIN) = 192	DISCHARGE (CFS) = 2.3
TIME (MIN) = 198	DISCHARGE (CFS) = 2.5
TIME (MIN) = 204	DISCHARGE (CFS) = 2.7
TIME (MIN) = 210	DISCHARGE (CFS) = 3
TIME (MIN) = 216	DISCHARGE (CFS) = 3.3
TIME (MIN) = 222	DISCHARGE (CFS) = 4
TIME (MIN) = 228	DISCHARGE (CFS) = 4.6
TIME (MIN) = 234	DISCHARGE (CFS) = 6.8
TIME (MIN) = 240	DISCHARGE (CFS) = 14.8
TIME (MIN) = 246	DISCHARGE (CFS) = 28.8
TIME (MIN) = 252	DISCHARGE (CFS) = 5.4
TIME (MIN) = 258	DISCHARGE (CFS) = 3.6
TIME (MIN) = 264	DISCHARGE (CFS) = 2.8
TIME (MIN) = 270	DISCHARGE (CFS) = 2.4
TIME (MIN) = 276	DISCHARGE (CFS) = 2.1
TIME (MIN) = 282	DISCHARGE (CFS) = 1.8
TIME (MIN) = 288	DISCHARGE (CFS) = 1.7
TIME (MIN) = 294	DISCHARGE (CFS) = 1.5
TIME (MIN) = 300	DISCHARGE (CFS) = 1.4
TIME (MIN) = 306	DISCHARGE (CFS) = 1.3
TIME (MIN) = 312	DISCHARGE (CFS) = 1.3
TIME (MIN) = 318	DISCHARGE (CFS) = 1.2
TIME (MIN) = 324	DISCHARGE (CFS) = 1.1
TIME (MIN) = 330	DISCHARGE (CFS) = 1.1
TIME (MIN) = 336	DISCHARGE (CFS) = 1
TIME (MIN) = 342	DISCHARGE (CFS) = 1
TIME (MIN) = 348	DISCHARGE (CFS) = 1
TIME (MIN) = 354	DISCHARGE (CFS) = 0.9
TIME (MIN) = 360	DISCHARGE (CFS) = 0.9
TIME (MIN) = 366	DISCHARGE (CFS) = 0



Routing Diagram for Area A Q100
Prepared by HP, Printed 2/5/2025
HydroCAD® 10.10-7a s/n 05586 © 2021 HydroCAD Software Solutions LLC

Summary for Pond 2: (new Pond) Area A

Inflow	=	28.83 cfs @	4.10 hrs, Volume=	1.206 af
Outflow	=	8.51 cfs @	4.19 hrs, Volume=	1.409 af, Atten= 70%, Lag= 5.3 min
Primary	=	8.51 cfs @	4.19 hrs, Volume=	1.409 af

Routing by Stor-Ind method, Time Span= 0.00-8.00 hrs, dt= 0.01 hrs
Starting Elev= 3.38' Storage= 41,082 cf
Peak Elev= 3.97' @ 4.19 hrs Storage= 48,164 cf (7,083 cf above start)

Plug-Flow detention time= 165.8 min calculated for 0.466 af (39% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

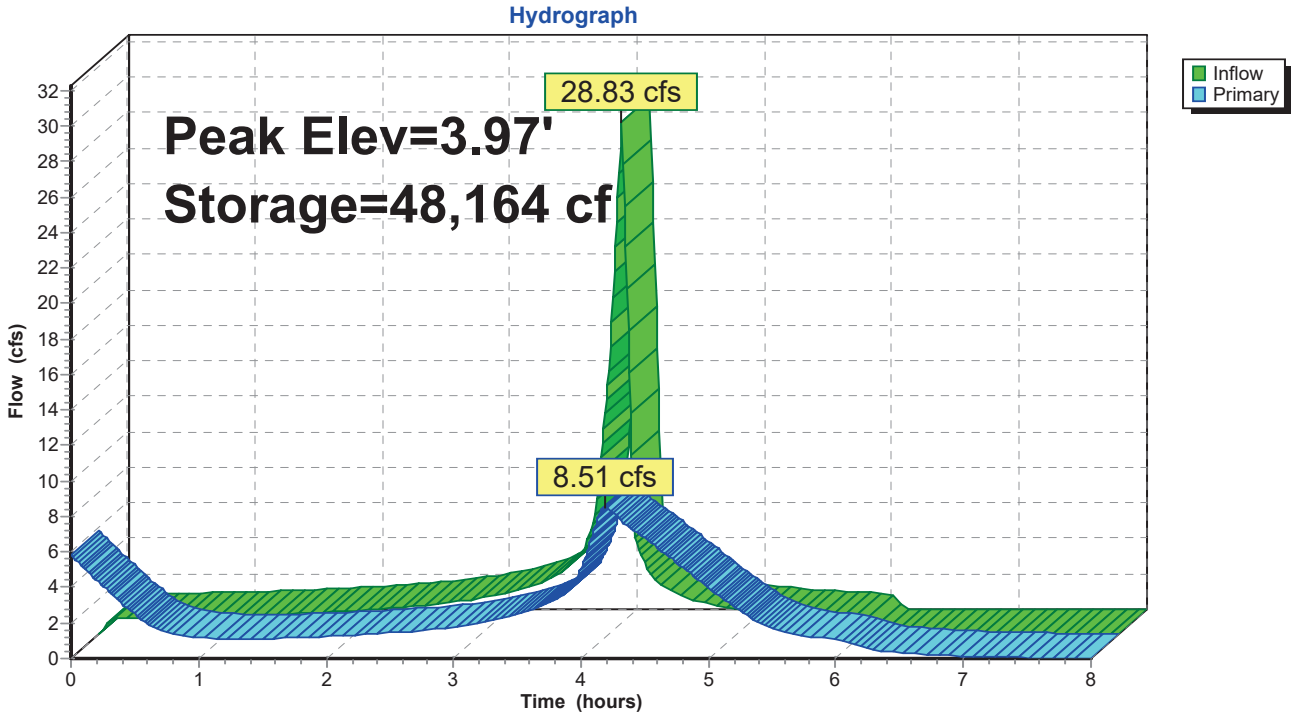
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	57,403 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
0.00	0
2.74	32,221
3.75	46,204
5.00	57,403

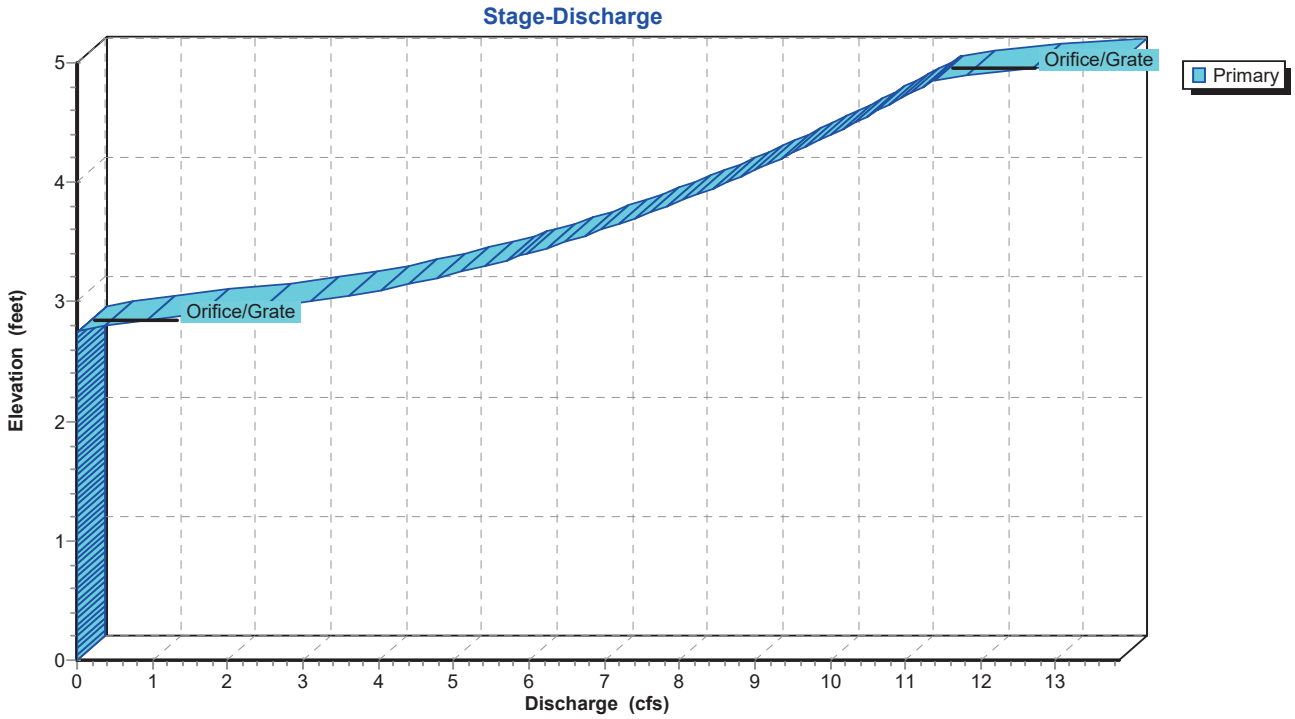
Device	Routing	Invert	Outlet Devices
#1	Primary	2.74'	**96.0" W x 2.5" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	4.86'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=8.50 cfs @ 4.19 hrs HW=3.97' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 8.50 cfs @ 5.10 fps)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 2: (new Pond) Area A



Pond 2: (new Pond) Area A



Summary for Link 1: Inflow Area A Q100

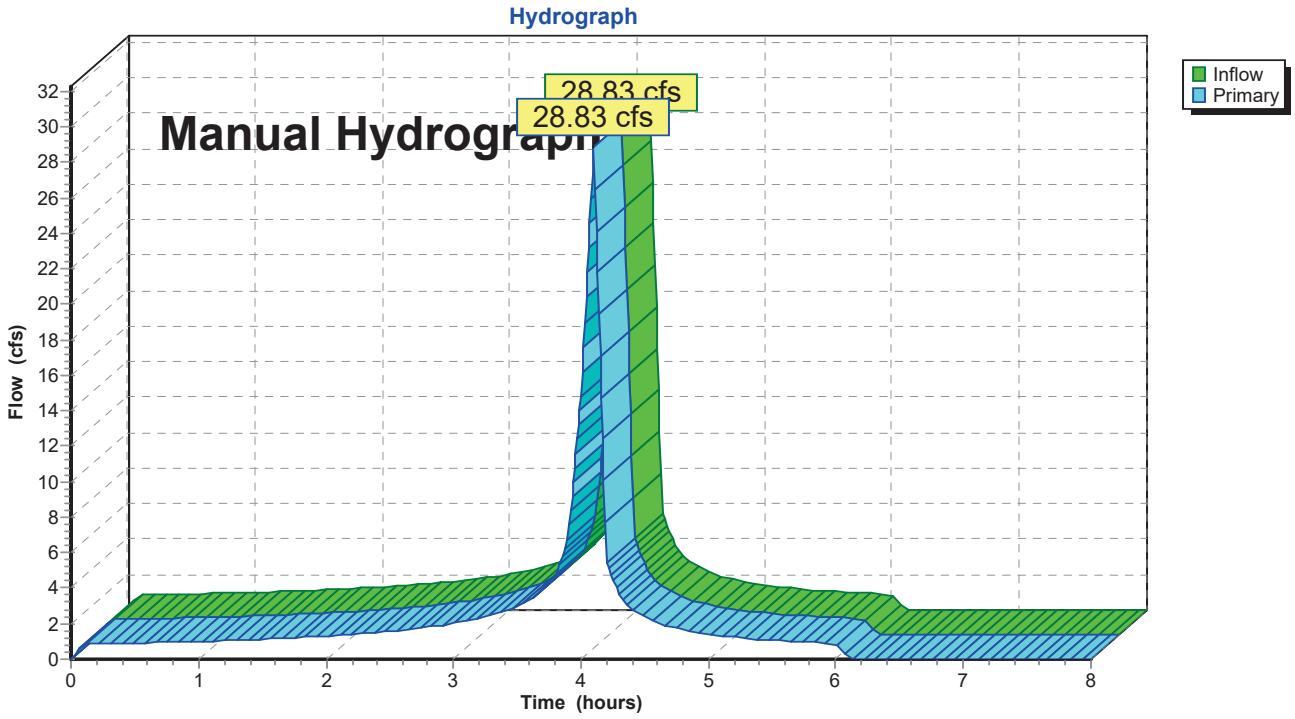
Inflow = 28.83 cfs @ 4.10 hrs, Volume= 1.206 af
Primary = 28.83 cfs @ 4.10 hrs, Volume= 1.206 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2 : (new Pond) Area A

Primary outflow = Inflow, Time Span= 0.00-8.00 hrs, dt= 0.01 hrs

62 Point manual hydrograph, To= 0.00 hrs, dt= 0.10 hrs, cfs =

0.00	0.90	0.90	0.90	0.90	0.90	0.90	1.00	1.00	1.00
1.00	1.00	1.10	1.10	1.10	1.10	1.20	1.20	1.20	1.30
1.30	1.40	1.40	1.50	1.50	1.60	1.60	1.70	1.80	1.90
2.00	2.20	2.30	2.50	2.70	3.00	3.30	4.00	4.60	6.80
14.80	28.80	5.40	3.60	2.80	2.40	2.10	1.80	1.70	1.50
1.40	1.30	1.30	1.20	1.10	1.10	1.00	1.00	1.00	0.90
0.90	0.00								

Link 1: Inflow Area A Q100

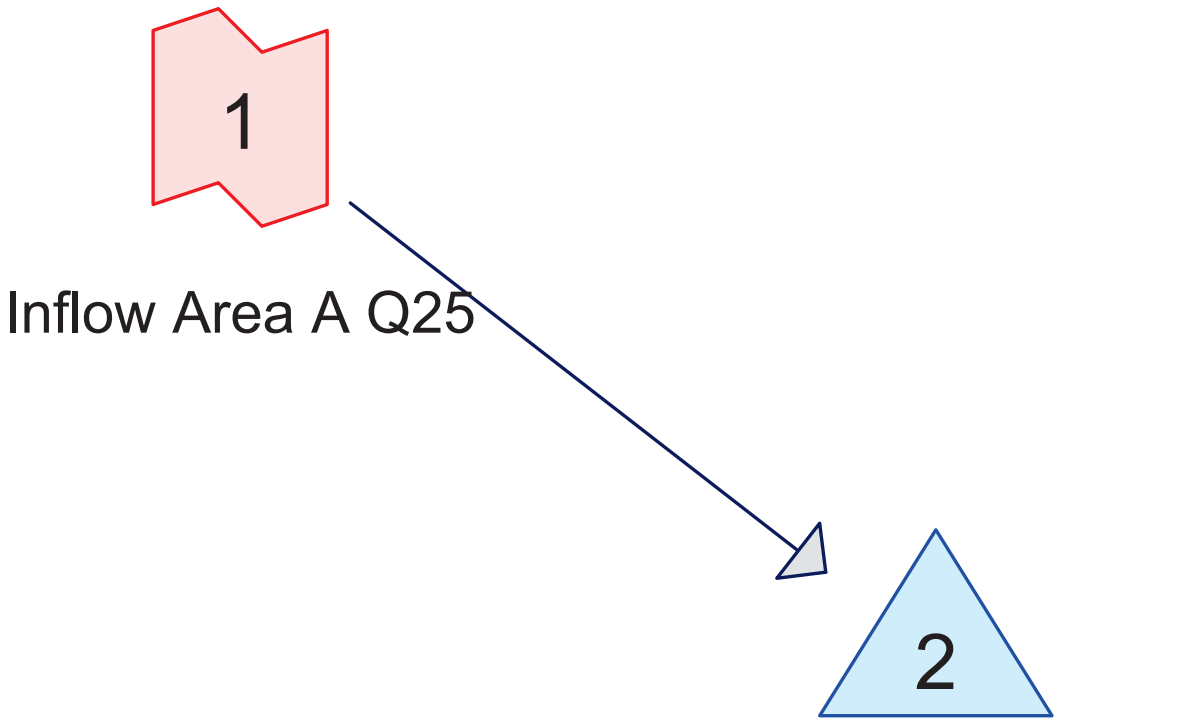


RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 2/17/2024
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.21 INCHES
BASIN AREA 6.84 ACRES
RUNOFF COEFFICIENT 0.76
PEAK DISCHARGE 22.9 CFS

Onsite & Offsite Q25 Inflow

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.7
TIME (MIN) = 12	DISCHARGE (CFS) = 0.7
TIME (MIN) = 18	DISCHARGE (CFS) = 0.7
TIME (MIN) = 24	DISCHARGE (CFS) = 0.7
TIME (MIN) = 30	DISCHARGE (CFS) = 0.7
TIME (MIN) = 36	DISCHARGE (CFS) = 0.7
TIME (MIN) = 42	DISCHARGE (CFS) = 0.8
TIME (MIN) = 48	DISCHARGE (CFS) = 0.8
TIME (MIN) = 54	DISCHARGE (CFS) = 0.8
TIME (MIN) = 60	DISCHARGE (CFS) = 0.8
TIME (MIN) = 66	DISCHARGE (CFS) = 0.8
TIME (MIN) = 72	DISCHARGE (CFS) = 0.8
TIME (MIN) = 78	DISCHARGE (CFS) = 0.9
TIME (MIN) = 84	DISCHARGE (CFS) = 0.9
TIME (MIN) = 90	DISCHARGE (CFS) = 0.9
TIME (MIN) = 96	DISCHARGE (CFS) = 0.9
TIME (MIN) = 102	DISCHARGE (CFS) = 1
TIME (MIN) = 108	DISCHARGE (CFS) = 1
TIME (MIN) = 114	DISCHARGE (CFS) = 1
TIME (MIN) = 120	DISCHARGE (CFS) = 1
TIME (MIN) = 126	DISCHARGE (CFS) = 1.1
TIME (MIN) = 132	DISCHARGE (CFS) = 1.1
TIME (MIN) = 138	DISCHARGE (CFS) = 1.2
TIME (MIN) = 144	DISCHARGE (CFS) = 1.2
TIME (MIN) = 150	DISCHARGE (CFS) = 1.2
TIME (MIN) = 156	DISCHARGE (CFS) = 1.3
TIME (MIN) = 162	DISCHARGE (CFS) = 1.4
TIME (MIN) = 168	DISCHARGE (CFS) = 1.4
TIME (MIN) = 174	DISCHARGE (CFS) = 1.5
TIME (MIN) = 180	DISCHARGE (CFS) = 1.6
TIME (MIN) = 186	DISCHARGE (CFS) = 1.7
TIME (MIN) = 192	DISCHARGE (CFS) = 1.8
TIME (MIN) = 198	DISCHARGE (CFS) = 2
TIME (MIN) = 204	DISCHARGE (CFS) = 2.1
TIME (MIN) = 210	DISCHARGE (CFS) = 2.4
TIME (MIN) = 216	DISCHARGE (CFS) = 2.6
TIME (MIN) = 222	DISCHARGE (CFS) = 3.2
TIME (MIN) = 228	DISCHARGE (CFS) = 3.6
TIME (MIN) = 234	DISCHARGE (CFS) = 5.3
TIME (MIN) = 240	DISCHARGE (CFS) = 11.5
TIME (MIN) = 246	DISCHARGE (CFS) = 22.9
TIME (MIN) = 252	DISCHARGE (CFS) = 4.3
TIME (MIN) = 258	DISCHARGE (CFS) = 2.9
TIME (MIN) = 264	DISCHARGE (CFS) = 2.2
TIME (MIN) = 270	DISCHARGE (CFS) = 1.9
TIME (MIN) = 276	DISCHARGE (CFS) = 1.6
TIME (MIN) = 282	DISCHARGE (CFS) = 1.5
TIME (MIN) = 288	DISCHARGE (CFS) = 1.3
TIME (MIN) = 294	DISCHARGE (CFS) = 1.2
TIME (MIN) = 300	DISCHARGE (CFS) = 1.1
TIME (MIN) = 306	DISCHARGE (CFS) = 1.1
TIME (MIN) = 312	DISCHARGE (CFS) = 1
TIME (MIN) = 318	DISCHARGE (CFS) = 0.9
TIME (MIN) = 324	DISCHARGE (CFS) = 0.9
TIME (MIN) = 330	DISCHARGE (CFS) = 0.9
TIME (MIN) = 336	DISCHARGE (CFS) = 0.8
TIME (MIN) = 342	DISCHARGE (CFS) = 0.8
TIME (MIN) = 348	DISCHARGE (CFS) = 0.8
TIME (MIN) = 354	DISCHARGE (CFS) = 0.7
TIME (MIN) = 360	DISCHARGE (CFS) = 0.7
TIME (MIN) = 366	DISCHARGE (CFS) = 0



Subcat Reach Pond Link

Routing Diagram for Area A Q25
Prepared by HP, Printed 2/5/2025
HydroCAD® 10.10-7a s/n 05586 © 2021 HydroCAD Software Solutions LLC

Summary for Pond 2: (new Pond) Area A

Inflow	=	22.92 cfs @	4.10 hrs, Volume=	0.953 af
Outflow	=	7.09 cfs @	4.19 hrs, Volume=	1.156 af, Atten= 69%, Lag= 5.2 min
Primary	=	7.09 cfs @	4.19 hrs, Volume=	1.156 af

Routing by Stor-Ind method, Time Span= 0.00-8.00 hrs, dt= 0.01 hrs
Starting Elev= 3.38' Storage= 41,082 cf
Peak Elev= 3.63' @ 4.19 hrs Storage= 44,479 cf (3,398 cf above start)

Plug-Flow detention time= 228.5 min calculated for 0.213 af (22% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

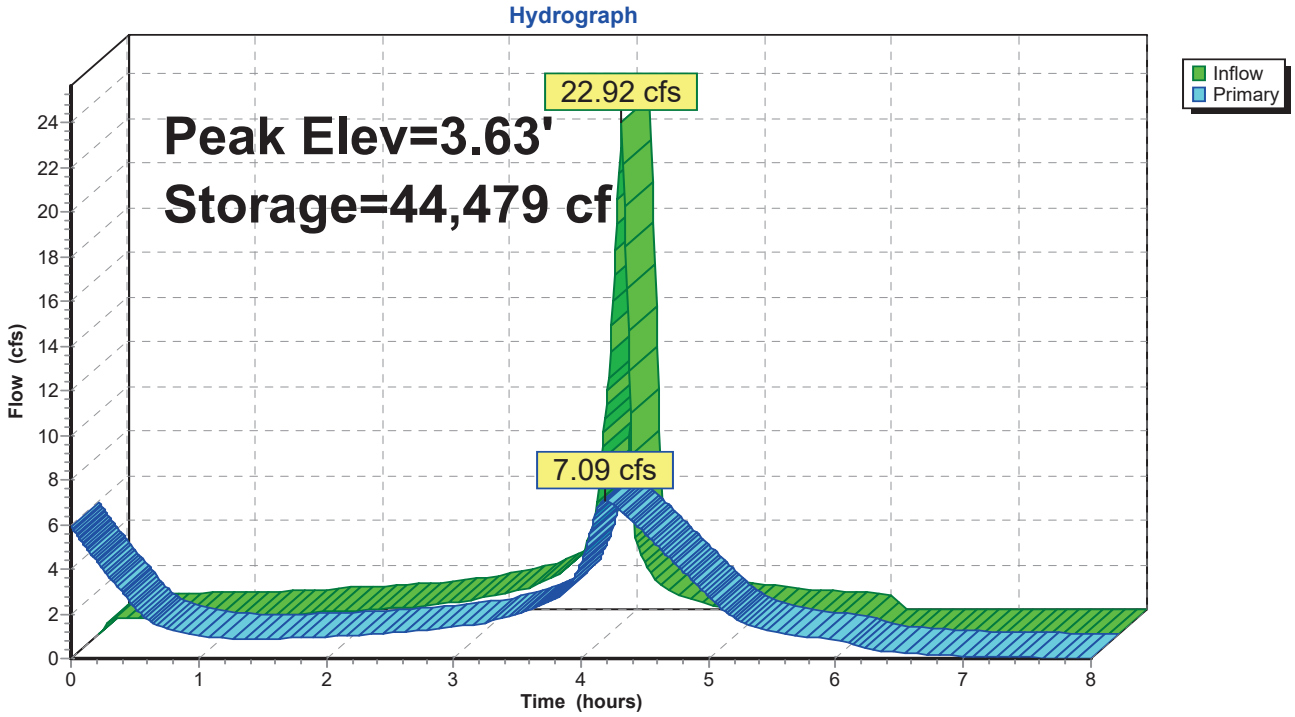
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	57,403 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
0.00	0
2.74	32,221
3.75	46,204
5.00	57,403

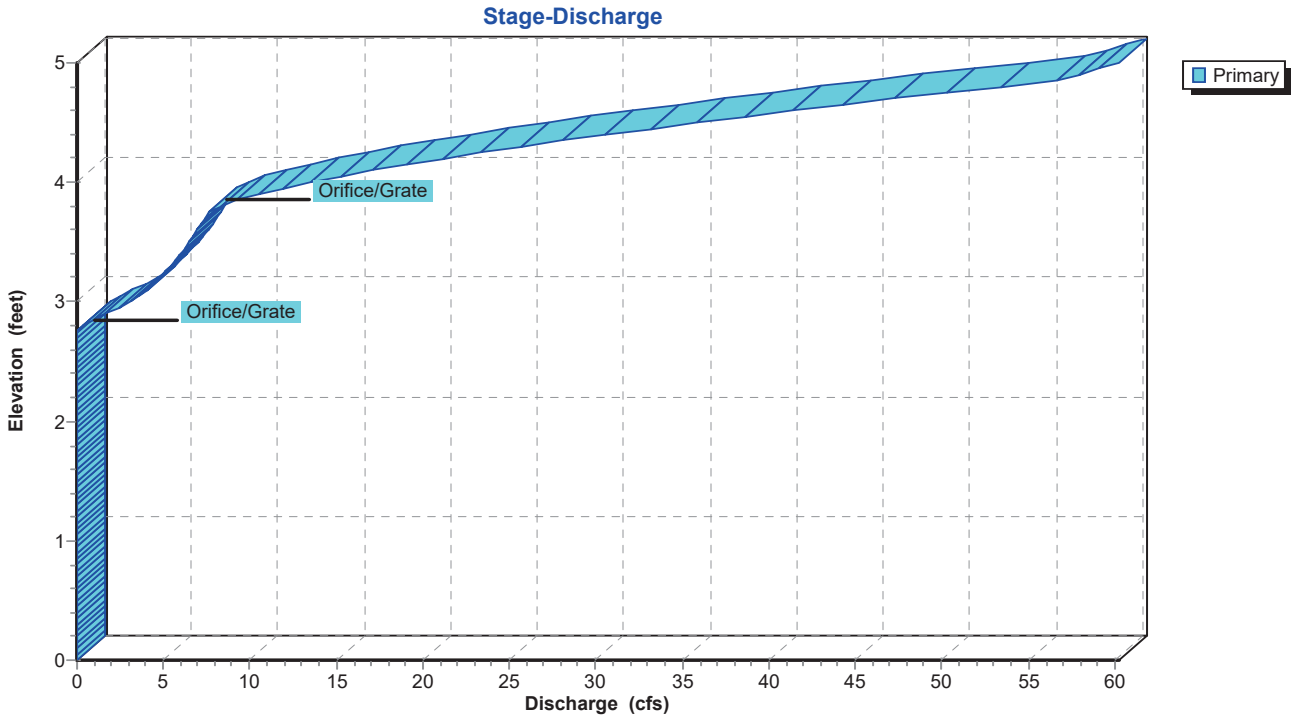
Device	Routing	Invert	Outlet Devices
#1	Primary	2.74'	**96.0" W x 2.5" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	3.75'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.09 cfs @ 4.19 hrs HW=3.62' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 7.09 cfs @ 4.25 fps)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 2: (new Pond) Area A



Pond 2: (new Pond) Area A



Summary for Link 1: Inflow Area A Q25

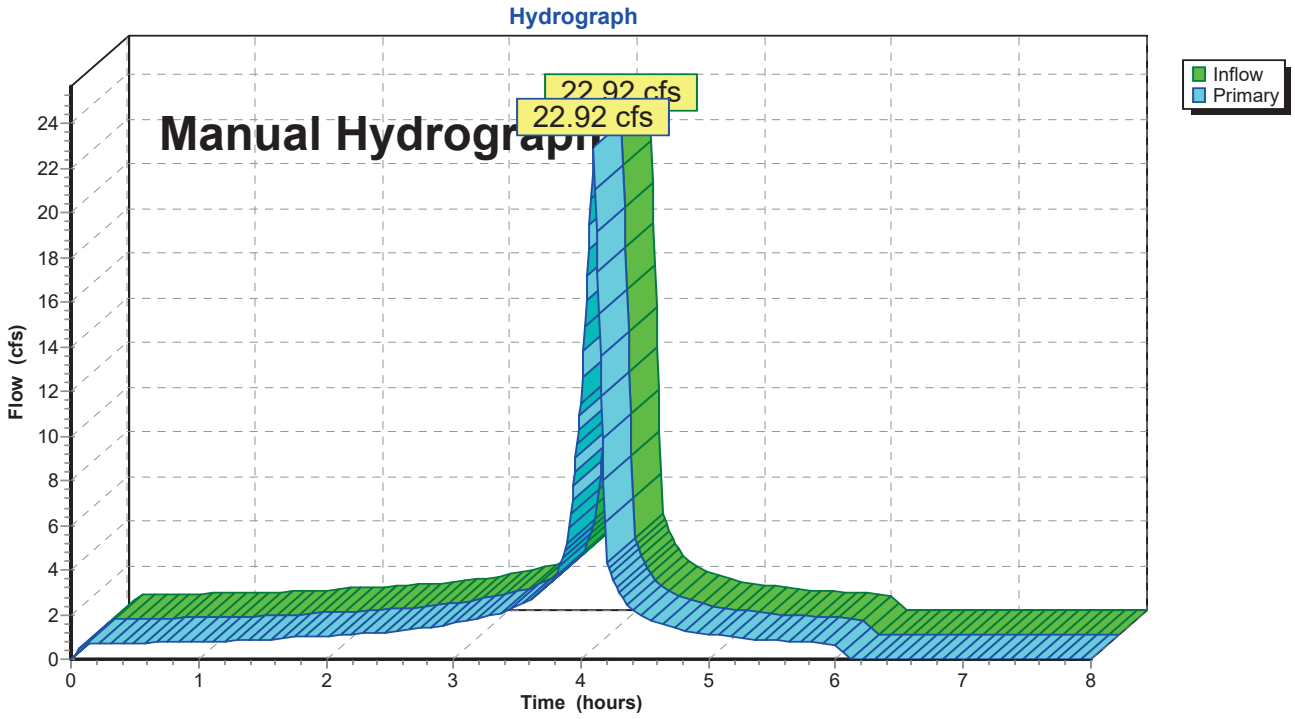
Inflow = 22.92 cfs @ 4.10 hrs, Volume= 0.953 af
Primary = 22.92 cfs @ 4.10 hrs, Volume= 0.953 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2 : (new Pond) Area A

Primary outflow = Inflow, Time Span= 0.00-8.00 hrs, dt= 0.01 hrs

62 Point manual hydrograph, To= 0.00 hrs, dt= 0.10 hrs, cfs =

0.00	0.70	0.70	0.70	0.70	0.70	0.70	0.80	0.80	0.80
0.80	0.80	0.80	0.90	0.90	0.90	0.90	1.00	1.00	1.00
1.00	1.10	1.10	1.20	1.20	1.20	1.30	1.40	1.40	1.50
1.60	1.70	1.80	2.00	2.10	2.40	2.60	3.20	3.60	5.30
11.50	22.90	4.30	2.90	2.20	1.90	1.60	1.50	1.30	1.20
1.10	1.10	1.00	0.90	0.90	0.90	0.80	0.80	0.80	0.70
0.70	0.00								

Link 1: Inflow Area A Q25



ATTACHMENT D

```
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.43
 FLOW VELOCITY(FEET/SEC.) =   0.74   FLOW DEPTH(FEET)      0.06
 TRAVEL TIME(MIN.) =   0.22   Tc(MIN.) =   8.02
 LONGEST FLOWPATH FROM NODE    731.20 TO NODE   7123.40 =   380.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7123.40 TO NODE   7123.40 IS CODE =   2

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
----------------------------------------------------------------------------
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.02
 RAINFALL INTENSITY(INCH/HR) =   3.83
 TOTAL STREAM AREA(ACRES) =      0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.43

 ** CONFLUENCE DATA
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
     1        21.14      8.73        3.690          6.00
     2         1.43      8.02        3.827          0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)
     1        21.82      8.02        3.827
     2        22.52      8.73        3.690

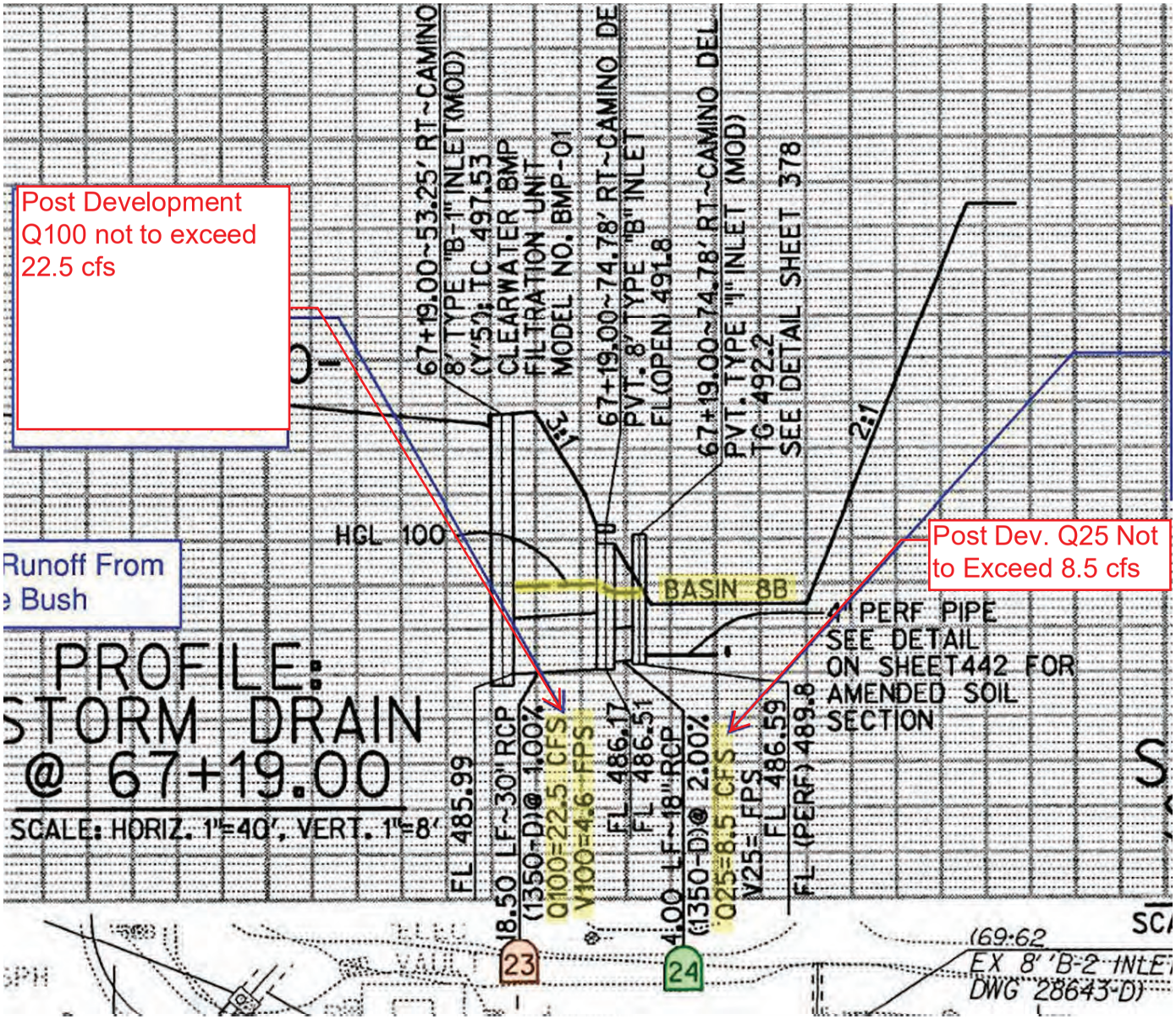
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      22.52   Tc(MIN.) =     8.73
 TOTAL AREA(ACRES) =      6.40
 LONGEST FLOWPATH FROM NODE   7123.10 TO NODE   7123.40     722.00 FEET.

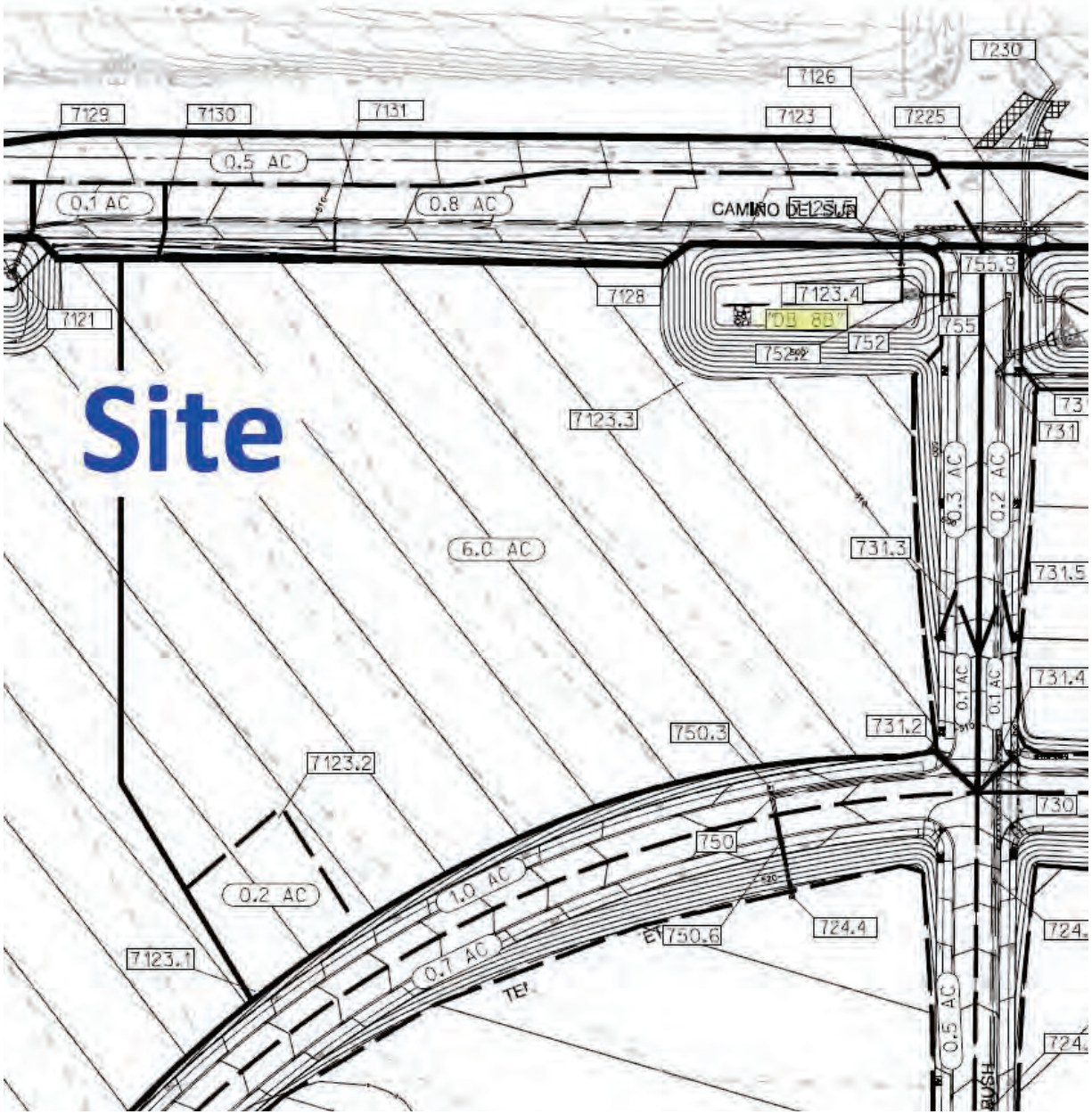
****************************************************************************
 FLOW PROCESS FROM NODE   7123.40 TO NOD     7123.00 IS CODE =  41

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
----------------------------------------------------------------------------
 ELEVATION DATA: UPSTREAM(FEET) =   489.00  DOWNSTREAM(FEET)      485.49
 FLOW LENGTH(FEET) =     40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIP  IS    9.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.53
 GIVEN PIPE DIAMETER(INCH) =  24.00     NUMBER OF PIPES =
 PIPE-FLOW(CFS) =      22.52
 PIPE TRAVEL TIME(MIN.) =   0.04     Tc(MIN.) =    8.77
 LONGEST FLOWPATH FROM NODE   7123.10 TO NODE   7123.00 =   762.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7123.00 TO NODE   7123.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

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


Post Development
Q100 not to exceed
22.5 cfs
Post Dev. Q25 Not
to Exceed 8.5 cfs
Runoff From
e Bush
PROFILE:
STORM DRAIN
@ 67+19.00
SCALE: HORIZ. 1"=40', VERT. 1"=8'
67+19.00~53.25' RT~CAMINO
8' TYPE "B-1" INLET (MOD)
(Y'S): TC 497.53
CLEARWATER BMP
FILTRATION UNIT
MODEL NO. BMP-01
67+19.00~74.78' RT~CAMINO DE
PVT. 8' TYPE "B" INLET
FL (OPEN) 491.8
67+19.00~74.78' RT~CAMINO DEL
PVT. TYPE "I" INLET (MOD)
TG: 492.2
SEE DETAIL SHEET 378
HGL 100
BASIN 8B
4" PERF PIPE
SEE DETAIL
ON SHEET442 FOR
AMENDED SOIL
SECTION
FL 485.99
18.50 LF~30" RCP
(1350-D)@ 1.00%
Q100=22.5 CFS
V100=4.6 FPS
FL 486.17
FL 486.51
4.00 LF~18" RCP
(1350-D)@ 2.00%
Q25=8.5 CFS
V25=FPS
FL 486.59
FL (PERF) 489.8
2:1
23
24
(69:62
EX 8' 'B-2' INLET
DWG 28643-D)


Site
7230
7126
7129
7130
7131
7123
7225
0.5 AC
0.1 AC
0.8 AC
CAMINO DE LOS
7125.5
755.9
7128
7123.4
7121
755
752
7123.3
731
0.3 AC
0.2 AC
6.0 AC
731.3
731.5
0.1 AC
0.1 AC
731.4
731.2
750.3
7123.2
730
750
1.0 AC
0.2 AC
724.4
750.6
7123.1
0.7 AC
0.5 AC
BUSH

ADDENDUM 6
DRAINAGE STUDY
FOR
CAMINO DEL SUR SOUTH HALF PHASE II

NORTHERLY DRAINING AREAS

(In Support of BMR Unit 14 Grading - Construction Change 'F'
BMR North Village East Town Center Improvements – Construction Change 'B'
BMR North Village Paseo Del Sur Phase 5 Improvements– Construction Change 'A')

PTS # 303110, I.O # 24003381, DWG # 37225-D
(Previously: PTS # 83713, # 302622)

Job Number 16630

(Original Report Job Number 15032
Addendum 1 Job Number 15009C
Addendum 2 Job Number 15009E
Addendum 3 Job Number 15009F
Addendum 4 Job Numbers 16806 & 16807)

Original: March 9, 2011
Addendum 1: January 6, 2012
Addendum 2: March 8, 2012
Addendum 3: August 13, 2012
Addendum 4: January 14, 2013
Addendum 5: April 24, 2013
Revised Addendum 5: July 11, 2013
Addendum 6: July 3, 2014
Revised Addendum 6: October 2, 2014

RICK ENGINEERING COMPANY

ADDENDUM 6

TO

DRAINAGE STUDY

FOR

CAMINO DEL SUR SOUTH HALF PHASE II

NORTHERLY DRAINING AREAS

(In Support of BMR Unit 14 Grading - Construction Change 'F'
BMR North Village East Town Center Improvements – Construction Change 'B'
BMR North Village Paseo Del Sur Phase 5 Improvements – Construction Change 'A')

Job Number 16630

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Original: March 9, 2011
Addendum 1: January 6, 2012
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Appendix G: AES Pipe Flow Hydraulic Analyses for Ultimate Condition
Appendix H: Inlet Design Calculations
Appendix L: Detention Basin Calculations

Map Pocket 5: Drainage Study map for Camino Del Sur South Half Phase II Basin 700 [Ultimate Condition]
Map Pocket 6: Drainage Study map for Camino Del Sur South Half Phase II Basin 900 [Ultimate Condition]

ADDENDUM 6 TO
DRAINAGE STUDY
FOR
CAMINO DEL SUR SOUTH HALF PHASE II
NORTHERLY DRAINING AREAS

(In Support of BMR Unit 14 Grading - Construction Change 'F'
BMR North Village East Town Center Improvements – Construction Change 'B'
BMR North Village Paseo Del Sur Phase 5 Improvements – Construction Change 'A')

Job Number 16630

REVISION PAGE(S)

October 2, 2014

This Drainage Study presents a revision to the July 3, 2014 report pursuant to first plan check comments of the ((Cycle 1 LDR – Drainage & Grades)). The comments have been included below for each plan set and the response-to-comments have been provided in italics.

BMR NVE Unit 14, East Town Center Improvements – Construction Change 'B'

32. Cover Sheet: Please reference the PTS # for this construction change. "Construction Change PTS 378809 to PTS 303110"

    Response: Noted. The cover has been updated

33. On Sheet 42: The Q & V on pipe #1 are provided to be Q = 4.4 & V = 2.5. I went to the provided Drainage Study (Basin 900) and was not able to find the analysis at node 904.5 (Templeton Street). Is there another drainage study that covers those nodes? Please

provide. Ensure that all Q & V provided on the plans match the drainage study analysis. (On my next review I will verify few other nodes to ensure consistency)

Response: Basin 900 rational method analysis omitted unintentionally. Please see appendix A, Basin 900 for analysis of node 904.5. Node 904.5 represents the street inlet on the north side of Templeton Street. Node 904.4 represents the cleanout where the confluence of the north and south street inlet occurs. The combined flow modeled in the pipe flow (pipe #1, node 904.4 to 906) analysis equals 4.4 cfs with a max velocity of 2.5 feet per second. Pipe flow analysis for node 904.5 can be found in Appendix G, Basin 900 in the AES pipeflow analyses file name: 9044.LAT. Pipeflow analyses of pipe #1 (node 904.4 to node 906) can be found in Appendix G, Basion 900 in the AES pipeflow analysis file name: 906.LAT. Note: Pipe #1 (node 904.4 to node 906) is under pressure due to the HGL at node 906, which confluences the flow from the parcel to south of Templeton Street. Pipe #1 is not undersized and meets capacity for waters received by the two street inlets.

Additional revisions included in this report: Revised AES Pipeflows for the storm drain inlet and outlet pipes of Underground Detention Basin 9A. Minor changes were made to the horizontal alignment of Detention Basin 9A's outlet works which required the pipeflows to be updated. See Appendix G.

BMR NVE Unit 14, Paseo Del Sur Phase 5 Improvements – Construction Change 'A'

Response: No comments to address.

BMR NVE Unit 14, Grading Plans – Construction Change 'F'

Response: No comments to address.

1.0 INTRODUCTION

This drainage study has been prepared to address changes to the northerly draining areas of Black Mountain Ranch North Village Unit 14, pursuant to the following projects:

- Black Mountain Ranch North Village East Unit 14 Grading Plans - Construction Change 'F'
- Black Mountain Ranch North Village East Town Center Improvement Plans – Construction Change 'B'
- Black Mountain Ranch North Village Paseo Del Sur Phase 5 Improvement Plans – Construction Change 'A'

This report is the sixth addendum to the report titled "Drainage Study for Camino Del Sur South Half Phase II, (In Support of BMR NVE Unit 14 Grading Plans – Construction Change 'F' – Northerly Draining Areas)," last revised on July 3, 2014 (herein referred to as the "original report"). The most recent addendums, Addendum 3 and 4, had specifically addressed Construction Change 'D' to the Unit 14 Grading Plans, and the original improvement plans for East Town Center and Paseo Del Sur Phase 5, respectively. Addendum 5 specifically addressed Construction Change 'E'.

Unit 14, as a whole, drains in two (2) directions. Because of this, Unit 14 was split between the northerly draining areas, referred to as the Town Center (covered in the report titled, "Drainage Study for Camino Del Sur South Half Phase II," and its subsequent addendums) and the southerly draining areas, referred to as Del Sur Ridge (covered in the report titled, "Drainage Study for Black Mountain Ranch North Village East Unit 14," and its subsequent addendums). The table below describes the history of revisions throughout BMR Unit 14, and the applicable addendum to the original studies for each change.

Table 1.1 – Black Mountain Ranch North Village East Unit 14 project history.

Project	Northerly Draining Area (Town Center)	Southerly Draining Area (Del Sur Ridge)
Construction Change 'B'	Addendum 1	Not Applicable
Construction Change 'C'	Addendum 2	Not Applicable
Construction Change 'D'	Addendum 3	Addendum 1
Improvement Plans to BMR North Village East Town Center and Paseo Del Sur Phase 5	Addendum 4	Not Applicable
Construction Change 'E'	Addendum 5	Addendum 2
Construction Change 'F'	Addendum 6	N/A

Detailed below are the changes to BMR North Village East Unit 14, pursuant to the Construction Change 'F' project, and the Construction Change 'A' & 'B' to the improvement plans listed above. The portions covered within the northerly draining report are italicized:

<u>BMRNV Unit 14 – Construction Change 'F':</u>

- *Replace Detention Basin 9A (above ground detention basin and bioretention swale) within Drainage Basin 900A, with an underground detention vault and an underground Jellyfish Filtration treatment unit.*
- *Revised sheet grading of the lots north of Del Sur Ridge Road, west of Paseo Del Sur, and east of Garretson Street within the commercial district of the Town Center, including the removal of the portion of Templeton Street between Garretson Street and Paseo Del Sur.*
- *Lower the street grades along portions of Del Sur Ridge Road, Garretson Street, Templeton Street, and Paseo Del Sur*

BMRNV East Town Center Improvements – Construction Change 'B':

- *Revisions to the storm drain layout for a portion of the system along Del Sur Ridge Road, Templeton Street, and Garretson Street*
- *Horizontal and vertical revisions to water, sewer and storm drain due to the lowering of streets listed above.*
- *Providing driveways, curb ramps and utility services to the Shea Commercial Site*

BMRNV Paseo Del Sur Phase 5 Improvements – Construction Change 'A':

- *Revisions to the storm drain layout for the system along Paseo Del Sur, north of Del Sur Ridge Road*
- *Horizontal and vertical revisions to water, sewer and storm drain due to the lowering of streets listed above.*
- *Providing driveways, curb ramps and utility services to the Shea Commercial Site*

Therefore, the following has been updated within this report to support the changes pursuant to the project:

- Updated rational method for the ultimate condition within Drainage Basin 700
- Updated rational method for the ultimate condition within Drainage Basin 900A
- Updated rational method for the ultimate condition within Drainage Basin 900
- Updated pipe flow analysis for the systems within Drainage Basin 700 (only including the pipe flow analysis for Garretson St.)
- Updated pipe flow analysis for the systems within Drainage Basin 900A
- Updated pipe flow analysis for the system within Drainage Basin 900 (only including the pipe flow analysis for Templeton St.)
- Sizing of curb inlets along Paseo Del Sur & Templeton St

- Ultimate sizing and final design of the underground detention vault and outlet structure for Detention Basin 9A

Refer to Appendix A for the revised Rational Method output files. Refer to Appendix B for the revised AES Pipe Flow output files. Refer to Appendix H for revised curb inlet calculations. Refer to Appendix L for revised Detention Basin calculations.

The revised Drainage Study Exhibits for Drainage Basin 700 and Drainage Basin 900 are located within Map Pocket 5 and 6, respectively.

2.0 HYDROLOGY

Based on the original report, the Town Center is divided between two (2) main drainage basins: Basin 700 and Basin 900 (drainage basin 900 is further sub-divided into Basin 900A and Basin 900). The storm drain within Basin 700 was designed to collect runoff from the lots and streets throughout the watershed and convey it to an existing 60-inch RCP that runs below Camino Del Sur and outlets to the north of that road. Basin 900 was primarily connected by two storm drain systems; one of these systems discharges runoff to the north of Camino Del Sur, just west of Four Gee Road (Basin 900A); and the other system discharges to an existing outfall approximately 450 feet east of Four Gee Road (Basin 900).

The AES Modified Rational Method models were revised to incorporate the revisions to the hydrology, per the changes listed above. For Drainage Basin 700, these changes include more detailed analysis of the revisions to street grades along Templeton Street, Garretson Street, and Del Sur Ridge Road, as well as revised slope grading of the pads adjacent to these roads, and sheet grading of the pads north of Del Sur Ridge Road and east of Garretson Street (including the removal of Templeton Street east of Garretson Street). For Drainage Basin 900A, these changes include the revisions to the street grades of Del Sur Ridge Road, Templeton Street, and Paseo Del Sur, as well as the sheet grading of the pads north of Del Sur Ridge Road, west of Paseo Del Sur, and east of Garretson Street, including the removal of Templeton Street west of Paseo Del Sur. Additionally, Construction Change 'F' includes the design of the underground detention basin 9A (DB 9A) within the lot west of Paseo Del Sur and north of Del Sur Ridge Road.

As stated above, the block north of Del Sur Ridge Road, west of Paseo Del Sur, and east of Garretson Street have revised sheet grading as part of the Construction Change 'F' project, which includes the location of proposed DB 9A. To design the size and layout for DB 9A, the ultimate condition for these lots was utilized. As shown on the Basin 900 Drainage Exhibit, the drainage boundaries in the vicinity of these lots do not follow the Construction Change 'F' grading. Rather, the boundaries correspond to the precise grading, which was completed by

Kimley Horn Engineering. A note has been placed on the exhibit to further clarify this condition.

The updated AES Modified Rational Method computer output for the project is provided in Appendix A of this report. For information regarding hydrologic criteria and methodology, refer to section 2.0, Hydrology, of the original Drainage Study.

3.0 HYDRAULICS

The changes to the hydraulic systems stemming from the Construction Change 'A', 'B' and Construction Change 'F' projects consist of the final design for storm drain, curb inlets, and detention basins throughout drainage basins 700 and 900A.

As stated in the introduction, the BMRNV East Town Center Improvements – Construction Change 'B' project designs the storm drain for portions of Del Sur Ridge Road, Garretson Street, and Templeton Street, and the BMRNV Paseo Del Sur Phase 5 Improvements – Construction Change 'A' project designs the storm drain along Paseo Del Sur. At this time, the horizontal & vertical alignment for the storm drain along these roads has been established, and is shown on the drainage exhibits located within Map Pockets 5 and 6. The pipe flows for these systems have been revised, and are included in appendix G.

As part of the Unit 14 – Construction Change 'F' project, changes to the hydraulics within Drainage Basins 700 and 900A stem from the revisions to the East Town Center grading revisions and the inclusion of underground DB 9A, respectively.

The redesign of Detention Basin 9A as an underground detention basin has revised the layout of the on-site storm drain for the lots west of Paseo Del Sur and north of Del Sur Ridge Road, within Drainage Basin 900A. The storm drain along Paseo Del Sur turns into the lot at Drainage Node 914.2, and discharges into DB 9A at Drainage Node 916. This storm drain consists of 30" RCP. DB 9A discharges at Drainage Node 919, and continues towards Camino Del Sur, where it ties into the mainline system along that road at the existing curb inlet at Drainage Node 990. The storm drain downstream of DB 9A is 36-inch RCP. AES Pipe Flow analyses for the storm drain from Paseo Del Sur to DB 9A, and from DB 9A to Camino Del Sur have been run, and are included within this report, and reflected on the Construction Change 'F' Grading Plans.

One additional Type-B curb inlet along Paseo Del Sur is proposed with this project. The inlet is located at Drainage Node 914, and has been sized and designed to collect 100% of surface runoff to it, as well as to ensure that a proper 'Dry Lane' is maintained (per the original report, this 'Dry Lane' must be a minimum of 9-feet in combined roadway width, though 12-feet is preferred).

The AES Pipe Flow computer output for the project is provided in Appendix G of this report. For inlet sizing refer to Appendix H of this report. For information regarding the methodology and criteria for hydraulic design, refer to section 3.0, Hydraulics, of the original drainage study.

4.0 DETENTION BASIN

As detailed within the original report (and subsequent addendums), detention requirements for the BMR North Village East Unit 14 Town Center area consists of detention for the 2-year, 10-year, and 25-year post-project peak flow rates. These detention requirements are met through six (6) regional detention basins, which are located along the southern edge of Camino Del Sur. As stated earlier, this project is redesigning Detention Basin 9A (DB 9A) as an underground detention vault, in conjunction with an underground filtration unit for treatment.

DB 9A was originally designed as part of the Addendum 3 report, and consisted of an above ground detention basin, with a bioretention swale along the bottom as a Treatment Control Best Management Practice (TC-BMP). Following the development of the site plan for the lots west of Paseo Del Sur, it was determined that DB 9A would be redesigned as an underground vault; therefore, as part of this project, DB 9A has been redesigned using StormTrap modular management systems.

Located within the pad immediately west of Paseo Del Sur, the StormTrap detention basin continues to provide 2-, 10-, and 25-year detention for all of Drainage Basin 900A, south of Camino Del Sur. The concrete modular system has a footprint of approximately 6500 square feet, with an interior height of 5’ 8”, for a total provided volume of approximately 0.767 acre-feet. The outlet structure for the unit consists of a galvanized steel plate with openings engineered to meet the detention discharge rates at various stages of ponding within the vault. In addition to detention, the vault, and its outlet structure, has been sized to convey the un-detained, 100-year peak flow rate downstream.

It should be noted that the original, above ground basin was able to collect and detain the entire runoff from Drainage Basin 900A, south of Camino Del Sur, within its basin; however, due to vertical constraints stemming from the existing storm drain flow lines along Camino Del Sur, and the location of the underground structure, a portion of the site bypasses the vault in the

proposed condition. The runoff along Paseo Del Sur, north of Templeton Street, and a portion of the perimeter area of the pad is unable to be collected and conveyed towards the detention vault. To account for this bypass, DB 9A has been designed to over-detain the runoff tributary to the vault, to ensure that the total runoff leaving Drainage Basin 9A has met the detention requirements for the site.

Though covered within the companion Water Quality Technical Report for this project, it is worth noting that a Jellyfish Filtration unit will be provided downstream of DB 9A to provide treatment of the runoff conveyed towards DB 9A. For the runoff within the downstream portion of Paseo Del Sur that bypasses the basin, Clearwater Filtration units will be provided within the curb inlet at Drainage Nodes 956.2 and 955 to provide treatment.

The calculations and backup for the sizing of Detention Basin 9A, as well as the detailed outlet works, have been provided within Appendix L of this report. For information regarding the criteria and methodology of designing the Detention Basin, refer to section 4.0, Detention Basins, from the original drainage study.

6.0 CONCLUSION

This drainage study has been prepared to address changes to the northerly draining areas of Black Mountain Ranch North Village Unit 14, pursuant to the following projects:

- Black Mountain Ranch North Village East Unit 14 Grading Plans - Construction Change 'F'
- Black Mountain Ranch North Village East Town Center Improvement Plans – Construction Change 'B'
- Black Mountain Ranch North Village Paseo Del Sur Phase 5 Improvement Plans – Construction Change 'A'

This report is the sixth addendum to the report titled "Drainage Study for Camino Del Sur South Half Phase II, (In Support of BMR NVE Unit 14 Grading Plans – Construction Change 'A' – Northerly Draining Areas)," last revised on July 11, 2013.

The changes incorporated within the aforementioned projects consist of:

<u>BMRNV Unit 14 – Construction Change 'F':</u>

- Replace Detention Basin 9A (above ground detention basin and bioretention swale) within Drainage Basin 900A, with an underground detention vault and an underground Jellyfish Filtration treatment unit.
- Sheet grading of the lots north of Del Sur Ridge Road, west of Paseo Del Sur, and east of Garretson Street within the commercial district of the Town Center, including the removal of the portion of Templeton Street between Garretson Street and Paseo Del Sur.
- Lower the street grades along portions of Del Sur Ridge Road, Garretson Street, Templeton Street, and Paseo Del Sur.

BMRNV East Town Center Improvements – Construction Change 'B':

- Revisions to the storm drain layout for a portion of the system along Del Sur Ridge Road, Templeton Street, and Garretson Street.
- Horizontal and vertical revisions to water, sewer and storm drain due to the lowering of streets listed above.
- Providing driveways, curb ramps and utility services to the Shea Commercial Site.

BMRNV Paseo Del Sur Phase 5 Improvements – Construction Change 'A':

- Revisions to the storm drain layout for the system along Paseo Del Sur, north of Del Sur Ridge Road.
- Horizontal and vertical revisions to water, sewer and storm drain due to the lowering of streets listed above.
- Providing driveways, curb ramps and utility services to the Shea Commercial Site.

Therefore, the following has been updated within this report to support the changes pursuant to the project:

- Updated rational method for the ultimate condition within Drainage Basin 700
- Updated rational method for the ultimate condition within Drainage Basin 900A
- Updated rational method for the ultimate condition within Drainage Basin 900
- Updated pipe flow analysis for the systems within Drainage Basin 700 (only including the pipe flow analysis for Garretson St.)
- Updated pipe flow analysis for the systems within Drainage Basin 900A
- Updated pipe flow analysis for the system within Drainage Basin 900 (only including the pipe flow analysis for Templeton St.)
- Sizing of curb inlets along Paseo Del Sur & Templeton St
- Ultimate sizing and final design of the underground detention vault and outlet structure for Detention Basin 9A

Refer to Appendix A for the revised Rational Method output files. Refer to Appendix B for the revised AES Pipe Flow output files. Refer to Appendix H for revised curb inlet calculations. Refer to Appendix L for revised Detention Basin calculations.

The revised Drainage Study Exhibits for Drainage Basin 700 and Drainage Basin 900 are located within Map Pocket 5 and 6, respectively.

Appendix A

AES Modified Rational Method Analyses

Basin 700

(For Reference Only – from approved C.C.E Drainage Study, used for Q_{100} on revised Pipeflows in this study)

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

              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                           2003,1985,1981 HYDROLOGY MANUAL
                (c) Copyright 1982-2003 Advanced Engineering Software (aes)
                    Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                                Analysis prepared by:

                                RICK ENGINEERING COMPANY
                                    5620 Friars Road
                                San Diego, California 92110
                               619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* BMR NVE Unit 14 - Construction Change 'E'                                  *
* Basin 700 Ultimate Condition                                               *
* 100 Year Event                                                             *
 ****************************************************************************

  FILE NAME: BMR7HP00.DAT
  TIME/DATE OF STUDY: 15:32 04/30/2013
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*******************************************************************************
  FLOW PROCESS FROM NODE     714.00 TO NODE     715.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
  UPSTREAM ELEVATION(FEET) =  546.70
  DOWNSTREAM ELEVATION(FEET) =  541.80
  ELEVATION DIFFERENCE(FEET) =  4.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  6.889
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.041
  SUBAREA RUNOFF(CFS) =  0.55
  TOTAL AREA(ACRES) =  0.30  TOTAL RUNOFF(CFS) =  0.55
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    715.00 TO NODE    708.50 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    541.80  DOWNSTREAM(FEET) =    539.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE =  0.0333
 CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.916
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.72
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.52
 AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.66
 Tc(MIN.) =   7.54
 SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.35
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       0.90

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.57
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    708.50 =   160.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    708.50 TO NODE    709.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   533.85  DOWNSTREAM(FEET) =   531.45
 FLOW LENGTH(FEET) =   120.09   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.67
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.90
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   7.97
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    709.00 =   280.09 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    709.00 TO NODE    709.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.835
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.35
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =    1.24
 TC(MIN.) =   7.97

**************************************************************************
 FLOW PROCESS FROM NODE    709.00 TO NODE    709.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.835
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7700
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.36
 TOTAL AREA(ACRES) =      1.50   TOTAL RUNOFF(CFS) =    3.61
 TC(MIN.) =   7.97

**************************************************************************
 FLOW PROCESS FROM NODE    709.00 TO NODE    710.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   530.95  DOWNSTREAM(FEET) =   527.61
 FLOW LENGTH(FEET) =   501.67   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.61
```

```
 PIPE TRAVEL TIME(MIN.) =   1.87    Tc(MIN.) =   9.84
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    710.00 =   781.76 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    710.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.480
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     1.10   SUBAREA RUNOFF(CFS) =    1.91
 TOTAL AREA(ACRES) =       2.60   TOTAL RUNOFF(CFS) =    5.52
 TC(MIN.) =   9.84

****************************************************************************
 FLOW PROCESS FROM NODE    710.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.480
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7700
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.90   SUBAREA RUNOFF(CFS) =    2.41
 TOTAL AREA(ACRES) =       3.50   TOTAL RUNOFF(CFS) =    7.93
 TC(MIN.) =   9.84

****************************************************************************
 FLOW PROCESS FROM NODE    710.00 TO NODE    706.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   527.28  DOWNSTREAM(FEET) =   526.56
 FLOW LENGTH(FEET) =   142.76   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.93
 PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =  10.33
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    706.00 =   924.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    706.00 TO NODE    706.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.33
 RAINFALL INTENSITY(INCH/HR) =   3.41
 TOTAL STREAM AREA(ACRES) =     3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.93

****************************************************************************
 FLOW PROCESS FROM NODE    705.10 TO NODE    705.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    543.40
 DOWNSTREAM ELEVATION(FEET) =    536.90
 ELEVATION DIFFERENCE(FEET) =      6.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.658
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.19
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
 FLOW PROCESS FROM NODE    705.20 TO NODE    705.20 IS CODE =  81
```

```
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7700
S.C.S. CURVE NUMBER (AMC II) =  0
SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.62
TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =    1.81
TC(MIN.) =   6.00

********************************************************************************
FLOW PROCESS FROM NODE    705.20 TO NODE    705.40 IS CODE =  41
--------------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   531.11  DOWNSTREAM(FEET) =   529.78
FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.45
GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      1.81
PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   6.48
LONGEST FLOWPATH FROM NODE    705.10 TO NODE    705.40 =   198.00 FEET.

********************************************************************************
FLOW PROCESS FROM NODE    705.40 TO NODE    705.40 IS CODE =  81
--------------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.119
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) =  0
SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.37
TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =    2.18
TC(MIN.) =   6.48

********************************************************************************
FLOW PROCESS FROM NODE    705.40 TO NODE    705.40 IS CODE =  81
--------------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.119
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7700
S.C.S. CURVE NUMBER (AMC II) =  0
SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.59
TOTAL AREA(ACRES) =      1.30   TOTAL RUNOFF(CFS) =    3.77
TC(MIN.) =   6.48

********************************************************************************
FLOW PROCESS FROM NODE    705.40 TO NODE    705.70 IS CODE =  41
--------------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   529.61  DOWNSTREAM(FEET) =   528.57
FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.87
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      3.77
PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   6.92
LONGEST FLOWPATH FROM NODE    705.10 TO NODE    705.70 =   326.00 FEET.

********************************************************************************
FLOW PROCESS FROM NODE    705.70 TO NODE    705.70 IS CODE =  81
--------------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.036
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) =  0
SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.54
TOTAL AREA(ACRES) =      1.60   TOTAL RUNOFF(CFS) =    4.31
```

```
 TC(MIN.) =   6.92
****************************************************************************
 FLOW PROCESS FROM NODE    705.70 TO NODE    705.70 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.036
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7700
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.55
 TOTAL AREA(ACRES) =      2.10   TOTAL RUNOFF(CFS) =    5.87
 TC(MIN.) =   6.92
****************************************************************************
 FLOW PROCESS FROM NODE    705.70 TO NODE    706.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   528.40  DOWNSTREAM(FEET) =   526.56
 FLOW LENGTH(FEET) =    72.46   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.32
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.87
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   7.06
 LONGEST FLOWPATH FROM NODE    705.10 TO NODE    706.00 =   398.46 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    706.00 TO NODE    706.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.008
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    0.90
 TOTAL AREA(ACRES) =      2.60   TOTAL RUNOFF(CFS) =    6.77
 TC(MIN.) =   7.06
****************************************************************************
 FLOW PROCESS FROM NODE    706.00 TO NODE    706.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.06
 RAINFALL INTENSITY(INCH/HR) =   4.01
 TOTAL STREAM AREA(ACRES) =     2.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.77

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
    1          7.93     10.33         3.414         3.50
    2          6.77      7.06         4.008         2.60

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1         13.52      7.06         4.008
    2         13.70     10.33         3.414

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     13.70   Tc(MIN.) =   10.33
 TOTAL AREA(ACRES) =      6.10
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    706.00 =   924.52 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    706.00 TO NODE    713.00 IS CODE =  41
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
ELEVATION DATA: UPSTREAM(FEET) =   526.23  DOWNSTREAM(FEET) =   525.63
FLOW LENGTH(FEET) =   120.86   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     13.70
PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =  10.70
LONGEST FLOWPATH FROM NODE    714.00 TO NODE    713.00 =  1045.38 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    713.00 TO NODE    713.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  10.70
RAINFALL INTENSITY(INCH/HR) =   3.37
TOTAL STREAM AREA(ACRES) =     6.10
PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.70

****************************************************************************
FLOW PROCESS FROM NODE    716.00 TO NODE    717.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.00
UPSTREAM ELEVATION(FEET) =    547.00
DOWNSTREAM ELEVATION(FEET) =    545.80
ELEVATION DIFFERENCE(FEET) =      1.20
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.017
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
SUBAREA RUNOFF(CFS) =      0.38
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
FLOW PROCESS FROM NODE    717.00 TO NODE    713.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  545.80  DOWNSTREAM ELEVATION(FEET) =  536.20
STREET LENGTH(FEET) =   556.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.77
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.29
  HALFSTREET FLOOD WIDTH(FEET) =    8.22
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.23
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
STREET FLOW TRAVEL TIME(MIN.) =   4.15   Tc(MIN.) =  10.15
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.434
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.78
TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =      3.16

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.61
```

```
 FLOW VELOCITY(FEET/SEC.) =  2.54   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
 LONGEST FLOWPATH FROM NODE    716.00 TO NODE    713.00 =   643.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    713.00 TO NODE    713.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.15
 RAINFALL INTENSITY(INCH/HR) =   3.43
 TOTAL STREAM AREA(ACRES) =     1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.16

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        13.70    10.70        3.373          6.10
    2         3.16    10.15        3.434          1.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1        16.62    10.15        3.434
    2        16.80    10.70        3.373

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     16.80   Tc(MIN.) =   10.70
 TOTAL AREA(ACRES) =      7.10
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    713.00 =  1045.38 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    713.00 TO NODE    719.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   525.30  DOWNSTREAM(FEET) =   524.82
 FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.56
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     16.80
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  10.80
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    719.00 =  1093.38 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    719.00 TO NODE    719.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.80
 RAINFALL INTENSITY(INCH/HR) =   3.36
 TOTAL STREAM AREA(ACRES) =     7.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.80

****************************************************************************
 FLOW PROCESS FROM NODE    718.10 TO NODE    718.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    542.97
 DOWNSTREAM ELEVATION(FEET) =    540.91
 ELEVATION DIFFERENCE(FEET) =      2.06
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.829
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
```

```
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    718.20 TO NODE    718.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  540.91  DOWNSTREAM ELEVATION(FEET) =  534.45
 STREET LENGTH(FEET) =   313.50   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.22
   HALFSTREET FLOOD WIDTH(FEET) =    4.86
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.01
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.45
 STREET FLOW TRAVEL TIME(MIN.) =   2.60   Tc(MIN.) =   8.60
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.717
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.67
 TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.05

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.09
 FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
 LONGEST FLOWPATH FROM NODE    718.10 TO NODE    718.00 =   413.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    718.00 TO NODE    719.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   529.55  DOWNSTREAM(FEET) =   525.49
 FLOW LENGTH(FEET) =    25.40   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.71
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.05
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   8.64
 LONGEST FLOWPATH FROM NODE    718.10 TO NODE    719.00 =   438.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    719.00 TO NODE    719.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.64
 RAINFALL INTENSITY(INCH/HR) =   3.71
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.05

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
    1         16.80     10.80        3.362         7.10
    2          1.05      8.64        3.708         0.30

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

```
** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc        INTENSITY
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1        16.28      8.64        3.708
    2        17.75     10.80        3.362

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     17.75   Tc(MIN.) =   10.80
TOTAL AREA(ACRES) =      7.40
LONGEST FLOWPATH FROM NODE    714.00 TO NODE    719.00 =  1093.38 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    719.00 TO NODE    720.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   524.49  DOWNSTREAM(FEET) =   523.89
FLOW LENGTH(FEET) =    56.69   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     17.75
PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  10.92
LONGEST FLOWPATH FROM NODE    714.00 TO NODE    720.00 =  1150.07 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    720.00 TO NODE    720.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  10.92
RAINFALL INTENSITY(INCH/HR) =   3.35
TOTAL STREAM AREA(ACRES) =     7.40
PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.75

****************************************************************************
FLOW PROCESS FROM NODE    721.00 TO NODE    722.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.00
UPSTREAM ELEVATION(FEET) =    544.00
DOWNSTREAM ELEVATION(FEET) =    542.80
ELEVATION DIFFERENCE(FEET) =      1.20
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.274
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
SUBAREA RUNOFF(CFS) =      0.38
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
FLOW PROCESS FROM NODE    722.00 TO NODE    723.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  542.80  DOWNSTREAM ELEVATION(FEET) =  535.60
STREET LENGTH(FEET) =   326.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.23
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.26
```

```
   HALFSTREET FLOOD WIDTH(FEET) =    6.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.27
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.58
 STREET FLOW TRAVEL TIME(MIN.) =   2.40   Tc(MIN.) =   8.40
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.755
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    1.69
 TOTAL AREA(ACRES) =      0.60       PEAK FLOW RATE(CFS) =       2.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.38
 FLOW VELOCITY(FEET/SEC.) =  2.52   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
 LONGEST FLOWPATH FROM NODE    721.00 TO NODE    723.00 =   422.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    723.00 TO NODE    720.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   527.28  DOWNSTREAM(FEET) =   524.56
 FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.71
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.07
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   8.45
 LONGEST FLOWPATH FROM NODE    721.00 TO NODE    720.00 =   452.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    720.00 TO NODE    720.00 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.) =   8.45
 RAINFALL INTENSITY(INCH/HR) =   3.74
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.07

****************************************************************************
 FLOW PROCESS FROM NODE    719.10 TO NODE    719.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    537.32
 DOWNSTREAM ELEVATION(FEET) =    537.00
 ELEVATION DIFFERENCE(FEET) =      0.32
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.263
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    719.20 TO NODE    720.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   524.67  DOWNSTREAM(FEET) =   524.56
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.69
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.38
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   6.01
 LONGEST FLOWPATH FROM NODE    719.10 TO NODE    720.00 =   102.25 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE     720.00 TO NODE     720.00 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.) =   6.01
 RAINFALL INTENSITY(INCH/HR) =   4.21
 TOTAL STREAM AREA(ACRES) =      0.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.38

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1         17.75     10.92        3.348        7.40
    2          2.07      8.45        3.745        0.60
    3          0.38      6.01        4.208        0.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)
    1         16.34      6.01        4.208
    2         18.28      8.45        3.745
    3         19.90     10.92        3.348

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     19.90   Tc(MIN.) =   10.92
 TOTAL AREA(ACRES) =      8.10
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    720.00 =  1150.07 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE     720.00 TO NODE     720.50 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.56  DOWNSTREAM(FEET) =   521.65
 FLOW LENGTH(FEET) =   382.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  18.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     19.90
 PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =  11.96
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    720.50 =  1532.37 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE     720.50 TO NODE     720.50 IS CODE =  10
--------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE     725.00 TO NODE     726.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
 UPSTREAM ELEVATION(FEET) =    550.00
 DOWNSTREAM ELEVATION(FEET) =    548.20
 ELEVATION DIFFERENCE(FEET) =      1.80
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.711
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

**************************************************************************
 FLOW PROCESS FROM NODE     726.00 TO NODE     727.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   548.20  DOWNSTREAM(FEET) =   540.50
 FLOW LENGTH(FEET) =   362.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.76
 PIPE TRAVEL TIME(MIN.) =   1.45    Tc(MIN.) =   7.45
 LONGEST FLOWPATH FROM NODE    725.00 TO NODE    727.00 =   452.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    727.00 TO NODE    727.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.935
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    2.90   SUBAREA RUNOFF(CFS) =   10.27
 TOTAL AREA(ACRES) =      3.10   TOTAL RUNOFF(CFS) =   11.03
 TC(MIN.) =   7.45

****************************************************************************
 FLOW PROCESS FROM NODE    727.00 TO NODE    727.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   531.27  DOWNSTREAM(FEET) =   524.27
 FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.05
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.03
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   7.47
 LONGEST FLOWPATH FROM NODE    725.00 TO NODE    727.30 =   480.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    727.30 TO NODE    727.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.47
 RAINFALL INTENSITY(INCH/HR) =   3.93
 TOTAL STREAM AREA(ACRES) =      3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.03

****************************************************************************
 FLOW PROCESS FROM NODE    727.10 TO NODE    727.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    549.70
 DOWNSTREAM ELEVATION(FEET) =    547.70
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    727.20 TO NODE    727.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  547.70  DOWNSTREAM ELEVATION(FEET) =  532.61
 STREET LENGTH(FEET) =   395.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.40
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.90
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
 STREET FLOW TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =   8.27
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.779
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.60      SUBAREA RUNOFF(CFS) =    2.04
 TOTAL AREA(ACRES) =      0.70       PEAK FLOW RATE(CFS) =       2.42

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.92
 FLOW VELOCITY(FEET/SEC.) =  3.25   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
 LONGEST FLOWPATH FROM NODE    727.10 TO NODE    727.30 =   495.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    727.30 TO NODE    727.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.27
 RAINFALL INTENSITY(INCH/HR) =   3.78
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.42

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1        11.03      7.47        3.931          3.10
    2         2.42      8.27        3.779          0.70

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1        13.35      7.47        3.931
    2        13.02      8.27        3.779

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     13.35   Tc(MIN.) =    7.47
 TOTAL AREA(ACRES) =      3.80
 LONGEST FLOWPATH FROM NODE    727.10 TO NODE    727.30 =   495.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    727.30 TO NODE    720.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.94  DOWNSTREAM(FEET) =   521.82
 FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.80
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     13.35
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.50
 LONGEST FLOWPATH FROM NODE    727.10 TO NODE    720.50 =   525.25 FEET.

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

```
 FLOW PROCESS FROM NODE    720.50 TO NODE    720.50 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        13.35      7.50        3.925         3.80
 LONGEST FLOWPATH FROM NODE    727.10 TO NODE    720.50 =   525.25 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        19.90     11.96        3.234         8.10
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    720.50 =  1532.37 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1       29.75       7.50        3.925
    2       30.90      11.96        3.234

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     30.90   Tc(MIN.) =   11.96
 TOTAL AREA(ACRES) =     11.90

****************************************************************************
 FLOW PROCESS FROM NODE    720.50 TO NODE    720.50 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    720.50 TO NODE    720.50 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.) =  11.96
 RAINFALL INTENSITY(INCH/HR) =   3.23
 TOTAL STREAM AREA(ACRES) =    11.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     30.90

****************************************************************************
 FLOW PROCESS FROM NODE    727.40 TO NODE    727.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   276.72
 UPSTREAM ELEVATION(FEET) =    537.25
 DOWNSTREAM ELEVATION(FEET) =    532.61
 ELEVATION DIFFERENCE(FEET) =      4.64
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.041
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE    727.50 TO NODE    720.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.37  DOWNSTREAM(FEET) =   522.32
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.76
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   6.01
 LONGEST FLOWPATH FROM NODE    727.40 TO NODE    720.50 =   278.97 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     720.50 TO NODE     720.50 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.) =   6.01
 RAINFALL INTENSITY(INCH/HR) =   4.21
 TOTAL STREAM AREA(ACRES) =      0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.76

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         30.90    11.96        3.234        11.90
    2          0.76     6.01        4.208         0.20

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         24.51     6.01        4.208
    2         31.49    11.96        3.234

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     31.49   Tc(MIN.) =   11.96
 TOTAL AREA(ACRES) =     12.10
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE     720.50 =  1532.37 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     720.50 TO NODE     724.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   521.32  DOWNSTREAM(FEET) =   520.86
 FLOW LENGTH(FEET) =    91.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  22.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.87
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     31.49
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =  12.19
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE     724.00 =  1624.27 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     724.00 TO NODE     730.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   520.53  DOWNSTREAM(FEET) =   501.40
 FLOW LENGTH(FEET) =   340.38   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.82
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     31.49
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =  12.53
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE     730.00 =  1964.65 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     730.00 TO NODE     730.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     750.70 TO NODE     750.80 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
```

```
 UPSTREAM ELEVATION(FEET) =    533.29
 DOWNSTREAM ELEVATION(FEET) =    531.29
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    750.80 TO NODE    750.60 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  531.29  DOWNSTREAM ELEVATION(FEET) =  511.68
 STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.20
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =    5.53
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.83
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
 STREET FLOW TRAVEL TIME(MIN.) =   2.94   Tc(MIN.) =   8.94
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.652
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    1.64
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       2.02

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.21
 FLOW VELOCITY(FEET/SEC.) =  3.17   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
 LONGEST FLOWPATH FROM NODE    750.70 TO NODE    750.60 =   600.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    750.60 TO NODE    750.60 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.94
 RAINFALL INTENSITY(INCH/HR) =   3.65
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.02

****************************************************************************
 FLOW PROCESS FROM NODE    750.40 TO NODE    750.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    542.96
 DOWNSTREAM ELEVATION(FEET) =    540.66
 ELEVATION DIFFERENCE(FEET) =      2.30
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.727
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

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

```
 FLOW PROCESS FROM NODE     750.50 TO NODE     750.60 IS CODE =  62
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
 UPSTREAM ELEVATION(FEET) =  540.66  DOWNSTREAM ELEVATION(FEET) =  511.68
 STREET LENGTH(FEET) =   745.21   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.46
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.95
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
 STREET FLOW TRAVEL TIME(MIN.) =   4.21   Tc(MIN.) =  10.21
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.427
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.70      SUBAREA RUNOFF(CFS) =    2.16
 TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFS) =       2.54

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.07
 FLOW VELOCITY(FEET/SEC.) =  3.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.95
 LONGEST FLOWPATH FROM NODE     750.40 TO NODE     750.60 =   845.21 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     750.60 TO NODE     750.60 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.21
 RAINFALL INTENSITY(INCH/HR) =   3.43
 TOTAL STREAM AREA(ACRES) =     0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.54

****************************************************************************
 FLOW PROCESS FROM NODE     724.10 TO NODE     724.20 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    539.40
 DOWNSTREAM ELEVATION(FEET) =    537.70
 ELEVATION DIFFERENCE(FEET) =      1.70
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.016
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE     724.20 TO NODE     724.40 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   537.70  DOWNSTREAM(FEET) =   524.50
 FLOW LENGTH(FEET) =   660.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.10
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
PIPE-FLOW(CFS) =      0.76
PIPE TRAVEL TIME(MIN.) =   2.69    Tc(MIN.) =   8.69
LONGEST FLOWPATH FROM NODE    724.10 TO NODE    724.40 =   760.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    724.40 TO NODE    724.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.700
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =    6.70   SUBAREA RUNOFF(CFS) =   22.31
TOTAL AREA(ACRES) =      6.90   TOTAL RUNOFF(CFS) =   23.07
TC(MIN.) =   8.69

****************************************************************************
FLOW PROCESS FROM NODE    724.40 TO NODE    750.60 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   514.02  DOWNSTREAM(FEET) =   504.42
FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS   6.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  26.78
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     23.07
PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.71
LONGEST FLOWPATH FROM NODE    724.10 TO NODE    750.60 =   798.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    750.60 TO NODE    750.60 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.) =   8.71
RAINFALL INTENSITY(INCH/HR) =   3.70
TOTAL STREAM AREA(ACRES) =      6.90
PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.07

** CONFLUENCE DATA **
STREAM      RUNOFF      Tc       INTENSITY      AREA
NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         2.02     8.94        3.652         0.60
    2         2.54    10.21        3.427         0.80
    3        23.07     8.71        3.695         6.90

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF      Tc       INTENSITY
NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1        27.42     8.71        3.695
    2        27.20     8.94        3.652
    3        25.83    10.21        3.427

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     27.42   Tc(MIN.) =    8.71
TOTAL AREA(ACRES) =      8.30
LONGEST FLOWPATH FROM NODE    750.40 TO NODE    750.60 =   845.21 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    750.60 TO NODE    750.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   504.18  DOWNSTREAM(FEET) =   503.88
FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS  18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.60
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     27.42
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   8.77
 LONGEST FLOWPATH FROM NODE    750.40 TO NODE    750.00 =   875.21 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    750.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.77
 RAINFALL INTENSITY(INCH/HR) =   3.68
 TOTAL STREAM AREA(ACRES) =     8.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.42

****************************************************************************
 FLOW PROCESS FROM NODE    750.10 TO NODE    750.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    547.10
 DOWNSTREAM ELEVATION(FEET) =    545.54
 ELEVATION DIFFERENCE(FEET) =      1.56
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.104
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    750.20 TO NODE    750.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  545.54  DOWNSTREAM ELEVATION(FEET) =  511.68
 STREET LENGTH(FEET) =  1000.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.86
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.21
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.91
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
 STREET FLOW TRAVEL TIME(MIN.) =   5.72   Tc(MIN.) =  11.72
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.261
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    2.93
 TOTAL AREA(ACRES) =      1.10        PEAK FLOW RATE(CFS) =       3.31

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.39
 FLOW VELOCITY(FEET/SEC.) =  3.31   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
 LONGEST FLOWPATH FROM NODE    750.10 TO NODE    750.30 =  1100.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    750.30 TO NODE    750.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   504.59  DOWNSTREAM(FEET) =   504.55
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.26
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.31
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  11.72
 LONGEST FLOWPATH FROM NODE    750.10 TO NODE    750.00 =  1102.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    750.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  11.72
 RAINFALL INTENSITY(INCH/HR) =   3.26
 TOTAL STREAM AREA(ACRES) =     1.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.31

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        27.42     8.77         3.684          8.30
    2         3.31    11.72         3.260          1.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1        30.35     8.77         3.684
    2        27.58    11.72         3.260

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     30.35   Tc(MIN.) =    8.77
 TOTAL AREA(ACRES) =      9.40
 LONGEST FLOWPATH FROM NODE    750.10 TO NODE    750.00 =  1102.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    730.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   503.55  DOWNSTREAM(FEET) =   501.90
 FLOW LENGTH(FEET) =   164.79   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     30.35
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   9.08
 LONGEST FLOWPATH FROM NODE    750.10 TO NODE    730.00 =  1267.04 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.00 TO NODE    730.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        30.35     9.08         3.625          9.40
 LONGEST FLOWPATH FROM NODE    750.10 TO NODE    730.00 =  1267.04 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        31.49    12.53         3.172         12.10
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    730.00 =  1964.65 FEET.

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

```
     1       57.91        9.08        3.625
     2       58.05       12.53        3.172

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     58.05   Tc(MIN.) =   12.53
  TOTAL AREA(ACRES) =     21.50

****************************************************************************
  FLOW PROCESS FROM NODE     730.00 TO NODE     730.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     730.00 TO NODE     730.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     751.10 TO NODE     751.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    533.29
  DOWNSTREAM ELEVATION(FEET) =    531.29
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE     751.20 TO NODE     751.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  531.29  DOWNSTREAM ELEVATION(FEET) =  510.17
  STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    5.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.69
  STREET FLOW TRAVEL TIME(MIN.) =   3.57   Tc(MIN.) =   9.57
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.531
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  SUBAREA AREA(ACRES) =    0.60     SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =      0.70       PEAK FLOW RATE(CFS) =       2.29

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.87
  FLOW VELOCITY(FEET/SEC.) =  3.10   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE    751.10 TO NODE    751.30 =   700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     751.30 TO NODE     751.30 IS CODE =   1
----------------------------------------------------------------------------
```

```
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.57
 RAINFALL INTENSITY(INCH/HR) =    3.53
 TOTAL STREAM AREA(ACRES) =      0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.29

****************************************************************************
 FLOW PROCESS FROM NODE     751.40 TO NODE     751.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.00
 DOWNSTREAM ELEVATION(FEET) =    532.50
 ELEVATION DIFFERENCE(FEET) =      3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.371
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =       0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE     751.50 TO NODE     751.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==============================================================================
 UPSTREAM ELEVATION(FEET) =  532.40  DOWNSTREAM ELEVATION(FEET) =  510.17
 STREET LENGTH(FEET) =   645.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    6.75
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.87
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
 STREET FLOW TRAVEL TIME(MIN.) =   3.75   Tc(MIN.) =   9.75
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.498
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =     2.52
 TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       2.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.78
 FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
 LONGEST FLOWPATH FROM NODE     751.40 TO NODE     751.30 =   745.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     751.30 TO NODE     751.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.75
 RAINFALL INTENSITY(INCH/HR) =    3.50
 TOTAL STREAM AREA(ACRES) =      0.90
```

PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.90

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	2.29	9.57	3.531	0.70
2	2.90	9.75	3.498	0.90

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	5.16	9.57	3.531
2	5.16	9.75	3.498

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 5.16 Tc(MIN.) = 9.75
TOTAL AREA(ACRES) = 1.60
LONGEST FLOWPATH FROM NODE 751.40 TO NODE 751.30 = 745.00 FEET.

****
FLOW PROCESS FROM NODE 751.30 TO NODE 751.30 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.75
RAINFALL INTENSITY(INCH/HR) = 3.50
TOTAL STREAM AREA(ACRES) = 1.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.16

****
FLOW PROCESS FROM NODE 724.70 TO NODE 724.80 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 537.15
DOWNSTREAM ELEVATION(FEET) = 535.00
ELEVATION DIFFERENCE(FEET) = 2.15
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.789
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.210
SUBAREA RUNOFF(CFS) = 0.76
TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.76

****
FLOW PROCESS FROM NODE 724.80 TO NODE 724.60 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 529.00
FLOW LENGTH(FEET) = 360.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 2.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.84
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.76
PIPE TRAVEL TIME(MIN.) = 1.56 Tc(MIN.) = 7.56
LONGEST FLOWPATH FROM NODE 724.70 TO NODE 724.60 = 460.00 FEET.

****
FLOW PROCESS FROM NODE 724.60 TO NODE 724.60 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.913
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
SUBAREA AREA(ACRES) = 3.80 SUBAREA RUNOFF(CFS) = 13.38
TOTAL AREA(ACRES) = 4.00 TOTAL RUNOFF(CFS) = 14.14

TC(MIN.) = 7.56

```
****************************************************************************
 FLOW PROCESS FROM NODE    724.60 TO NODE    751.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   515.45  DOWNSTREAM(FEET) =   503.82
 FLOW LENGTH(FEET) =    46.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.31
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.14
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.59
 LONGEST FLOWPATH FROM NODE    724.70 TO NODE    751.30 =   506.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    751.30 TO NODE    751.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.59
 RAINFALL INTENSITY(INCH/HR) =   3.91
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.14

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          5.16     9.75        3.498         1.60
    2         14.14     7.59        3.907         4.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         18.76     7.59        3.907
    2         17.82     9.75        3.498

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     18.76   Tc(MIN.) =    7.59
 TOTAL AREA(ACRES) =      5.60
 LONGEST FLOWPATH FROM NODE    751.40 TO NODE    751.30 =   745.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    751.30 TO NODE    730.90 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   503.32  DOWNSTREAM(FEET) =   502.72
 FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.15
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     18.76
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   7.64
 LONGEST FLOWPATH FROM NODE    751.40 TO NODE    730.90 =   775.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.90 TO NODE    730.90 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.64
 RAINFALL INTENSITY(INCH/HR) =   3.90
 TOTAL STREAM AREA(ACRES) =     5.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.76

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

```
 FLOW PROCESS FROM NODE     751.70 TO NODE     751.80 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
 UPSTREAM ELEVATION(FEET) =  515.81
 DOWNSTREAM ELEVATION(FEET) =  513.81
 ELEVATION DIFFERENCE(FEET) =  2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =  0.38
 TOTAL AREA(ACRES) =  0.10  TOTAL RUNOFF(CFS) =  0.38

****************************************************************************
 FLOW PROCESS FROM NODE     751.80 TO NODE     751.60 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  513.81  DOWNSTREAM ELEVATION(FEET) =  510.17
 STREET LENGTH(FEET) =  210.00  CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =  0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =  0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  0.90
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =  5.89
   AVERAGE FLOW VELOCITY(FEET/SEC.) =  1.94
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =  0.47
 STREET FLOW TRAVEL TIME(MIN.) =  1.80  Tc(MIN.) =  7.80
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.867
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =  0.30  SUBAREA RUNOFF(CFS) =  1.04
 TOTAL AREA(ACRES) =  0.40  PEAK FLOW RATE(CFS) =  1.42

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27  HALFSTREET FLOOD WIDTH(FEET) =  7.41
 FLOW VELOCITY(FEET/SEC.) =  2.13  DEPTH*VELOCITY(FT*FT/SEC.) =  0.59
 LONGEST FLOWPATH FROM NODE  751.70 TO NODE  751.60 =  310.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     751.60 TO NODE     730.90 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  503.26  DOWNSTREAM(FEET) =  503.22
 FLOW LENGTH(FEET) =  2.25  MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  4.92
 GIVEN PIPE DIAMETER(INCH) =  18.00  NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  1.42
 PIPE TRAVEL TIME(MIN.) =  0.01  Tc(MIN.) =  7.81
 LONGEST FLOWPATH FROM NODE  751.70 TO NODE  730.90 =  312.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     730.90 TO NODE     730.90 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
 TIME OF CONCENTRATION(MIN.) =   7.81
 RAINFALL INTENSITY(INCH/HR) =   3.87
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.42

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        18.76     7.64         3.898          5.60
     2         1.42     7.81         3.866          0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
     1        20.17     7.64         3.898
     2        20.03     7.81         3.866

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     20.17   Tc(MIN.) =    7.64
 TOTAL AREA(ACRES) =      6.00
 LONGEST FLOWPATH FROM NODE    751.40 TO NODE    730.90 =   775.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.90 TO NODE    730.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   502.22  DOWNSTREAM(FEET) =   500.56
 FLOW LENGTH(FEET) =   215.20   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.26
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     20.17
 PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   8.14
 LONGEST FLOWPATH FROM NODE    751.40 TO NODE    730.00 =   990.45 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.00 TO NODE    730.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        20.17     8.14         3.804          6.00
 LONGEST FLOWPATH FROM NODE    751.40 TO NODE    730.00 =   990.45 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        58.05    12.53         3.172         21.50
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    730.00 =  1964.65 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1       68.58        8.14         3.804
     2       74.87       12.53         3.172

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     74.87   Tc(MIN.) =   12.53
 TOTAL AREA(ACRES) =     27.50

****************************************************************************
 FLOW PROCESS FROM NODE    730.00 TO NODE    730.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    730.00 TO NODE    731.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   501.40  DOWNSTREAM(FEET) =   488.38
 FLOW LENGTH(FEET) =   298.21   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.32
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     74.87
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  12.78
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    731.00 =  2262.86 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    731.00 TO NODE    731.10 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   489.05  DOWNSTREAM(FEET) =   486.28
 FLOW LENGTH(FEET) =    13.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  34.18
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     74.87
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  12.79
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    731.10 =  2276.36 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    731.10 TO NODE    731.10 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.) =  12.79
 RAINFALL INTENSITY(INCH/HR) =   3.14
 TOTAL STREAM AREA(ACRES) =    27.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     74.87

****************************************************************************
 FLOW PROCESS FROM NODE    731.40 TO NODE    731.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    514.00
 DOWNSTREAM ELEVATION(FEET) =    503.00
 ELEVATION DIFFERENCE(FEET) =     11.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.619
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    731.50 TO NODE    755.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  503.00  DOWNSTREAM ELEVATION(FEET) =  495.86
 STREET LENGTH(FEET) =   235.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.73
```

```
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.21
  HALFSTREET FLOOD WIDTH(FEET) =    4.37
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.36
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
 STREET FLOW TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =   7.66
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.895
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =    0.70
 TOTAL AREA(ACRES) =       0.30        PEAK FLOW RATE(CFS) =       1.08

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.58
 FLOW VELOCITY(FEET/SEC.) =  2.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
 LONGEST FLOWPATH FROM NODE    731.40 TO NODE    755.00 =   335.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    755.00 TO NODE    731.10 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   488.18  DOWNSTREAM(FEET) =   487.78
 FLOW LENGTH(FEET) =    39.52   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.71
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.08
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   7.84
 LONGEST FLOWPATH FROM NODE    731.40 TO NODE    731.10 =   374.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    731.10 TO NODE    731.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.84
 RAINFALL INTENSITY(INCH/HR) =   3.86
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.08

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        74.87    12.79         3.143         27.50
     2         1.08     7.84         3.861          0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
     1        62.03     7.84         3.861
     2        75.75    12.79         3.143

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     75.75   Tc(MIN.) =   12.79
 TOTAL AREA(ACRES) =     27.80
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    731.10 =  2276.36 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    731.10 TO NODE    755.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   485.78  DOWNSTREAM(FEET) =   485.50
 FLOW LENGTH(FEET) =    27.75   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  28.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.07
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     75.75
```

```
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  12.83
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    755.20 =  2304.11 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    755.20 TO NODE    755.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    488.90  DOWNSTREAM(FEET) =    488.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =    24.00   CHANNEL SLOPE =  0.0042
 CHANNEL BASE(FEET) =   48.00   "Z" FACTOR =   2.500
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.50
 CHANNEL FLOW THRU SUBAREA(CFS) =     75.75
 FLOW VELOCITY(FEET/SEC.) =   2.34   FLOW DEPTH(FEET) =   0.65
 TRAVEL TIME(MIN.) =   0.17   Tc(MIN.) =  13.00
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    755.30 =  2328.11 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    755.30 TO NODE    755.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.00
 RAINFALL INTENSITY(INCH/HR) =   3.12
 TOTAL STREAM AREA(ACRES) =    27.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     75.75

****************************************************************************
 FLOW PROCESS FROM NODE    755.40 TO NODE    755.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    510.50
 DOWNSTREAM ELEVATION(FEET) =    508.50
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE    755.50 TO NODE    755.60 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.50  DOWNSTREAM(FEET) =   503.80
 FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   2.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.96
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.76
 PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   7.01
 LONGEST FLOWPATH FROM NODE    755.40 TO NODE    755.60 =   340.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    755.60 TO NODE    755.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.018
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     2.90   SUBAREA RUNOFF(CFS) =   10.49
 TOTAL AREA(ACRES) =      3.10   TOTAL RUNOFF(CFS) =   11.24
 TC(MIN.) =   7.01

****************************************************************************
 FLOW PROCESS FROM NODE    755.60 TO NODE    755.70 IS CODE =  41
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
ELEVATION DATA: UPSTREAM(FEET) =   486.50  DOWNSTREAM(FEET) =   486.30
FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.72
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     11.24
PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   7.11
LONGEST FLOWPATH FROM NODE    755.40 TO NODE    755.70 =   373.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    755.70 TO NODE    755.70 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.000
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    1.08
TOTAL AREA(ACRES) =      3.40   TOTAL RUNOFF(CFS) =   12.32
TC(MIN.) =   7.11

****************************************************************************
FLOW PROCESS FROM NODE    755.70 TO NODE    755.30 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    486.30  DOWNSTREAM(FEET) =    485.30
CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00   CHANNEL SLOPE =  0.0045
CHANNEL BASE(FEET) =   45.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.444
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) =   0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.79
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   2.95
Tc(MIN.) =  10.05
SUBAREA AREA(ACRES) =     0.60       SUBAREA RUNOFF(CFS) =    0.93
TOTAL AREA(ACRES) =      4.00        PEAK FLOW RATE(CFS) =     13.25

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   1.25
LONGEST FLOWPATH FROM NODE    755.40 TO NODE    755.30 =   593.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    755.30 TO NODE    755.30 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  10.05
RAINFALL INTENSITY(INCH/HR) =   3.44
TOTAL STREAM AREA(ACRES) =     4.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.25

** CONFLUENCE DATA **
STREAM      RUNOFF       Tc       INTENSITY       AREA
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
   1         75.75    13.00        3.120         27.80
   2         13.25    10.05        3.444          4.00

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc       INTENSITY
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
   1         81.87    10.05        3.444
   2         87.76    13.00        3.120
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    87.76   Tc(MIN.) =   13.00
 TOTAL AREA(ACRES) =     31.80
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    755.30 =  2328.11 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    755.30 TO NODE   7225.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   483.47  DOWNSTREAM(FEET) =   482.24
 FLOW LENGTH(FEET) =    53.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  19.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.65
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     87.76
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  13.06
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE   7225.00 =  2381.11 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7225.00 TO NODE   7225.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    725.10 TO NODE    725.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    548.38
 DOWNSTREAM ELEVATION(FEET) =    546.38
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    725.20 TO NODE    725.30 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  546.38  DOWNSTREAM ELEVATION(FEET) =  538.00
 STREET LENGTH(FEET) =   275.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  11.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.18
   HALFSTREET FLOOD WIDTH(FEET) =    2.73
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.33
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.42
 STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =   7.97
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.836
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =    1.04
 TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.41
```

```
 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.26
 FLOW VELOCITY(FEET/SEC.) =  2.36   DEPTH*VELOCITY(FT*FT/SEC.) =   0.50
 LONGEST FLOWPATH FROM NODE    725.10 TO NODE    725.30 =   375.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    725.30 TO NODE    725.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   531.04  DOWNSTREAM(FEET) =   530.53
 FLOW LENGTH(FEET) =    25.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.13
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.41
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   8.05
 LONGEST FLOWPATH FROM NODE    725.10 TO NODE    725.40 =   400.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    725.40 TO NODE    725.70 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   530.20  DOWNSTREAM(FEET) =   523.07
 FLOW LENGTH(FEET) =    76.11   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.82
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.41
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   8.20
 LONGEST FLOWPATH FROM NODE    725.10 TO NODE    725.70 =   476.36 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    725.70 TO NODE    725.70 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    735.10 TO NODE    735.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    551.73
 DOWNSTREAM ELEVATION(FEET) =    548.38
 ELEVATION DIFFERENCE(FEET) =      3.35
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.406
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    735.20 TO NODE    726.40 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  548.38  DOWNSTREAM ELEVATION(FEET) =  532.40
 STREET LENGTH(FEET) =   770.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
```

```
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.57
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    7.46
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.33
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
 STREET FLOW TRAVEL TIME(MIN.) =   5.52   Tc(MIN.) =  11.52
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.283
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =    2.36
 TOTAL AREA(ACRES) =       0.90        PEAK FLOW RATE(CFS) =       2.74

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.60
 FLOW VELOCITY(FEET/SEC.) =  2.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    726.40 =   870.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    726.40 TO NODE    726.40 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.) =  11.52
 RAINFALL INTENSITY(INCH/HR) =   3.28
 TOTAL STREAM AREA(ACRES) =     0.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.74

****************************************************************************
 FLOW PROCESS FROM NODE    726.10 TO NODE    726.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    550.12
 DOWNSTREAM ELEVATION(FEET) =    544.82
 ELEVATION DIFFERENCE(FEET) =      5.30
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.065
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    726.20 TO NODE    726.40 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  544.82  DOWNSTREAM ELEVATION(FEET) =  532.40
 STREET LENGTH(FEET) =   504.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.16
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.21
   HALFSTREET FLOOD WIDTH(FEET) =    3.99
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.09
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.43
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   4.02   Tc(MIN.) =  10.02
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.448
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     1.55
 TOTAL AREA(ACRES) =       0.60        PEAK FLOW RATE(CFS) =        1.93

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.53
 FLOW VELOCITY(FEET/SEC.) =  2.27   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
 LONGEST FLOWPATH FROM NODE    726.10 TO NODE    726.40 =   604.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    726.40 TO NODE    726.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.02
 RAINFALL INTENSITY(INCH/HR) =   3.45
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.93

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1          2.74     11.52         3.283          0.90
    2          1.93     10.02         3.448          0.60

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          4.54     10.02         3.448
    2          4.58     11.52         3.283

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      4.58   Tc(MIN.) =   11.52
 TOTAL AREA(ACRES) =      1.50
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    726.40 =   870.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    726.40 TO NODE    726.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   530.00  DOWNSTREAM(FEET) =   529.50
 FLOW LENGTH(FEET) =    27.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.91
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      4.58
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  11.58
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    726.50 =   897.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    726.50 TO NODE    726.50 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.) =  11.58
 RAINFALL INTENSITY(INCH/HR) =   3.28
 TOTAL STREAM AREA(ACRES) =     1.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.58

****************************************************************************
 FLOW PROCESS FROM NODE    726.70 TO NODE    726.80 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
 UPSTREAM ELEVATION(FEET) =  536.26
 DOWNSTREAM ELEVATION(FEET) =  534.26
 ELEVATION DIFFERENCE(FEET) =  2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =  0.38
 TOTAL AREA(ACRES) =  0.10  TOTAL RUNOFF(CFS) =  0.38

****************************************************************************
 FLOW PROCESS FROM NODE  726.80 TO NODE  726.60 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  532.40
 STREET LENGTH(FEET) =  260.00  CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =  0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =  0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  0.70
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =  6.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =  1.30
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =  0.33
 STREET FLOW TRAVEL TIME(MIN.) =  3.34  Tc(MIN.) =  9.34
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.576
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =  0.20  SUBAREA RUNOFF(CFS) =  0.64
 TOTAL AREA(ACRES) =  0.30  PEAK FLOW RATE(CFS) =  1.02

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28  HALFSTREET FLOOD WIDTH(FEET) =  7.82
 FLOW VELOCITY(FEET/SEC.) =  1.40  DEPTH*VELOCITY(FT*FT/SEC.) =  0.40
 LONGEST FLOWPATH FROM NODE  726.70 TO NODE  726.60 =  360.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  726.60 TO NODE  726.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  530.00  DOWNSTREAM(FEET) =  529.90
 FLOW LENGTH(FEET) =  5.25  MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  3.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  4.58
 GIVEN PIPE DIAMETER(INCH) =  18.00  NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  1.02
 PIPE TRAVEL TIME(MIN.) =  0.02  Tc(MIN.) =  9.36
 LONGEST FLOWPATH FROM NODE  726.70 TO NODE  726.50 =  365.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  726.50 TO NODE  726.50 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.) =  9.36
 RAINFALL INTENSITY(INCH/HR) =  3.57
 TOTAL STREAM AREA(ACRES) =  0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =  1.02
```

```
 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1          4.58     11.58         3.276          1.50
    2          1.02      9.36         3.572          0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          5.22      9.36         3.572
    2          5.52     11.58         3.276

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.52   Tc(MIN.) =   11.58
 TOTAL AREA(ACRES) =       1.80
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    726.50 =   897.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    726.50 TO NODE    725.80 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   529.40  DOWNSTREAM(FEET) =   528.70
 FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.34
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.52
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =  12.16
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    725.80 =  1047.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    725.90 TO NODE    725.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.213
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     2.70   SUBAREA RUNOFF(CFS) =     7.81
 TOTAL AREA(ACRES) =       4.50   TOTAL RUNOFF(CFS) =   13.33
 TC(MIN.) =  12.16

****************************************************************************
 FLOW PROCESS FROM NODE    725.80 TO NODE    725.70 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   528.70  DOWNSTREAM(FEET) =   524.33
 FLOW LENGTH(FEET) =   234.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.13
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.33
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =  12.59
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    725.70 =  1281.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    725.70 TO NODE    725.70 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1         13.33     12.59         3.166          4.50
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    725.70 =  1281.30 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
```

```
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        1.41     8.20        3.793         0.40
LONGEST FLOWPATH FROM NODE    725.10 TO NODE    725.70 =   476.36 FEET.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF       Tc       INTENSITY
NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1       12.54       8.20         3.793
    2       14.51      12.59         3.166

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     14.51   Tc(MIN.) =   12.59
TOTAL AREA(ACRES) =      4.90

****************************************************************************
FLOW PROCESS FROM NODE    725.70 TO NODE    725.70 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    725.70 TO NODE    725.70 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.) =  12.59
RAINFALL INTENSITY(INCH/HR) =   3.17
TOTAL STREAM AREA(ACRES) =     4.90
PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.51

****************************************************************************
FLOW PROCESS FROM NODE    735.30 TO NODE    735.40 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
UPSTREAM ELEVATION(FEET) =    549.60
DOWNSTREAM ELEVATION(FEET) =    547.00
ELEVATION DIFFERENCE(FEET) =      2.60
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.618
*CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
 DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
SUBAREA RUNOFF(CFS) =      0.76
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
FLOW PROCESS FROM NODE    735.40 TO NODE    726.30 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   547.00  DOWNSTREAM(FEET) =   541.20
FLOW LENGTH(FEET) =   322.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.95
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      0.76
PIPE TRAVEL TIME(MIN.) =   1.36    Tc(MIN.) =   7.36
LONGEST FLOWPATH FROM NODE    735.30 TO NODE    726.30 =   422.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    726.30 TO NODE    726.30 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.952
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =     1.40   SUBAREA RUNOFF(CFS) =    4.98
TOTAL AREA(ACRES) =      1.60   TOTAL RUNOFF(CFS) =    5.74
```

TC(MIN.) = 7.36

```
****************************************************************************
 FLOW PROCESS FROM NODE    726.30 TO NODE    735.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   533.33  DOWNSTREAM(FEET) =   527.33
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.16
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.74
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   7.44
 LONGEST FLOWPATH FROM NODE    735.30 TO NODE    735.50 =   482.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    735.50 TO NODE    725.70 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   527.33  DOWNSTREAM(FEET) =   524.33
 FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.80
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.74
 PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =   8.30
 LONGEST FLOWPATH FROM NODE    735.30 TO NODE    725.70 =   782.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    725.70 TO NODE    725.70 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.30
 RAINFALL INTENSITY(INCH/HR) =   3.77
 TOTAL STREAM AREA(ACRES) =     1.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.74

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1        14.51     12.59         3.166         4.90
     2         5.74      8.30         3.773         1.60

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        17.91      8.30         3.773
     2        19.32     12.59         3.166

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     19.32   Tc(MIN.) =   12.59
 TOTAL AREA(ACRES) =      6.50
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    725.70 =  1281.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    725.70 TO NODE    730.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   524.30  DOWNSTREAM(FEET) =   503.60
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.66
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     19.32
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  13.04
```

```
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    730.40 =  1681.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.40 TO NODE    730.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.04
 RAINFALL INTENSITY(INCH/HR) =   3.12
 TOTAL STREAM AREA(ACRES) =     6.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.32

****************************************************************************
 FLOW PROCESS FROM NODE    730.10 TO NODE    730.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    533.26
 ELEVATION DIFFERENCE(FEET) =      3.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    730.20 TO NODE    730.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  533.26  DOWNSTREAM ELEVATION(FEET) =  515.37
 STREET LENGTH(FEET) =   307.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.91
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.21
   HALFSTREET FLOOD WIDTH(FEET) =    4.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.22
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
 STREET FLOW TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =   7.59
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.908
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.30     SUBAREA RUNOFF(CFS) =    1.06
 TOTAL AREA(ACRES) =      0.40       PEAK FLOW RATE(CFS) =       1.43

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.43
 FLOW VELOCITY(FEET/SEC.) =  3.47   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
 LONGEST FLOWPATH FROM NODE    730.10 TO NODE    730.30 =   407.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.30 TO NODE    730.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   506.55  DOWNSTREAM(FEET) =   506.40
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.13
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.43
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   7.75
 LONGEST FLOWPATH FROM NODE    730.10 TO NODE    730.40 =   437.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.40 TO NODE    730.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.75
 RAINFALL INTENSITY(INCH/HR) =   3.88
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.43

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         19.32    13.04        3.116         6.50
    2          1.43     7.75        3.878         0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         16.96     7.75        3.878
    2         20.47    13.04        3.116

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     20.47   Tc(MIN.) =   13.04
 TOTAL AREA(ACRES) =      6.90
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    730.40 =  1681.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.40 TO NODE    730.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   503.60  DOWNSTREAM(FEET) =   501.50
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.14
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     20.47
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  13.14
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    730.50 =  1751.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    730.50 TO NODE    743.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   501.40  DOWNSTREAM(FEET) =   491.20
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.14
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     20.47
 PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =  13.60
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    743.00 =  2091.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    743.00 TO NODE    743.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    733.00 TO NODE    734.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
 UPSTREAM ELEVATION(FEET) =  515.37
 DOWNSTREAM ELEVATION(FEET) =  513.00
 ELEVATION DIFFERENCE(FEET) =  2.37
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.700
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =  0.38
 TOTAL AREA(ACRES) =  0.10  TOTAL RUNOFF(CFS) =  0.38

****************************************************************************
 FLOW PROCESS FROM NODE    734.00 TO NODE    735.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  513.00  DOWNSTREAM ELEVATION(FEET) =  500.03
 STREET LENGTH(FEET) =  314.78  CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =  0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =  0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  1.07
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =  5.08
   AVERAGE FLOW VELOCITY(FEET/SEC.) =  2.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =  0.65
 STREET FLOW TRAVEL TIME(MIN.) =  1.84  Tc(MIN.) =  7.84
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.861
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =  0.40  SUBAREA RUNOFF(CFS) =  1.39
 TOTAL AREA(ACRES) =  0.50  PEAK FLOW RATE(CFS) =  1.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26  HALFSTREET FLOOD WIDTH(FEET) =  6.70
 FLOW VELOCITY(FEET/SEC.) =  3.12  DEPTH*VELOCITY(FT*FT/SEC.) =  0.81
 LONGEST FLOWPATH FROM NODE  733.00 TO NODE  735.00 =  414.78 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    735.00 TO NODE    735.00 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  7.84
 RAINFALL INTENSITY(INCH/HR) =  3.86
 TOTAL STREAM AREA(ACRES) =  0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =  1.77

****************************************************************************
 FLOW PROCESS FROM NODE    737.00 TO NODE    738.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
 UPSTREAM ELEVATION(FEET) =  517.30
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 DOWNSTREAM ELEVATION(FEET) =     516.30
 ELEVATION DIFFERENCE(FEET) =       1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     3.600
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =       1.52
 TOTAL AREA(ACRES) =       0.40   TOTAL RUNOFF(CFS) =       1.52

****************************************************************************
 FLOW PROCESS FROM NODE     738.00 TO NODE     736.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   516.30  DOWNSTREAM(FEET) =   506.00
 FLOW LENGTH(FEET) =   675.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.58
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.52
 PIPE TRAVEL TIME(MIN.) =   2.46    Tc(MIN.) =   8.46
 LONGEST FLOWPATH FROM NODE     737.00 TO NODE     736.00 =   775.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     736.00 TO NODE     736.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.743
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     6.00   SUBAREA RUNOFF(CFS) =   20.21
 TOTAL AREA(ACRES) =       6.40   TOTAL RUNOFF(CFS) =   21.73
 TC(MIN.) =   8.46

****************************************************************************
 FLOW PROCESS FROM NODE     736.00 TO NODE     735.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   500.00  DOWNSTREAM(FEET) =   494.00
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.74
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.73
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.48
 LONGEST FLOWPATH FROM NODE     737.00 TO NODE     735.00 =   805.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     735.00 TO NODE     735.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.48
 RAINFALL INTENSITY(INCH/HR) =   3.74
 TOTAL STREAM AREA(ACRES) =      6.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.73

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1         1.77      7.84         3.861          0.50
     2        21.73      8.48         3.739          6.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        22.81      7.84         3.861
     2        23.44      8.48         3.739
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     23.44   Tc(MIN.) =    8.48
 TOTAL AREA(ACRES) =      6.90
 LONGEST FLOWPATH FROM NODE    737.00 TO NODE    735.00 =   805.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    735.00 TO NODE    743.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   494.00  DOWNSTREAM(FEET) =  492.63
 FLOW LENGTH(FEET) =    27.75   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.26
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     23.44
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   8.51
 LONGEST FLOWPATH FROM NODE    737.00 TO NODE    743.00 =   832.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    743.00 TO NODE    743.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        23.44      8.51        3.732         6.90
 LONGEST FLOWPATH FROM NODE    737.00 TO NODE    743.00 =   832.75 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        20.47     13.60        3.054         6.90
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    743.00 =  2091.30 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1        40.19       8.51        3.732
    2        39.65      13.60        3.054

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     40.19   Tc(MIN.) =    8.51
 TOTAL AREA(ACRES) =     13.80

****************************************************************************
 FLOW PROCESS FROM NODE    743.00 TO NODE    743.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    743.00 TO NODE    742.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.30  DOWNSTREAM(FEET) =   492.03
 FLOW LENGTH(FEET) =     5.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.34
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     40.19
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.52
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    742.00 =  2096.55 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    742.00 TO NODE    742.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
 TIME OF CONCENTRATION(MIN.) =    8.52
 RAINFALL INTENSITY(INCH/HR) =    3.73
 TOTAL STREAM AREA(ACRES) =    13.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      40.19

****************************************************************************
 FLOW PROCESS FROM NODE     740.00 TO NODE     741.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    512.78
 DOWNSTREAM ELEVATION(FEET) =    508.00
 ELEVATION DIFFERENCE(FEET) =      4.78
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.137
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE     741.00 TO NODE     742.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  508.00  DOWNSTREAM ELEVATION(FEET) =  500.03
 STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.74
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    2.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.33
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
 STREET FLOW TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =   6.77
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.064
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.73
 TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =      1.11

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   3.47
 FLOW VELOCITY(FEET/SEC.) =  3.69   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
 LONGEST FLOWPATH FROM NODE     740.00 TO NODE     742.00 =   300.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     742.00 TO NODE     742.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   6.77
 RAINFALL INTENSITY(INCH/HR) =   4.06
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.11

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

NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	40.19	8.52	3.732	13.80
2	1.11	6.77	4.064	0.30

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	38.01	6.77	4.064
2	41.21	8.52	3.732

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 41.21 Tc(MIN.) = 8.52
TOTAL AREA(ACRES) = 14.10
LONGEST FLOWPATH FROM NODE 735.10 TO NODE 742.00 = 2096.55 FEET.

****
FLOW PROCESS FROM NODE 742.00 TO NODE 742.20 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 491.70 DOWNSTREAM(FEET) = 491.00
FLOW LENGTH(FEET) = 35.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.12
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.21
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 8.56
LONGEST FLOWPATH FROM NODE 735.10 TO NODE 742.20 = 2131.55 FEET.

****
FLOW PROCESS FROM NODE 742.20 TO NODE 742.30 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 491.00 DOWNSTREAM(FEET) = 490.50
CHANNEL LENGTH THRU SUBAREA(FEET) = 115.00 CHANNEL SLOPE = 0.0043
CHANNEL BASE(FEET) = 60.00 "Z" FACTOR = 2.500
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 5.50
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.513
*USER SPECIFIED(SUBAREA):
INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 41.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.74
AVERAGE FLOW DEPTH(FEET) = 0.39 TRAVEL TIME(MIN.) = 1.10
Tc(MIN.) = 9.67
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.95
TOTAL AREA(ACRES) = 14.40 PEAK FLOW RATE(CFS) = 42.16

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.40 FLOW VELOCITY(FEET/SEC.) = 1.73
LONGEST FLOWPATH FROM NODE 735.10 TO NODE 742.30 = 2246.55 FEET.

****
FLOW PROCESS FROM NODE 742.30 TO NODE 742.40 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 490.50 DOWNSTREAM(FEET) = 489.00
FLOW LENGTH(FEET) = 45.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.42
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 42.16
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 9.72
LONGEST FLOWPATH FROM NODE 735.10 TO NODE 742.40 = 2291.55 FEET.

****
FLOW PROCESS FROM NODE 742.40 TO NODE 742.40 IS CODE = 1

```
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.72
 RAINFALL INTENSITY(INCH/HR) =   3.50
 TOTAL STREAM AREA(ACRES) =    14.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.16

****************************************************************************
 FLOW PROCESS FROM NODE    7216.00 TO NODE    7217.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7400
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    503.34
 DOWNSTREAM ELEVATION(FEET) =    503.19
 ELEVATION DIFFERENCE(FEET) =      0.15
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.844
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.050
 SUBAREA RUNOFF(CFS) =      0.60
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.60

****************************************************************************
 FLOW PROCESS FROM NODE    7217.00 TO NODE    7219.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
 UPSTREAM ELEVATION(FEET) =  503.19  DOWNSTREAM ELEVATION(FEET) =  501.53
 STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 51.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.97
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    8.19
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.23
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.36
 STREET FLOW TRAVEL TIME(MIN.) =   4.32   Tc(MIN.) =  11.16
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.322
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7400
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =     0.30     SUBAREA RUNOFF(CFS) =     0.74
 TOTAL AREA(ACRES) =      0.50      PEAK FLOW RATE(CFS) =      1.34

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.45
 FLOW VELOCITY(FEET/SEC.) =  1.32   DEPTH*VELOCITY(FT*FT/SEC.) =   0.42
 LONGEST FLOWPATH FROM NODE   7216.00 TO NODE   7219.00 =   368.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    7219.00 TO NODE     742.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   494.26  DOWNSTREAM(FEET) =   490.85
 FLOW LENGTH(FEET) =   256.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.34
```

```
 PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =  12.14
 LONGEST FLOWPATH FROM NODE   7216.00 TO NODE    742.40 =   624.59 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    742.40 TO NODE    742.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  12.14
 RAINFALL INTENSITY(INCH/HR) =   3.21
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.34

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         42.16     9.72        3.503        14.40
    2          1.34    12.14        3.214         0.50

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc      INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         43.38     9.72        3.503
    2         40.02    12.14        3.214

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     43.38   Tc(MIN.) =    9.72
 TOTAL AREA(ACRES) =     14.90
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE    742.40 =  2291.55 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    742.40 TO NODE   7222.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   489.35  DOWNSTREAM(FEET) =   487.00
 FLOW LENGTH(FEET) =   225.36   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  21.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.82
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     43.38
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  10.11
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE   7222.00 =  2516.91 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7222.00 TO NODE   7222.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.11
 RAINFALL INTENSITY(INCH/HR) =   3.44
 TOTAL STREAM AREA(ACRES) =    14.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     43.38

****************************************************************************
 FLOW PROCESS FROM NODE   7220.00 TO NODE   7221.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8300
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    501.65
 DOWNSTREAM ELEVATION(FEET) =    500.70
 ELEVATION DIFFERENCE(FEET) =      0.95
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.890
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
```

```
 SUBAREA RUNOFF(CFS) =      0.35
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
 FLOW PROCESS FROM NODE    7221.00 TO NODE    7222.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  500.70  DOWNSTREAM ELEVATION(FEET) =  495.20
 STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 51.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.44
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    7.47
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.12
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
 STREET FLOW TRAVEL TIME(MIN.) =   2.50   Tc(MIN.) =   8.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.736
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8300
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.70      SUBAREA RUNOFF(CFS) =     2.17
 TOTAL AREA(ACRES) =      0.80       PEAK FLOW RATE(CFS) =       2.52

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.63
 FLOW VELOCITY(FEET/SEC.) =  2.41   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
 LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7222.00 =   393.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    7222.00 TO NODE    7222.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.50
 RAINFALL INTENSITY(INCH/HR) =   3.74
 TOTAL STREAM AREA(ACRES) =     0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.52

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        43.38    10.11        3.438          14.90
    2         2.52     8.50        3.736           0.80

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1        42.45     8.50        3.736
    2        45.70    10.11        3.438

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     45.70   Tc(MIN.) =   10.11
 TOTAL AREA(ACRES) =     15.70
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE   7222.00 =  2516.91 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    7222.00 TO NODE    7225.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   486.87  DOWNSTREAM(FEET) =   484.24
 FLOW LENGTH(FEET) =   141.86   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  18.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.39
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     45.70
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =  10.30
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE   7225.00 =  2658.77 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7225.00 TO NODE   7225.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        45.70     10.30        3.417        15.70
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE   7225.00 =  2658.77 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        87.76     13.06        3.114        31.80
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE   7225.00 =  2381.11 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1      125.66       10.30        3.417
    2      129.40       13.06        3.114

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    129.40   Tc(MIN.) =   13.06
 TOTAL AREA(ACRES) =     47.50

****************************************************************************
 FLOW PROCESS FROM NODE   7225.00 TO NODE   7225.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   7225.00 TO NODE   7225.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   7101.00 TO NODE   7102.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    546.89
 DOWNSTREAM ELEVATION(FEET) =    545.58
 ELEVATION DIFFERENCE(FEET) =      1.31
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.444
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE   7102.00 TO NODE   7114.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  545.58  DOWNSTREAM ELEVATION(FEET) =  515.65
 STREET LENGTH(FEET) =   700.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 25.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.37
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.15
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
 STREET FLOW TRAVEL TIME(MIN.) =   3.71   Tc(MIN.) =   9.71
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.506
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =    2.52
 TOTAL AREA(ACRES) =      0.90       PEAK FLOW RATE(CFS) =       2.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.40
 FLOW VELOCITY(FEET/SEC.) =  3.53   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
 LONGEST FLOWPATH FROM NODE   7101.00 TO NODE   7114.00 =   770.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7114.00 TO NODE   7114.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   7107.00 TO NODE   7108.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
 UPSTREAM ELEVATION(FEET) =    549.05
 DOWNSTREAM ELEVATION(FEET) =    548.45
 ELEVATION DIFFERENCE(FEET) =      0.60
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.789
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE   7108.00 TO NODE   7109.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    548.45  DOWNSTREAM(FEET) =    535.85
 CHANNEL LENGTH THRU SUBAREA(FEET) =   557.00   CHANNEL SLOPE =  0.0226
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.631
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.19
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.04
 AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   3.05
 Tc(MIN.) =   9.05
 SUBAREA AREA(ACRES) =     2.70      SUBAREA RUNOFF(CFS) =    8.82
 TOTAL AREA(ACRES) =      2.90       PEAK FLOW RATE(CFS) =       9.58

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.66   FLOW VELOCITY(FEET/SEC.) =   3.64
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7109.00 =   617.00 FEET.
```

```
 FLOW PROCESS FROM NODE   7109.00 TO NODE   7110.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   527.85  DOWNSTREAM(FEET) =   524.33
 FLOW LENGTH(FEET) =    23.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.25
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      9.58
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   9.07
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7110.00 =   640.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7110.00 TO NODE   7111.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   527.52  DOWNSTREAM(FEET) =   524.33
 FLOW LENGTH(FEET) =    59.09   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.48
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      9.58
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   9.15
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7111.00 =   699.09 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7111.00 TO NODE   7118.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   524.00  DOWNSTREAM(FEET) =   509.26
 FLOW LENGTH(FEET) =   313.53   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.86
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      9.58
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   9.59
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7118.00 =  1012.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7118.00 TO NODE   7118.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.59
 RAINFALL INTENSITY(INCH/HR) =   3.53
 TOTAL STREAM AREA(ACRES) =     2.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.58

****************************************************************************
 FLOW PROCESS FROM NODE   7115.00 TO NODE   7116.00 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    546.89
 DOWNSTREAM ELEVATION(FEET) =    545.58
 ELEVATION DIFFERENCE(FEET) =      1.31
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.444
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE   7116.00 TO NODE   7117.00 IS CODE =  61
----------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  545.58  DOWNSTREAM ELEVATION(FEET) =  515.91
 STREET LENGTH(FEET) =   697.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 25.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.37
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.15
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
 STREET FLOW TRAVEL TIME(MIN.) =   3.69   Tc(MIN.) =   9.69
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.509
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =    2.53
 TOTAL AREA(ACRES) =       0.90        PEAK FLOW RATE(CFS) =       2.91

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.40
 FLOW VELOCITY(FEET/SEC.) =  3.53   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
 LONGEST FLOWPATH FROM NODE   7115.00 TO NODE   7117.00 =   767.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7117.00 TO NODE   7118.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   509.52  DOWNSTREAM(FEET) =   509.26
 FLOW LENGTH(FEET) =    11.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.62
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.91
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   9.72
 LONGEST FLOWPATH FROM NODE   7115.00 TO NODE   7118.00 =   778.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7118.00 TO NODE   7118.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.72
 RAINFALL INTENSITY(INCH/HR) =   3.50
 TOTAL STREAM AREA(ACRES) =     0.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.91

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1         9.58      9.59        3.528          2.90
     2         2.91      9.72        3.504          0.90

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        12.47      9.59        3.528
     2        12.42      9.72        3.504
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     12.47   Tc(MIN.) =    9.59
 TOTAL AREA(ACRES) =      3.80
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7118.00 =  1012.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7118.00 TO NODE   7114.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.93  DOWNSTREAM(FEET) =   508.54
 FLOW LENGTH(FEET) =    39.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.08
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.47
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   9.68
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7114.00 =  1051.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7114.00 TO NODE   7114.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        12.47      9.68        3.510         3.80
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7114.00 =  1051.87 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         2.90      9.71        3.506         0.90
 LONGEST FLOWPATH FROM NODE   7101.00 TO NODE   7114.00 =   770.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1       15.37       9.68        3.510
     2       15.35       9.71        3.506

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     15.37   Tc(MIN.) =    9.68
 TOTAL AREA(ACRES) =      4.70

****************************************************************************
 FLOW PROCESS FROM NODE   7114.00 TO NODE   7114.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   7114.00 TO NODE   7114.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.20  DOWNSTREAM(FEET) =   507.96
 FLOW LENGTH(FEET) =    24.33   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.40
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     15.37
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   9.74
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7114.50 =  1076.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7114.50 TO NODE   7121.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    503.30  DOWNSTREAM(FEET) =    501.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.0050
 CHANNEL BASE(FEET) =   24.00   "Z" FACTOR =   2.500
```

```
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   7.50
 CHANNEL FLOW THRU SUBAREA(CFS) =     15.37
 FLOW VELOCITY(FEET/SEC.) =   1.71   FLOW DEPTH(FEET) =   0.36
 TRAVEL TIME(MIN.) =   2.93   Tc(MIN.) =  12.67
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7121.00 =  1376.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7121.00 TO NODE   7121.00 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.) =  12.67
 RAINFALL INTENSITY(INCH/HR) =   3.16
 TOTAL STREAM AREA(ACRES) =     4.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.37

****************************************************************************
 FLOW PROCESS FROM NODE    756.00 TO NODE    757.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    548.00
 DOWNSTREAM ELEVATION(FEET) =    545.50
 ELEVATION DIFFERENCE(FEET) =      2.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.653
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE    757.00 TO NODE   7121.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   545.50  DOWNSTREAM(FEET) =   501.80
 FLOW LENGTH(FEET) =   820.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.77
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.76
 PIPE TRAVEL TIME(MIN.) =   2.37    Tc(MIN.) =   8.37
 LONGEST FLOWPATH FROM NODE    756.00 TO NODE   7121.00 =   920.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7121.00 TO NODE   7121.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.760
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     7.30   SUBAREA RUNOFF(CFS) =   24.70
 TOTAL AREA(ACRES) =      7.50   TOTAL RUNOFF(CFS) =   25.46
 TC(MIN.) =   8.37

****************************************************************************
 FLOW PROCESS FROM NODE   7121.00 TO NODE   7121.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.37
 RAINFALL INTENSITY(INCH/HR) =   3.76
 TOTAL STREAM AREA(ACRES) =     7.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.46

 ** CONFLUENCE DATA **
```

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	15.37	12.67	3.157	4.70
2	25.46	8.37	3.760	7.50

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	38.36	8.37	3.760
2	36.74	12.67	3.157

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 38.36 Tc(MIN.) = 8.37
TOTAL AREA(ACRES) = 12.20
LONGEST FLOWPATH FROM NODE 7107.00 TO NODE 7121.00 = 1376.20 FEET.

****
FLOW PROCESS FROM NODE 7121.00 TO NODE 7122.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 505.77 DOWNSTREAM(FEET) = 505.53
FLOW LENGTH(FEET) = 24.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.06
GIVEN PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.36
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 8.41
LONGEST FLOWPATH FROM NODE 7107.00 TO NODE 7122.00 = 1400.20 FEET.

****
FLOW PROCESS FROM NODE 7122.00 TO NODE 7122.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.41
RAINFALL INTENSITY(INCH/HR) = 3.75
TOTAL STREAM AREA(ACRES) = 12.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 38.36

****
FLOW PROCESS FROM NODE 7120.00 TO NODE 7120.50 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 90.00
UPSTREAM ELEVATION(FEET) = 517.60
DOWNSTREAM ELEVATION(FEET) = 517.30
ELEVATION DIFFERENCE(FEET) = 0.30
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.388
*CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.946
SUBAREA RUNOFF(CFS) = 0.63
TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.63

****
FLOW PROCESS FROM NODE 7120.50 TO NODE 7122.00 IS CODE = 61

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
==
UPSTREAM ELEVATION(FEET) = 517.30 DOWNSTREAM ELEVATION(FEET) = 514.17
STREET LENGTH(FEET) = 242.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 51.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 46.00
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) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.93
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
  STREET FLOW TRAVEL TIME(MIN.) =   2.29   Tc(MIN.) =   9.68
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.511
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =    0.84
  TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS) =       1.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.10
  FLOW VELOCITY(FEET/SEC.) =  1.90   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
  LONGEST FLOWPATH FROM NODE   7120.00 TO NODE   7122.00 =   332.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7122.00 TO NODE   7122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.68
  RAINFALL INTENSITY(INCH/HR) =   3.51
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.47

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1        38.36      8.41         3.751          12.20
      2         1.47      9.68         3.511           0.50

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1        39.74      8.41         3.751
      2        37.38      9.68         3.511

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     39.74   Tc(MIN.) =    8.41
  TOTAL AREA(ACRES) =     12.70
  LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7122.00 =  1400.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7122.00 TO NODE   7123.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   505.20  DOWNSTREAM(FEET) =   485.82
  FLOW LENGTH(FEET) =   647.05   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.31
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.74
  PIPE TRAVEL TIME(MIN.) =  0.75    Tc(MIN.) =   9.17
  LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7123.00 =  2047.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7123.00 TO NODE   7123.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.17
 RAINFALL INTENSITY(INCH/HR) =   3.61
 TOTAL STREAM AREA(ACRES) =    12.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.74

****************************************************************************
 FLOW PROCESS FROM NODE   7124.00 TO NODE   7125.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    517.01
 DOWNSTREAM ELEVATION(FEET) =    516.76
 ELEVATION DIFFERENCE(FEET) =     0.25
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.423
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.403
 SUBAREA RUNOFF(CFS) =      0.15
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
 FLOW PROCESS FROM NODE   7125.00 TO NODE   7126.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    516.00  DOWNSTREAM(FEET) =    498.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   875.00   CHANNEL SLOPE =  0.0206
 CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.490
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =  0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.44
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.50
 AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   9.75
 Tc(MIN.) =  20.17
 SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.56
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       0.71

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   1.68
 LONGEST FLOWPATH FROM NODE   7124.00 TO NODE   7126.00 =   925.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7126.00 TO NODE   7123.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   486.12  DOWNSTREAM(FEET) =   485.82
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.56
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.71
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =  20.56
 LONGEST FLOWPATH FROM NODE   7124.00 TO NODE   7123.00 =   985.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7123.00 TO NODE   7123.00 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.) =  20.56
 RAINFALL INTENSITY(INCH/HR) =   2.47
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.71

****************************************************************************
 FLOW PROCESS FROM NODE   7129.00 TO NODE   7130.00 IS CODE =  21
```

```
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
S.C.S. CURVE NUMBER (AMC II) =  0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    89.00
UPSTREAM ELEVATION(FEET) =    514.39
DOWNSTREAM ELEVATION(FEET) =    512.80
ELEVATION DIFFERENCE(FEET) =      1.59
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.198
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
SUBAREA RUNOFF(CFS) =      0.34
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
FLOW PROCESS FROM NODE   7130.00 TO NODE   7123.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  512.80  DOWNSTREAM ELEVATION(FEET) =  502.81
STREET LENGTH(FEET) =   355.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 51.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
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) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.70
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.27
  HALFSTREET FLOOD WIDTH(FEET) =    7.20
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.68
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
STREET FLOW TRAVEL TIME(MIN.) =   2.21   Tc(MIN.) =   8.21
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.790
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
S.C.S. CURVE NUMBER (AMC II) =  0
SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.73
TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =      3.07

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.45
FLOW VELOCITY(FEET/SEC.) =  3.03   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
LONGEST FLOWPATH FROM NODE   7129.00 TO NODE   7123.00 =   444.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   7123.00 TO NODE   7123.00 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.) =   8.21
RAINFALL INTENSITY(INCH/HR) =   3.79
TOTAL STREAM AREA(ACRES) =     1.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.07

** CONFLUENCE DATA **
STREAM      RUNOFF       Tc      INTENSITY      AREA
NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        39.74     9.17        3.608         12.70
    2         0.71    20.56        2.466          0.60
    3         3.07     8.21        3.790          1.00

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

** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	41.36	8.21	3.790
2	43.15	9.17	3.608
3	29.87	20.56	2.466

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 43.15 Tc(MIN.) = 9.17
TOTAL AREA(ACRES) = 14.30
LONGEST FLOWPATH FROM NODE 7107.00 TO NODE 7123.00 = 2047.25 FEET.

****
FLOW PROCESS FROM NODE 7123.00 TO NODE 7123.00 IS CODE = 10

>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==========

****
FLOW PROCESS FROM NODE 7123.10 TO NODE 7123.20 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 529.70
DOWNSTREAM ELEVATION(FEET) = 527.70
ELEVATION DIFFERENCE(FEET) = 2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.857
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.210
SUBAREA RUNOFF(CFS) = 0.76
TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.76

****
FLOW PROCESS FROM NODE 7123.20 TO NODE 7123.30 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 527.70 DOWNSTREAM(FEET) = 512.00
FLOW LENGTH(FEET) = 472.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 2.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.89
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.76
PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 7.61
LONGEST FLOWPATH FROM NODE 7123.10 TO NODE 7123.30 = 572.00 FEET.

****
FLOW PROCESS FROM NODE 7123.30 TO NODE 7123.30 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.905
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 20.38
TOTAL AREA(ACRES) = 6.00 TOTAL RUNOFF(CFS) = 21.14
TC(MIN.) = 7.61

****
FLOW PROCESS FROM NODE 7123.30 TO NODE 7123.40 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 490.50 DOWNSTREAM(FEET) = 489.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 150.00 CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 30.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 5.00
CHANNEL FLOW THRU SUBAREA(CFS) = 21.14
FLOW VELOCITY(FEET/SEC.) = 2.22 FLOW DEPTH(FEET) = 0.31
TRAVEL TIME(MIN.) = 1.13 Tc(MIN.) = 8.73
LONGEST FLOWPATH FROM NODE 7123.10 TO NODE 7123.40 = 722.00 FEET.

```
****************************************************************************
 FLOW PROCESS FROM NODE   7123.40 TO NODE   7123.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.73
 RAINFALL INTENSITY(INCH/HR) =   3.69
 TOTAL STREAM AREA(ACRES) =     6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.14

****************************************************************************
 FLOW PROCESS FROM NODE    731.20 TO NODE    731.30 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    514.00
 DOWNSTREAM ELEVATION(FEET) =    503.50
 ELEVATION DIFFERENCE(FEET) =     10.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.644
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    731.30 TO NODE    752.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  503.00  DOWNSTREAM ELEVATION(FEET) =  495.86
 STREET LENGTH(FEET) =   235.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.91
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.03
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.44
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.55
 STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   7.60
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.906
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     1.05
 TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.43

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.50
 FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
 LONGEST FLOWPATH FROM NODE    731.20 TO NODE    752.00 =   335.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    752.00 TO NODE    752.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   489.17  DOWNSTREAM(FEET) =   489.00
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  24.0 INCH PIPE IS    5.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.04
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.43
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   7.79
 LONGEST FLOWPATH FROM NODE    731.20 TO NODE    752.20 =   370.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    752.20 TO NODE   7123.40 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    489.00  DOWNSTREAM(FEET) =    488.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =    10.00   CHANNEL SLOPE =  0.0100
 CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.43
 FLOW VELOCITY(FEET/SEC.) =   0.74   FLOW DEPTH(FEET) =   0.06
 TRAVEL TIME(MIN.) =   0.22   Tc(MIN.) =   8.02
 LONGEST FLOWPATH FROM NODE    731.20 TO NODE   7123.40 =   380.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7123.40 TO NODE   7123.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.02
 RAINFALL INTENSITY(INCH/HR) =   3.83
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.43

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1        21.14      8.73         3.690          6.00
    2         1.43      8.02         3.827          0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1        21.82      8.02         3.827
    2        22.52      8.73         3.690

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     22.52   Tc(MIN.) =    8.73
 TOTAL AREA(ACRES) =      6.40
 LONGEST FLOWPATH FROM NODE   7123.10 TO NODE   7123.40 =   722.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7123.40 TO NODE   7123.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   489.00  DOWNSTREAM(FEET) =   485.49
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.53
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     22.52
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   8.77
 LONGEST FLOWPATH FROM NODE   7123.10 TO NODE   7123.00 =   762.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7123.00 TO NODE   7123.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        22.52     8.77        3.684         6.40
 LONGEST FLOWPATH FROM NODE   7123.10 TO NODE   7123.00 =   762.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        43.15     9.17        3.608        14.30
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7123.00 =  2047.25 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
    1        64.78      8.77        3.684
    2        65.21      9.17        3.608

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     65.21   Tc(MIN.) =    9.17
 TOTAL AREA(ACRES) =     20.70

****************************************************************************
 FLOW PROCESS FROM NODE   7123.00 TO NODE   7123.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   7123.00 TO NODE   7225.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   485.49  DOWNSTREAM(FEET) =   483.74
 FLOW LENGTH(FEET) =    89.31   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  20.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.83
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     65.21
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   9.28
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7225.00 =  2136.56 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7225.00 TO NODE   7225.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        65.21     9.28        3.588        20.70
 LONGEST FLOWPATH FROM NODE   7107.00 TO NODE   7225.00 =  2136.56 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       129.40     13.06       3.114        47.50
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE   7225.00 =  2658.77 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
    1       177.51      9.28        3.588
    2       185.99     13.06        3.114

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    185.99   Tc(MIN.) =   13.06
 TOTAL AREA(ACRES) =     68.20

****************************************************************************
 FLOW PROCESS FROM NODE   7225.00 TO NODE   7225.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   7225.00 TO NODE   7230.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   482.22  DOWNSTREAM(FEET) =   481.75
 FLOW LENGTH(FEET) =   106.78   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.47
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    185.99
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =  13.25
 LONGEST FLOWPATH FROM NODE    735.10 TO NODE   7230.00 =  2765.55 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     68.20  TC(MIN.) =     13.25
 PEAK FLOW RATE(CFS)   =    185.99
================================================================================

 END OF RATIONAL METHOD ANALYSIS
```

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****************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                          Rick Engineering Company
                        1223 University Ave., Suite 240
                         Riverside, California 92507

 ************************** DESCRIPTION OF STUDY **************************
* J-16630 BMR North Village East Town Center Improvements                 *
* Basin 900 - 100 Year Storm Event - Construction Change "F"              *
* Revisions to Del Sur Ridge Road and 'AR' Street                         *
 ****************************************************************************

  FILE NAME: BMR9HP00.DAT
  TIME/DATE OF STUDY: 09:50 07/01/2014
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE     900.00 TO NODE     901.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
  UPSTREAM ELEVATION(FEET) =  553.99
  DOWNSTREAM ELEVATION(FEET) =  552.36
  ELEVATION DIFFERENCE(FEET) =  1.63
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  3.059
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =  0.38
  TOTAL AREA(ACRES) =  0.10  TOTAL RUNOFF(CFS) =  0.38

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

```
 FLOW PROCESS FROM NODE     901.00 TO NODE     902.00 IS CODE =  62
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
 UPSTREAM ELEVATION(FEET) =  552.36  DOWNSTREAM ELEVATION(FEET) =  531.33
 STREET LENGTH(FEET) =   550.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.19
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =    5.53
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.81
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
 STREET FLOW TRAVEL TIME(MIN.) =   3.27   Tc(MIN.) =   9.27
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.589
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    1.62
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       1.99

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.21
 FLOW VELOCITY(FEET/SEC.) =  3.13   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
 LONGEST FLOWPATH FROM NODE     900.00 TO NODE     902.00 =   650.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     902.00 TO NODE     903.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   520.36  DOWNSTREAM(FEET) =   517.63
 FLOW LENGTH(FEET) =    27.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.97
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.99
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   9.31
 LONGEST FLOWPATH FROM NODE     900.00 TO NODE     903.00 =   677.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     903.00 TO NODE     903.00 IS CODE =  10
----------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
======================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     902.20 TO NODE     902.30 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    544.00
 DOWNSTREAM ELEVATION(FEET) =    539.86
 ELEVATION DIFFERENCE(FEET) =      4.14
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.242
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     902.30 TO NODE     902.40 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  539.86  DOWNSTREAM ELEVATION(FEET) =  529.22
 STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.86
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.20
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
 STREET FLOW TRAVEL TIME(MIN.) =   3.38   Tc(MIN.) =   9.39
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.567
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =    0.96
 TOTAL AREA(ACRES) =       0.40        PEAK FLOW RATE(CFS) =       1.34

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.65
 FLOW VELOCITY(FEET/SEC.) =  2.39   DEPTH*VELOCITY(FT*FT/SEC.) =   0.62
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    902.40 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     902.40 TO NODE     902.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.39
 RAINFALL INTENSITY(INCH/HR) =   3.57
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.34

****************************************************************************
 FLOW PROCESS FROM NODE     901.40 TO NODE     901.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    544.88
 DOWNSTREAM ELEVATION(FEET) =    540.41
 ELEVATION DIFFERENCE(FEET) =      4.47
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.186
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE     901.50 TO NODE     902.40 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  540.41  DOWNSTREAM ELEVATION(FEET) =  529.22
 STREET LENGTH(FEET) =   365.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.21
   HALFSTREET FLOOD WIDTH(FEET) =    4.26
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.38
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
 STREET FLOW TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =   8.55
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.725
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.67
 TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.05

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.48
 FLOW VELOCITY(FEET/SEC.) =  2.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.59
 LONGEST FLOWPATH FROM NODE    901.40 TO NODE    902.40 =   465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.40 TO NODE    902.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.55
 RAINFALL INTENSITY(INCH/HR) =   3.72
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.05

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1          1.34      9.39         3.567          0.40
    2          1.05      8.55         3.725          0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          2.33      8.55         3.725
    2          2.35      9.39         3.567

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      2.35   Tc(MIN.) =    9.39
 TOTAL AREA(ACRES) =      0.70
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    902.40 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.40 TO NODE    902.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.39
 RAINFALL INTENSITY(INCH/HR) =   3.57
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.35

****************************************************************************
 FLOW PROCESS FROM NODE    901.10 TO NODE    901.20 IS CODE =  21
----------------------------------------------------------------------------
```

```
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
 UPSTREAM ELEVATION(FEET) =  548.90
 DOWNSTREAM ELEVATION(FEET) =  546.00
 ELEVATION DIFFERENCE(FEET) =  2.90
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.525
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =  1.52
 TOTAL AREA(ACRES) =  0.40  TOTAL RUNOFF(CFS) =  1.52

****************************************************************************
 FLOW PROCESS FROM NODE  901.20 TO NODE  901.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  546.00  DOWNSTREAM(FEET) =  535.00
 FLOW LENGTH(FEET) =  361.00  MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  3.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  6.04
 GIVEN PIPE DIAMETER(INCH) =  18.00  NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  1.52
 PIPE TRAVEL TIME(MIN.) =  1.00  Tc(MIN.) =  7.00
 LONGEST FLOWPATH FROM NODE  901.10 TO NODE  901.30 =  461.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  901.30 TO NODE  901.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.021
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =  2.70  SUBAREA RUNOFF(CFS) =  9.77
 TOTAL AREA(ACRES) =  3.10  TOTAL RUNOFF(CFS) =  11.29
 TC(MIN.) =  7.00

****************************************************************************
 FLOW PROCESS FROM NODE  901.30 TO NODE  902.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  523.64  DOWNSTREAM(FEET) =  523.16
 FLOW LENGTH(FEET) =  24.00  MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  8.87
 GIVEN PIPE DIAMETER(INCH) =  18.00  NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  11.29
 PIPE TRAVEL TIME(MIN.) =  0.05  Tc(MIN.) =  7.04
 LONGEST FLOWPATH FROM NODE  901.10 TO NODE  902.40 =  485.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  902.40 TO NODE  902.40 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  7.04
 RAINFALL INTENSITY(INCH/HR) =  4.01
 TOTAL STREAM AREA(ACRES) =  3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =  11.29

 ** CONFLUENCE DATA **
 STREAM    RUNOFF     Tc     INTENSITY     AREA
 NUMBER    (CFS)    (MIN.)  (INCH/HOUR)   (ACRE)
    1       2.35     9.39      3.567        0.70
    2      11.29     7.04      4.012        3.10
```

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        13.37      7.04        4.012
     2        12.38      9.39        3.567

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      13.37   Tc(MIN.) =     7.04
 TOTAL AREA(ACRES) =       3.80
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    902.40 =    547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.40 TO NODE    902.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.83  DOWNSTREAM(FEET) =   522.28
 FLOW LENGTH(FEET) =    27.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.12
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     13.37
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   7.09
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    902.50 =    574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.50 TO NODE    902.50 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.) =   7.09
 RAINFALL INTENSITY(INCH/HR) =   4.00
 TOTAL STREAM AREA(ACRES) =     3.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.37

****************************************************************************
 FLOW PROCESS FROM NODE    901.60 TO NODE    901.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    535.00
 DOWNSTREAM ELEVATION(FEET) =    531.00
 ELEVATION DIFFERENCE(FEET) =      4.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.268
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    901.70 TO NODE    902.90 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  531.00  DOWNSTREAM ELEVATION(FEET) =  529.17
 STREET LENGTH(FEET) =   114.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

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

```
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.56
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.22
   HALFSTREET FLOOD WIDTH(FEET) =    4.54
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.73
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.37
 STREET FLOW TRAVEL TIME(MIN.) =   1.10   Tc(MIN.) =   7.10
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.001
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.10      SUBAREA RUNOFF(CFS) =     0.36
 TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.74

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.38
 FLOW VELOCITY(FEET/SEC.) =  1.81   DEPTH*VELOCITY(FT*FT/SEC.) =   0.42
 LONGEST FLOWPATH FROM NODE    901.60 TO NODE    902.90 =   214.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.90 TO NODE    902.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.39  DOWNSTREAM(FEET) =   522.28
 FLOW LENGTH(FEET) =     5.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.74
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   7.12
 LONGEST FLOWPATH FROM NODE    901.60 TO NODE    902.50 =   219.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.50 TO NODE    902.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.12
 RAINFALL INTENSITY(INCH/HR) =   4.00
 TOTAL STREAM AREA(ACRES) =     0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.74

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        13.37     7.09        4.003          3.80
     2         0.74     7.12        3.997          0.20

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
     1        14.11     7.09        4.003
     2        14.09     7.12        3.997

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     14.11   Tc(MIN.) =    7.09
 TOTAL AREA(ACRES) =      4.00
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    902.50 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.50 TO NODE    902.60 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   521.78  DOWNSTREAM(FEET) =   519.77
 FLOW LENGTH(FEET) =   201.08   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.11
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   7.55
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    902.60 =   775.33 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.60 TO NODE    903.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   519.44  DOWNSTREAM(FEET) =   517.46
 FLOW LENGTH(FEET) =   198.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.11
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   8.00
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    903.00 =   973.33 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    902.70 TO NODE    903.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.829
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20   SUBAREA RUNOFF(CFS) =     0.69
 TOTAL AREA(ACRES) =      4.20   TOTAL RUNOFF(CFS) =   14.80
 TC(MIN.) =   8.00

****************************************************************************
 FLOW PROCESS FROM NODE    903.00 TO NODE    903.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        14.80      8.00        3.829        4.20
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    903.00 =   973.33 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         1.99      9.31        3.581        0.60
 LONGEST FLOWPATH FROM NODE    900.00 TO NODE    903.00 =   677.25 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
    1       16.66       8.00        3.829
    2       15.83       9.31        3.581

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     16.66   Tc(MIN.) =    8.00
 TOTAL AREA(ACRES) =      4.80

****************************************************************************
 FLOW PROCESS FROM NODE    903.00 TO NODE    903.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    903.00 TO NODE    904.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   517.13  DOWNSTREAM(FEET) =   504.39
 FLOW LENGTH(FEET) =   394.45   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.0 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.83
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     16.66
 PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   8.56
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    904.00 =  1367.78 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.00 TO NODE    904.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    904.10 TO NODE    904.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    530.65
 DOWNSTREAM ELEVATION(FEET) =    527.34
 ELEVATION DIFFERENCE(FEET) =      3.31
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.416
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    904.20 TO NODE    904.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  527.34  DOWNSTREAM ELEVATION(FEET) =  511.87
 STREET LENGTH(FEET) =   450.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.04
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.28
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.62
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
 STREET FLOW TRAVEL TIME(MIN.) =   2.86   Tc(MIN.) =   8.86
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.667
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.32
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.70

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.85
 FLOW VELOCITY(FEET/SEC.) =  2.89   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
 LONGEST FLOWPATH FROM NODE    904.10 TO NODE    904.30 =   550.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.30 TO NODE    904.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.86
```

```
 RAINFALL INTENSITY(INCH/HR) =   3.67
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.70

****************************************************************************
 FLOW PROCESS FROM NODE    904.80 TO NODE    904.90 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    531.86
 DOWNSTREAM ELEVATION(FEET) =    530.20
 ELEVATION DIFFERENCE(FEET) =      1.66
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.040
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    904.90 TO NODE    904.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  530.20  DOWNSTREAM ELEVATION(FEET) =  511.87
 STREET LENGTH(FEET) =   425.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.05
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    4.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
 STREET FLOW TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   8.45
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.744
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.35
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.73

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.55
 FLOW VELOCITY(FEET/SEC.) =  3.16   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
 LONGEST FLOWPATH FROM NODE    904.80 TO NODE    904.30 =   525.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.30 TO NODE    904.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.45
 RAINFALL INTENSITY(INCH/HR) =   3.74
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.73

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          1.70     8.86        3.667         0.50
    2          1.73     8.45        3.744         0.50
```

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          3.39      8.45         3.744
    2          3.39      8.86         3.667

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       3.39   Tc(MIN.) =    8.45
 TOTAL AREA(ACRES) =      1.00
 LONGEST FLOWPATH FROM NODE    904.10 TO NODE    904.30 =   550.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.30 TO NODE    904.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   505.69  DOWNSTREAM(FEET) =   505.40
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.04
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.39
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   8.55
 LONGEST FLOWPATH FROM NODE    904.10 TO NODE    904.40 =   580.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.40 TO NODE    904.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.55
 RAINFALL INTENSITY(INCH/HR) =   3.72
 TOTAL STREAM AREA(ACRES) =      1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.39

****************************************************************************
 FLOW PROCESS FROM NODE    905.60 TO NODE    905.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =     517.91
 DOWNSTREAM ELEVATION(FEET) =    515.40
 ELEVATION DIFFERENCE(FEET) =      2.51
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.649
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =       0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    905.70 TO NODE    904.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  515.40  DOWNSTREAM ELEVATION(FEET) =  511.87
 STREET LENGTH(FEET) =   165.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

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

```
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.73
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.22
  HALFSTREET FLOOD WIDTH(FEET) =    4.92
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.46
STREET FLOW TRAVEL TIME(MIN.) =   1.35   Tc(MIN.) =   7.35
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.954
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.71
TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.09

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.14
FLOW VELOCITY(FEET/SEC.) =  2.20   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
LONGEST FLOWPATH FROM NODE    905.60 TO NODE    904.50 =   265.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.50 TO NODE    904.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   505.54  DOWNSTREAM(FEET) =   505.48
 FLOW LENGTH(FEET) =     3.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.72
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.09
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   7.36
 LONGEST FLOWPATH FROM NODE    905.60 TO NODE    904.40 =   268.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.40 TO NODE    904.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.36
 RAINFALL INTENSITY(INCH/HR) =   3.95
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.09

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         3.39      8.55         3.725          1.00
    2         1.09      7.36         3.952          0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1         4.29      7.36         3.952
    2         4.42      8.55         3.725

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      4.42   Tc(MIN.) =    8.55
 TOTAL AREA(ACRES) =      1.30
 LONGEST FLOWPATH FROM NODE    904.10 TO NODE    904.40 =   580.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.40 TO NODE    906.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   505.30  DOWNSTREAM(FEET) =   504.93
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.20
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      4.42
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   8.85
 LONGEST FLOWPATH FROM NODE    904.10 TO NODE    906.00 =   655.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    906.00 TO NODE    906.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.85
 RAINFALL INTENSITY(INCH/HR) =   3.67
 TOTAL STREAM AREA(ACRES) =     1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.42

****************************************************************************
 FLOW PROCESS FROM NODE    903.10 TO NODE    903.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    535.20
 DOWNSTREAM ELEVATION(FEET) =    532.20
 ELEVATION DIFFERENCE(FEET) =      3.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE    903.20 TO NODE    903.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   532.20  DOWNSTREAM(FEET) =   519.90
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.84
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.76
 PIPE TRAVEL TIME(MIN.) =   1.45    Tc(MIN.) =   7.45
 LONGEST FLOWPATH FROM NODE    903.10 TO NODE    903.30 =   520.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    903.30 TO NODE    903.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.935
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     2.90   SUBAREA RUNOFF(CFS) =   10.27
 TOTAL AREA(ACRES) =      3.10   TOTAL RUNOFF(CFS) =   11.03
 TC(MIN.) =   7.45

****************************************************************************
 FLOW PROCESS FROM NODE    903.30 TO NODE    906.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   510.85  DOWNSTREAM(FEET) =   504.93
 FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.65
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     11.03
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   7.51
 LONGEST FLOWPATH FROM NODE    903.10 TO NODE    906.00 =   582.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    906.00 TO NODE    906.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.51
 RAINFALL INTENSITY(INCH/HR) =   3.92
 TOTAL STREAM AREA(ACRES) =     3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.03

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          4.42     8.85        3.668         1.30
    2         11.03     7.51        3.923         3.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc      INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         15.16     7.51        3.923
    2         14.73     8.85        3.668

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     15.16   Tc(MIN.) =    7.51
 TOTAL AREA(ACRES) =      4.40
 LONGEST FLOWPATH FROM NODE    904.10 TO NODE    906.00 =   655.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    906.00 TO NODE    904.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   504.83  DOWNSTREAM(FEET) =   503.72
 FLOW LENGTH(FEET) =   206.68   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.71
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     15.16
 PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   8.12
 LONGEST FLOWPATH FROM NODE    904.10 TO NODE    904.00 =   861.68 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.00 TO NODE    904.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         15.16     8.12        3.808         4.40
 LONGEST FLOWPATH FROM NODE    904.10 TO NODE    904.00 =   861.68 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         16.66     8.56        3.724         4.80
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    904.00 =  1367.78 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         31.46     8.12        3.808
    2         31.49     8.56        3.724

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     31.49   Tc(MIN.) =    8.56
```

```
 TOTAL AREA(ACRES) =      9.20

****************************************************************************
 FLOW PROCESS FROM NODE     904.00 TO NODE     904.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     904.00 TO NODE     905.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   503.39  DOWNSTREAM(FEET) =   494.77
 FLOW LENGTH(FEET) =   360.67   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  14.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.33
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     31.49
 PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   9.05
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    905.00 =  1728.45 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     905.00 TO NODE     905.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.05
 RAINFALL INTENSITY(INCH/HR) =   3.63
 TOTAL STREAM AREA(ACRES) =     9.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.49

****************************************************************************
 FLOW PROCESS FROM NODE     905.20 TO NODE     905.30 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    531.86
 DOWNSTREAM ELEVATION(FEET) =    530.30
 ELEVATION DIFFERENCE(FEET) =      1.56
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.104
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE     905.30 TO NODE     905.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  530.30  DOWNSTREAM ELEVATION(FEET) =  500.00
 STREET LENGTH(FEET) =   587.61   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.70
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.19
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.39
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   2.89   Tc(MIN.) =   8.89
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.661
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =     2.64
 TOTAL AREA(ACRES) =       0.90        PEAK FLOW RATE(CFS) =        3.01

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.17
 FLOW VELOCITY(FEET/SEC.) =  3.83   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
 LONGEST FLOWPATH FROM NODE    905.20 TO NODE    905.10 =   687.61 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    905.10 TO NODE    905.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.14  DOWNSTREAM(FEET) =   494.77
 FLOW LENGTH(FEET) =    36.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.97
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.01
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   9.01
 LONGEST FLOWPATH FROM NODE    905.20 TO NODE    905.00 =   724.11 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    905.00 TO NODE    905.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.01
 RAINFALL INTENSITY(INCH/HR) =   3.64
 TOTAL STREAM AREA(ACRES) =     0.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.01

****************************************************************************
 FLOW PROCESS FROM NODE    905.40 TO NODE    905.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    517.91
 DOWNSTREAM ELEVATION(FEET) =    510.64
 ELEVATION DIFFERENCE(FEET) =      7.27
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.858
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    905.50 TO NODE    905.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  510.64  DOWNSTREAM ELEVATION(FEET) =  500.00
 STREET LENGTH(FEET) =   277.61   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.71   Tc(MIN.) =   7.71
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.885
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =    1.05
  TOTAL AREA(ACRES) =       0.40        PEAK FLOW RATE(CFS) =       1.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.09
  FLOW VELOCITY(FEET/SEC.) =  2.92   DEPTH*VELOCITY(FT*FT/SEC.) =   0.72
  LONGEST FLOWPATH FROM NODE    905.40 TO NODE    905.00 =   377.61 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    905.00 TO NODE    905.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.71
  RAINFALL INTENSITY(INCH/HR) =   3.89
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.43

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1        31.49      9.05         3.631          9.20
      2         3.01      9.01         3.638          0.90
      3         1.43      7.71         3.885          0.40

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1        33.68      7.71         3.885
      2        35.78      9.01         3.638
      3        35.83      9.05         3.631

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     35.83   Tc(MIN.) =    9.05
  TOTAL AREA(ACRES) =     10.50
  LONGEST FLOWPATH FROM NODE    902.20 TO NODE    905.00 =  1728.45 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    905.00 TO NODE    904.60 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.44  DOWNSTREAM(FEET) =   494.29
  FLOW LENGTH(FEET) =    15.08   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.22
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     35.83
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   9.07
  LONGEST FLOWPATH FROM NODE    902.20 TO NODE    904.60 =  1743.53 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    904.60 TO NODE    904.70 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.50  DOWNSTREAM(FEET) =   494.20
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.38
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     35.83
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   9.14
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    904.70 =  1778.53 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.70 TO NODE    904.70 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.14
 RAINFALL INTENSITY(INCH/HR) =   3.61
 TOTAL STREAM AREA(ACRES) =    10.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     35.83

****************************************************************************
 FLOW PROCESS FROM NODE    957.00 TO NODE    958.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    66.00
 UPSTREAM ELEVATION(FEET) =    514.00
 DOWNSTREAM ELEVATION(FEET) =    512.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.021
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE    958.00 TO NODE    960.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   512.00  DOWNSTREAM(FEET) =   498.00
 FLOW LENGTH(FEET) =   460.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   2.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.58
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.76
 PIPE TRAVEL TIME(MIN.) =   1.67    Tc(MIN.) =   7.67
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    960.00 =   526.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    960.00 TO NODE    960.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.892
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     3.80   SUBAREA RUNOFF(CFS) =   13.31
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =   14.07
 TC(MIN.) =   7.67

****************************************************************************
 FLOW PROCESS FROM NODE    960.00 TO NODE    904.70 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    494.50  DOWNSTREAM(FEET) =    494.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.0007
 CHANNEL BASE(FEET) =   35.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =   5.50
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.07
```

```
 FLOW VELOCITY(FEET/SEC.) =   0.90   FLOW DEPTH(FEET) =   0.43
 TRAVEL TIME(MIN.) =   7.40   Tc(MIN.) =  15.07
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    904.70 =   926.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.70 TO NODE    904.70 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  15.07
 RAINFALL INTENSITY(INCH/HR) =   2.89
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.07

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        35.83     9.14        3.613         10.50
     2        14.07    15.07        2.894          4.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
     1        47.10     9.14        3.613
     2        42.77    15.07        2.894

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     47.10   Tc(MIN.) =    9.14
 TOTAL AREA(ACRES) =     14.50
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    904.70 =  1778.53 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.70 TO NODE    992.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   494.20  DOWNSTREAM(FEET) =   492.41
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.02
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     47.10
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   9.28
 LONGEST FLOWPATH FROM NODE    902.20 TO NODE    992.00 =  1878.53 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    992.00 TO NODE    992.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.28
 RAINFALL INTENSITY(INCH/HR) =   3.59
 TOTAL STREAM AREA(ACRES) =    14.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.10

****************************************************************************
 FLOW PROCESS FROM NODE    920.00 TO NODE    921.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    542.00
 DOWNSTREAM ELEVATION(FEET) =    540.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
SUBAREA RUNOFF(CFS) =      7.20
TOTAL AREA(ACRES) =      1.90   TOTAL RUNOFF(CFS) =      7.20

****************************************************************************
 FLOW PROCESS FROM NODE    921.00 TO NODE    907.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   532.00  DOWNSTREAM(FEET) =   502.00
 FLOW LENGTH(FEET) =   908.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.66
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.20
 PIPE TRAVEL TIME(MIN.) =   1.57    Tc(MIN.) =   7.57
 LONGEST FLOWPATH FROM NODE    920.00 TO NODE    907.50 =  1008.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    907.50 TO NODE    907.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.912
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =   18.40   SUBAREA RUNOFF(CFS) =   64.79
 TOTAL AREA(ACRES) =     20.30   TOTAL RUNOFF(CFS) =   71.99
 TC(MIN.) =   7.57

****************************************************************************
 FLOW PROCESS FROM NODE    907.50 TO NODE   9801.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   496.56  DOWNSTREAM(FEET) =   494.23
 FLOW LENGTH(FEET) =   233.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.18
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     71.99
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   7.95
 LONGEST FLOWPATH FROM NODE    920.00 TO NODE   9801.50 =  1241.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   9801.50 TO NODE    992.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.73  DOWNSTREAM(FEET) =   492.41
 FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  27.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.92
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     71.99
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   8.05
 LONGEST FLOWPATH FROM NODE    920.00 TO NODE    992.00 =  1297.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    992.00 TO NODE    992.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.05
 RAINFALL INTENSITY(INCH/HR) =   3.82
 TOTAL STREAM AREA(ACRES) =    20.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     71.99

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

NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	47.10	9.28	3.586	14.50
2	71.99	8.05	3.820	20.30

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	116.21	8.05	3.820
2	114.69	9.28	3.586

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 116.21 Tc(MIN.) = 8.05
TOTAL AREA(ACRES) = 34.80
LONGEST FLOWPATH FROM NODE 902.20 TO NODE 992.00 = 1878.53 FEET.

****
FLOW PROCESS FROM NODE 992.00 TO NODE 9903.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 492.20 DOWNSTREAM(FEET) = 491.77
FLOW LENGTH(FEET) = 77.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 37.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.82
GIVEN PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 116.21
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 8.18
LONGEST FLOWPATH FROM NODE 902.20 TO NODE 9903.00 = 1955.53 FEET.
==
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 34.80 TC(MIN.) = 8.18
PEAK FLOW RATE(CFS) = 116.21
==
==
END OF RATIONAL METHOD ANALYSIS

♀

Basin 900A

Un-Detained Flow

100-Year

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                          Rick Engineering Company
                        1223 University Ave., Suite 240
                          Riverside, California 92507


 ************************** DESCRIPTION OF STUDY **************************
* J-16630 BMR North Village East Unit 14                                  *
* Construction Change 'F'                                                 *
* Basin 900A - 100 Year Storm Event                                       *
 **************************************************************************

  FILE NAME: BMR9AP00.DAT
  TIME/DATE OF STUDY: 14:33 06/20/2014
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ======  =====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180
  3   51.0     46.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    911.00 TO NODE    912.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
  UPSTREAM ELEVATION(FEET) =  544.00
  DOWNSTREAM ELEVATION(FEET) =  539.81
  ELEVATION DIFFERENCE(FEET) =  4.19
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.233
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =  0.38
```

```
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE     912.00 TO NODE     913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  539.81  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.03
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =    5.58
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
 STREET FLOW TRAVEL TIME(MIN.) =   3.10   Tc(MIN.) =   9.10
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.621
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.30
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.68

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.16
 FLOW VELOCITY(FEET/SEC.) =  2.67   DEPTH*VELOCITY(FT*FT/SEC.) =   0.72
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     913.00 TO NODE     913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.10
 RAINFALL INTENSITY(INCH/HR) =   3.62
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.68

****************************************************************************
 FLOW PROCESS FROM NODE     913.40 TO NODE     913.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE     913.50 TO NODE     913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   368.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.04
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.19
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.07
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.52
 STREET FLOW TRAVEL TIME(MIN.) =   2.97   Tc(MIN.) =   8.97
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.646
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    1.31
 TOTAL AREA(ACRES) =      0.50       PEAK FLOW RATE(CFS) =       1.69

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.92
 FLOW VELOCITY(FEET/SEC.) =  2.27   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
 LONGEST FLOWPATH FROM NODE    913.40 TO NODE    913.00 =   468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 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.) =   8.97
 RAINFALL INTENSITY(INCH/HR) =   3.65
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.69

****************************************************************************
 FLOW PROCESS FROM NODE    912.20 TO NODE    912.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    545.00
 DOWNSTREAM ELEVATION(FEET) =    542.00
 ELEVATION DIFFERENCE(FEET) =      3.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    912.40 TO NODE    913.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   542.00  DOWNSTREAM(FEET) =   532.00
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.93
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.38
 PIPE TRAVEL TIME(MIN.) =   1.44    Tc(MIN.) =   7.44
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.20 =   440.00 FEET.

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

```
 FLOW PROCESS FROM NODE    913.20 TO NODE    913.20 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.936
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     2.00   SUBAREA RUNOFF(CFS) =    7.08
 TOTAL AREA(ACRES) =       2.10   TOTAL RUNOFF(CFS) =    7.46
 TC(MIN.) =   7.44

**********************************************************************
 FLOW PROCESS FROM NODE    913.20 TO NODE    913.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.84  DOWNSTREAM(FEET) =   523.69
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.23
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.46
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   7.48
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.00 =   455.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.48
 RAINFALL INTENSITY(INCH/HR) =   3.93
 TOTAL STREAM AREA(ACRES) =     2.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.46

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         1.68     9.10        3.621         0.50
     2         1.69     8.97        3.646         0.50
     3         7.46     7.48        3.928         2.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
     1        10.58     7.48        3.928
     2        10.29     8.97        3.646
     3        10.24     9.10        3.621

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     10.58   Tc(MIN.) =    7.48
 TOTAL AREA(ACRES) =      3.10
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    909.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.69  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =    27.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.81
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.58
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   7.54
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

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

```
 FLOW PROCESS FROM NODE    909.00 TO NODE    909.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.54
 RAINFALL INTENSITY(INCH/HR) =   3.92
 TOTAL STREAM AREA(ACRES) =      3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.58

****************************************************************************
 FLOW PROCESS FROM NODE    913.60 TO NODE    913.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    913.70 TO NODE    909.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.86
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =    5.69
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.96
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
 STREET FLOW TRAVEL TIME(MIN.) =   3.28   Tc(MIN.) =   9.28
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.587
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.97
 TOTAL AREA(ACRES) =      0.40       PEAK FLOW RATE(CFS) =       1.35

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.16
 FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.58
 LONGEST FLOWPATH FROM NODE    913.60 TO NODE    909.20 =   485.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.20 TO NODE    909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.25  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =     5.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.11
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =      1.35
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   9.29
 LONGEST FLOWPATH FROM NODE    913.60 TO NODE    909.00 =   490.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    909.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.29
 RAINFALL INTENSITY(INCH/HR) =   3.58
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.35

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         10.58     7.54        3.918         3.10
    2          1.35     9.29        3.584         0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         11.82     7.54        3.918
    2         11.03     9.29        3.584

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     11.82   Tc(MIN.) =    7.54
 TOTAL AREA(ACRES) =      3.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    910.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.64  DOWNSTREAM(FEET) =   521.73
 FLOW LENGTH(FEET) =    91.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.82
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   7.75
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.00 =   665.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.00 TO NODE    910.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   521.40  DOWNSTREAM(FEET) =   512.91
 FLOW LENGTH(FEET) =   256.12   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.91
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.82
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   8.14
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.20 =   921.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.20 TO NODE    910.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   511.29  DOWNSTREAM(FEET) =   506.34
 FLOW LENGTH(FEET) =   123.77   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.68
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     11.82
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   8.32
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.32
 RAINFALL INTENSITY(INCH/HR) =   3.77
 TOTAL STREAM AREA(ACRES) =     3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.82

****************************************************************************
 FLOW PROCESS FROM NODE    910.40 TO NODE    910.60 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    528.83
 DOWNSTREAM ELEVATION(FEET) =    525.33
 ELEVATION DIFFERENCE(FEET) =      3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.371
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    910.60 TO NODE    910.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  527.40  DOWNSTREAM ELEVATION(FEET) =  513.28
 STREET LENGTH(FEET) =   312.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.73
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    3.71
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.84
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
 STREET FLOW TRAVEL TIME(MIN.) =   1.83   Tc(MIN.) =   7.83
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.862
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.70
 TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.92
 FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
 LONGEST FLOWPATH FROM NODE    910.40 TO NODE    910.30 =   412.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.83
  RAINFALL INTENSITY(INCH/HR) =   3.86
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.07

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1        11.82      8.32         3.769          3.50
      2         1.07      7.83         3.862          0.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1        12.61      7.83         3.862
      2        12.86      8.32         3.769

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     12.86   Tc(MIN.) =    8.32
  TOTAL AREA(ACRES) =      3.80
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    910.30 TO NODE    914.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   505.84  DOWNSTREAM(FEET) =   499.83
  FLOW LENGTH(FEET) =   140.08   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.04
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.86
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   8.51
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.51
  RAINFALL INTENSITY(INCH/HR) =   3.73
  TOTAL STREAM AREA(ACRES) =     3.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.86

****************************************************************************
  FLOW PROCESS FROM NODE    914.20 TO NODE    914.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    516.00
  DOWNSTREAM ELEVATION(FEET) =    513.78
  ELEVATION DIFFERENCE(FEET) =      2.22
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.760
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE    914.40 TO NODE    914.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  513.28  DOWNSTREAM ELEVATION(FEET) =  505.13
  STREET LENGTH(FEET) =   122.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   6.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.115
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =   3.17
  FLOW VELOCITY(FEET/SEC.) =  3.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
  LONGEST FLOWPATH FROM NODE    914.20 TO NODE    914.00 =   222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.50
  RAINFALL INTENSITY(INCH/HR) =   4.11
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.75

  ** CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY       AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        12.86     8.51        3.732          3.80
      2         0.75     6.50        4.115          0.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF      Tc       INTENSITY
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
      1        12.42     6.50        4.115
      2        13.54     8.51        3.732

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     13.54   Tc(MIN.) =    8.51
  TOTAL AREA(ACRES) =      4.00
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    954.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   499.50  DOWNSTREAM(FEET) =   498.71
  FLOW LENGTH(FEET) =    79.37   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.21
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     13.54
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   8.70
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    954.20 =  1265.09 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    954.20 TO NODE    954.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.697
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40   SUBAREA RUNOFF(CFS) =    1.33
 TOTAL AREA(ACRES) =       4.40   TOTAL RUNOFF(CFS) =   14.88
 TC(MIN.) =   8.70

****************************************************************************
 FLOW PROCESS FROM NODE    954.20 TO NODE    918.80 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.61  DOWNSTREAM(FEET) =   497.39
 FLOW LENGTH(FEET) =   121.84   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.41
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.88
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   8.97
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    918.80 =  1386.93 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.80 TO NODE    918.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.645
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.10   SUBAREA RUNOFF(CFS) =    0.33
 TOTAL AREA(ACRES) =       4.50   TOTAL RUNOFF(CFS) =   15.20
 TC(MIN.) =   8.97

****************************************************************************
 FLOW PROCESS FROM NODE    918.80 TO NODE    918.60 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   497.29  DOWNSTREAM(FEET) =   495.55
 FLOW LENGTH(FEET) =   173.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.46
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     15.20
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   9.36
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    918.60 =  1560.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.60 TO NODE    918.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.572
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     1.00   SUBAREA RUNOFF(CFS) =    3.21
 TOTAL AREA(ACRES) =       5.50   TOTAL RUNOFF(CFS) =   18.42
 TC(MIN.) =   9.36

****************************************************************************
 FLOW PROCESS FROM NODE    918.60 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   495.44  DOWNSTREAM(FEET) =   495.06
 FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  14.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.76
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     18.42
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   9.44
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.44
 RAINFALL INTENSITY(INCH/HR) =   3.56
 TOTAL STREAM AREA(ACRES) =     5.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.42

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    512.74
 DOWNSTREAM ELEVATION(FEET) =    511.74
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.600
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      2.65
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      2.65

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.74  DOWNSTREAM(FEET) =   504.69
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.78
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.65
 PIPE TRAVEL TIME(MIN.) =   1.41    Tc(MIN.) =   7.41
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.20 =   505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.942
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     3.30   SUBAREA RUNOFF(CFS) =   11.71
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =   14.36
 TC(MIN.) =   7.41

****************************************************************************
 FLOW PROCESS FROM NODE    918.20 TO NODE    918.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   504.59  DOWNSTREAM(FEET) =   499.00
 FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.13
```

```
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.36
 PIPE TRAVEL TIME(MIN.) =   1.15    Tc(MIN.) =   8.56
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.40 =  1065.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.40 TO NODE    918.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.90  DOWNSTREAM(FEET) =   495.36
 FLOW LENGTH(FEET) =   259.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.13
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.36
 PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   9.09
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.50 =  1324.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.50 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.26  DOWNSTREAM(FEET) =   495.16
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.13
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.36
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   9.14
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    916.00 =  1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.14
 RAINFALL INTENSITY(INCH/HR) =   3.61
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.36

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        18.42      9.44         3.556          5.50
     2        14.36      9.14         3.614          4.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        32.48      9.14         3.614
     2        32.55      9.44         3.556

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     32.55   Tc(MIN.) =    9.44
 TOTAL AREA(ACRES) =      9.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.556
 *USER SPECIFIED(SUBAREA):
```

```
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =  2.40   SUBAREA RUNOFF(CFS) =  7.68
 TOTAL AREA(ACRES) =  11.90   TOTAL RUNOFF(CFS) =  40.23
 TC(MIN.) =  9.44

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    919.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  495.06  DOWNSTREAM(FEET) =  494.56
 CHANNEL LENGTH THRU SUBAREA(FEET) =  140.00   CHANNEL SLOPE =  0.0036
 CHANNEL BASE(FEET) =  45.50   "Z" FACTOR =  0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  6.00
 CHANNEL FLOW THRU SUBAREA(CFS) =  40.23
 FLOW VELOCITY(FEET/SEC.) =  2.73   FLOW DEPTH(FEET) =  0.32
 TRAVEL TIME(MIN.) =  0.85   Tc(MIN.) =  10.30
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    919.00 =  1739.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    919.00 TO NODE    920.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  494.51  DOWNSTREAM(FEET) =  493.67
 FLOW LENGTH(FEET) =  88.30   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  8.19
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  30.00   NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  40.23
 PIPE TRAVEL TIME(MIN.) =  0.18   Tc(MIN.) =  10.48
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    920.00 =  1827.82 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    920.00 TO NODE    921.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  493.57  DOWNSTREAM(FEET) =  493.09
 FLOW LENGTH(FEET) =  56.30   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  8.19
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  30.00   NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  40.23
 PIPE TRAVEL TIME(MIN.) =  0.11   Tc(MIN.) =  10.59
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    921.00 =  1884.12 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    921.00 TO NODE    952.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  492.99  DOWNSTREAM(FEET) =  491.45
 FLOW LENGTH(FEET) =  187.54   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  8.19
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  30.00   NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  40.23
 PIPE TRAVEL TIME(MIN.) =  0.38   Tc(MIN.) =  10.97
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    952.20 =  2071.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    952.20 TO NODE    990.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  491.15  DOWNSTREAM(FEET) =  491.06
 FLOW LENGTH(FEET) =  11.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  22.3 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.77
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     40.23
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  10.99
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.99
 RAINFALL INTENSITY(INCH/HR) =   3.34
 TOTAL STREAM AREA(ACRES) =    11.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     40.23

****************************************************************************
 FLOW PROCESS FROM NODE    988.00 TO NODE    989.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    503.87
 DOWNSTREAM ELEVATION(FEET) =    503.75
 ELEVATION DIFFERENCE(FEET) =      0.12
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.096
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE    989.00 TO NODE    990.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  503.75  DOWNSTREAM ELEVATION(FEET) =  500.48
 STREET LENGTH(FEET) =   375.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.26
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    7.41
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.84
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
 STREET FLOW TRAVEL TIME(MIN.) =   3.39   Tc(MIN.) =   9.39
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.566
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.00
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       1.76

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.91
 FLOW VELOCITY(FEET/SEC.) =  1.95   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
 LONGEST FLOWPATH FROM NODE    988.00 TO NODE    990.00 =   425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
```

```
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.39
RAINFALL INTENSITY(INCH/HR) = 3.57
TOTAL STREAM AREA(ACRES) = 0.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.76

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	40.23	10.99	3.341	11.90
2	1.76	9.39	3.566	0.60

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	39.44	9.39	3.566
2	41.87	10.99	3.341

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 41.87 Tc(MIN.) = 10.99
TOTAL AREA(ACRES) = 12.50
LONGEST FLOWPATH FROM NODE 911.00 TO NODE 990.00 = 2082.66 FEET.

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

FLOW PROCESS FROM NODE 990.00 TO NODE 991.00 IS CODE = 41

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

ELEVATION DATA: UPSTREAM(FEET) = 491.21 DOWNSTREAM(FEET) = 491.06
FLOW LENGTH(FEET) = 11.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.33
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.87
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 11.01
LONGEST FLOWPATH FROM NODE 911.00 TO NODE 991.00 = 2093.66 FEET.

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

FLOW PROCESS FROM NODE 991.00 TO NODE 991.00 IS CODE = 10

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

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

FLOW PROCESS FROM NODE 957.00 TO NODE 958.00 IS CODE = 21

```
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 503.59
DOWNSTREAM ELEVATION(FEET) = 501.59
ELEVATION DIFFERENCE(FEET) = 2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.857
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.210
SUBAREA RUNOFF(CFS) = 0.38
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.38

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

FLOW PROCESS FROM NODE 958.00 TO NODE 955.00 IS CODE = 62

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 2 USED)<<<<<
```

UPSTREAM ELEVATION(FEET) = 501.59 DOWNSTREAM ELEVATION(FEET) = 497.41

```
 STREET LENGTH(FEET) =   304.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.21
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.26
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.88
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
 STREET FLOW TRAVEL TIME(MIN.) =   2.69   Tc(MIN.) =   8.69
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.698
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    1.66
 TOTAL AREA(ACRES) =       0.60        PEAK FLOW RATE(CFS) =       2.04

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.24
 FLOW VELOCITY(FEET/SEC.) =  2.10   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    955.00 =   404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    955.00 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.76  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.04
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   8.81
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.81
 RAINFALL INTENSITY(INCH/HR) =   3.68
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.04

****************************************************************************
 FLOW PROCESS FROM NODE    959.00 TO NODE    960.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    503.59
 DOWNSTREAM ELEVATION(FEET) =    501.59
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    960.00 TO NODE    956.20 IS CODE =  62
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.41
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.28
  HALFSTREET FLOOD WIDTH(FEET) =    7.46
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.10
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.58
STREET FLOW TRAVEL TIME(MIN.) =   1.99   Tc(MIN.) =   7.99
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.832
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =     0.60      SUBAREA RUNOFF(CFS) =     2.07
TOTAL AREA(ACRES) =       0.70        PEAK FLOW RATE(CFS) =       2.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.60
FLOW VELOCITY(FEET/SEC.) =  2.36   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.20 =   350.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    956.20 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   492.48  DOWNSTREAM(FEET) =   492.46
FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.48
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      2.45
PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.00
LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.00 =   352.25 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   8.00
RAINFALL INTENSITY(INCH/HR) =   3.83
TOTAL STREAM AREA(ACRES) =     0.70
PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.45

** CONFLUENCE DATA **
STREAM      RUNOFF       Tc       INTENSITY       AREA
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
   1          2.04      8.81         3.676          0.60
   2          2.45      8.00         3.831          0.70

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc       INTENSITY
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
   1          4.41      8.00         3.831
   2          4.39      8.81         3.676
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      4.41   Tc(MIN.) =    8.00
 TOTAL AREA(ACRES) =      1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.46  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.73
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      4.41
 PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   8.70
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          4.41      8.70        3.697        1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         41.87     11.01        3.339       12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
    1        42.23       8.70        3.697
    2        45.85      11.01        3.339

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     45.85   Tc(MIN.) =   11.01
 TOTAL AREA(ACRES) =     13.80

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 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.) =  11.01
 RAINFALL INTENSITY(INCH/HR) =   3.34
 TOTAL STREAM AREA(ACRES) =   13.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     45.85

****************************************************************************
 FLOW PROCESS FROM NODE    994.20 TO NODE    994.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    501.47
 DOWNSTREAM ELEVATION(FEET) =    500.54
```

```
 ELEVATION DIFFERENCE(FEET) =      0.93
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.688
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    994.40 TO NODE    994.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  500.54  DOWNSTREAM ELEVATION(FEET) =  498.52
 STREET LENGTH(FEET) =   205.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 51.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.06
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.38
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.61
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
 STREET FLOW TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =   8.13
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.806
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     1.37
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.75

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.27
 FLOW VELOCITY(FEET/SEC.) =  1.79   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE    994.20 TO NODE    994.00 =   305.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    994.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.61  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.58
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.75
 PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =   9.20
 LONGEST FLOWPATH FROM NODE    994.20 TO NODE    991.00 =   535.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.20
 RAINFALL INTENSITY(INCH/HR) =   3.60
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.75

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        45.85    11.01        3.339         13.80
    2         1.75     9.20        3.602          0.50
```

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        44.25      9.20        3.602
     2        47.47     11.01        3.339

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     47.47   Tc(MIN.) =   11.01
 TOTAL AREA(ACRES) =     14.30
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    987.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   490.73  DOWNSTREAM(FEET) =   490.40
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.09
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     47.47
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  11.08
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    987.00 =  2133.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    987.00 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.) =  11.08
 RAINFALL INTENSITY(INCH/HR) =   3.33
 TOTAL STREAM AREA(ACRES) =    14.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.47

****************************************************************************
 FLOW PROCESS FROM NODE    985.00 TO NODE    986.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    505.80
 DOWNSTREAM ELEVATION(FEET) =    505.60
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.228
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.315
 SUBAREA RUNOFF(CFS) =      0.15
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
 FLOW PROCESS FROM NODE    986.00 TO NODE    987.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    505.60  DOWNSTREAM(FEET) =    501.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   330.00   CHANNEL SLOPE =  0.0124
 CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.825
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.34
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.17
 AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   4.71
```

```
 Tc(MIN.) =  15.94
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =    0.38
 TOTAL AREA(ACRES) =      0.40       PEAK FLOW RATE(CFS) =       0.53

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   1.31
 LONGEST FLOWPATH FROM NODE    985.00 TO NODE    987.00 =   380.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    987.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  15.94
 RAINFALL INTENSITY(INCH/HR) =   2.82
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.53

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1        47.47     11.08        3.331         14.30
     2         0.53     15.94        2.825          0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        47.92     11.08        3.331
     2        40.79     15.94        2.825

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     47.92   Tc(MIN.) =   11.08
 TOTAL AREA(ACRES) =     14.70
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    987.00 =  2133.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    983.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   490.07  DOWNSTREAM(FEET) =   489.98
 FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.85
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     47.92
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.10
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    983.00 =  2142.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    983.00 TO NODE    983.00 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.) =  11.10
 RAINFALL INTENSITY(INCH/HR) =   3.33
 TOTAL STREAM AREA(ACRES) =    14.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.92

****************************************************************************
 FLOW PROCESS FROM NODE    981.00 TO NODE    982.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    505.41
```

```
 DOWNSTREAM ELEVATION(FEET) =    505.21
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.873
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.32
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
 FLOW PROCESS FROM NODE    982.00 TO NODE    983.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  505.21  DOWNSTREAM ELEVATION(FEET) =  502.12
 STREET LENGTH(FEET) =   360.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 51.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.58
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =    5.58
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.35
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.32
 STREET FLOW TRAVEL TIME(MIN.) =   4.46   Tc(MIN.) =  10.46
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.400
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.52
 TOTAL AREA(ACRES) =       0.30        PEAK FLOW RATE(CFS) =        0.84

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.84
 FLOW VELOCITY(FEET/SEC.) =  1.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.38
 LONGEST FLOWPATH FROM NODE    981.00 TO NODE    983.00 =   410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    983.00 TO NODE    983.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREA VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.46
 RAINFALL INTENSITY(INCH/HR) =   3.40
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.84

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1        47.92     11.10         3.329         14.70
    2         0.84     10.46         3.400          0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1        47.77     10.46         3.400
    2        48.74     11.10         3.329

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     48.74   Tc(MIN.) =   11.10
```

```
 TOTAL AREA(ACRES) =     15.00
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    983.00 =  2142.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    983.00 TO NODE    999.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   489.65  DOWNSTREAM(FEET) =   489.10
 FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     48.74
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  11.23
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    999.00 =  2215.66 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     15.00  TC(MIN.) =     11.23
 PEAK FLOW RATE(CFS)   =     48.74
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

25-Year

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        Rick Engineering Company
                      1223 University Ave., Suite 240
                        Riverside, California 92507

 ************************** DESCRIPTION OF STUDY **************************
* J-16630 BMR North Village East Unit 14                                  *
* Construction Change 'F'                                                 *
* Basin 900A - 25 Year Storm Event                                        *
 **************************************************************************

  FILE NAME: BMR9AP25.DAT
  TIME/DATE OF STUDY: 14:46 06/20/2014
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  3.800
   2)  10.000;  3.000
   3)  15.000;  2.500
   4)  20.000;  2.100
   5)  25.000;  1.900
   6)  30.000;  1.700
   7)  40.000;  1.450
   8)  50.000;  1.300
   9)  60.000;  1.150
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL   IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  ==================  ======  =====  ====  =====  =======
  1   30.0     20.0   0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0   0.020/0.020/0.020    0.50    1.50 0.0313 0.125 0.0180
  3   51.0     46.0   0.020/0.020/0.020    0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE     911.00 TO NODE     912.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
  UPSTREAM ELEVATION(FEET) =  544.00
  DOWNSTREAM ELEVATION(FEET) =  539.81
  ELEVATION DIFFERENCE(FEET) =  4.19
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.233
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
  SUBAREA RUNOFF(CFS) =  0.33
```

```
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE     912.00 TO NODE     913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  539.81  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.89
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.13
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.34
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
 STREET FLOW TRAVEL TIME(MIN.) =   3.18   Tc(MIN.) =   9.18
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.131
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.13
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.45

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.70
 FLOW VELOCITY(FEET/SEC.) =  2.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     913.00 TO NODE     913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.18
 RAINFALL INTENSITY(INCH/HR) =   3.13
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.45

****************************************************************************
 FLOW PROCESS FROM NODE     913.40 TO NODE     913.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE     913.50 TO NODE     913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   368.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =    5.74
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.00
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
 STREET FLOW TRAVEL TIME(MIN.) =   3.06   Tc(MIN.) =   9.06
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.150
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    1.13
 TOTAL AREA(ACRES) =      0.50       PEAK FLOW RATE(CFS) =       1.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.36
 FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
 LONGEST FLOWPATH FROM NODE    913.40 TO NODE    913.00 =   468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.06
 RAINFALL INTENSITY(INCH/HR) =   3.15
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.46

****************************************************************************
 FLOW PROCESS FROM NODE    912.20 TO NODE    912.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    545.00
 DOWNSTREAM ELEVATION(FEET) =    542.00
 ELEVATION DIFFERENCE(FEET) =      3.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    912.40 TO NODE    913.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   542.00  DOWNSTREAM(FEET) =   532.00
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.82
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.33
 PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =   7.48
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.20 =   440.00 FEET.

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

```
 FLOW PROCESS FROM NODE    913.20 TO NODE    913.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.402
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     2.00   SUBAREA RUNOFF(CFS) =     6.12
 TOTAL AREA(ACRES) =       2.10   TOTAL RUNOFF(CFS) =     6.45
 TC(MIN.) =   7.48

****************************************************************************
 FLOW PROCESS FROM NODE    913.20 TO NODE    913.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.84  DOWNSTREAM(FEET) =   523.69
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.99
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.45
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   7.53
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.00 =   455.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.53
 RAINFALL INTENSITY(INCH/HR) =   3.40
 TOTAL STREAM AREA(ACRES) =     2.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.45

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          1.45     9.18        3.131         0.50
    2          1.46     9.06        3.150         0.50
    3          6.45     7.53        3.396         2.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1          9.15     7.53        3.396
    2          8.89     9.06        3.150
    3          8.86     9.18        3.131

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      9.15   Tc(MIN.) =    7.53
 TOTAL AREA(ACRES) =      3.10
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.69  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =    27.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.53
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      9.15
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   7.58
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

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

```
 FLOW PROCESS FROM NODE     909.00 TO NODE     909.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.58
 RAINFALL INTENSITY(INCH/HR) =    3.39
 TOTAL STREAM AREA(ACRES) =      3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.15

**********************************************************************
 FLOW PROCESS FROM NODE     913.60 TO NODE     913.70 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
 UPSTREAM ELEVATION(FEET) =     536.26
 DOWNSTREAM ELEVATION(FEET) =     534.26
 ELEVATION DIFFERENCE(FEET) =       2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =       0.33
 TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.33

**********************************************************************
 FLOW PROCESS FROM NODE     913.70 TO NODE     909.20 IS CODE =  62
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.75
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
 STREET FLOW TRAVEL TIME(MIN.) =   3.36   Tc(MIN.) =   9.36
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.102
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.84
 TOTAL AREA(ACRES) =       0.40        PEAK FLOW RATE(CFS) =       1.17

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.70
 FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
 LONGEST FLOWPATH FROM NODE     913.60 TO NODE     909.20 =   485.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     909.20 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.25  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =      5.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.92
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =      1.17
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   9.38
 LONGEST FLOWPATH FROM NODE    913.60 TO NODE    909.00 =   490.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    909.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.38
 RAINFALL INTENSITY(INCH/HR) =   3.10
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.17

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          9.15     7.58        3.387         3.10
    2          1.17     9.38        3.099         0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         10.22     7.58        3.387
    2          9.54     9.38        3.099

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     10.22   Tc(MIN.) =    7.58
 TOTAL AREA(ACRES) =      3.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    910.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.64  DOWNSTREAM(FEET) =   521.73
 FLOW LENGTH(FEET) =    91.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.22
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   7.81
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.00 =   665.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.00 TO NODE    910.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   521.40  DOWNSTREAM(FEET) =   512.91
 FLOW LENGTH(FEET) =   256.12   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.22
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   8.21
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.20 =   921.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.20 TO NODE    910.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   511.29  DOWNSTREAM(FEET) =   506.34
 FLOW LENGTH(FEET) =   123.77   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.22
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     10.22
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   8.40
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.40
 RAINFALL INTENSITY(INCH/HR) =   3.26
 TOTAL STREAM AREA(ACRES) =     3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.22

****************************************************************************
 FLOW PROCESS FROM NODE    910.40 TO NODE    910.60 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    528.83
 DOWNSTREAM ELEVATION(FEET) =    525.33
 ELEVATION DIFFERENCE(FEET) =      3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.371
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    910.60 TO NODE    910.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  527.40  DOWNSTREAM ELEVATION(FEET) =  513.28
 STREET LENGTH(FEET) =   312.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.63
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.19
   HALFSTREET FLOOD WIDTH(FEET) =    3.22
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.83
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
 STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   7.84
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.346
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.60
 TOTAL AREA(ACRES) =      0.30       PEAK FLOW RATE(CFS) =       0.93

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.48
 FLOW VELOCITY(FEET/SEC.) =  2.92   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
 LONGEST FLOWPATH FROM NODE    910.40 TO NODE    910.30 =   412.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.84
 RAINFALL INTENSITY(INCH/HR) =   3.35
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.93

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1         10.22      8.40         3.257          3.50
    2          0.93      7.84         3.346          0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1         10.87      7.84         3.346
    2         11.12      8.40         3.257

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     11.12   Tc(MIN.) =    8.40
 TOTAL AREA(ACRES) =      3.80
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    914.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   505.84  DOWNSTREAM(FEET) =   499.83
 FLOW LENGTH(FEET) =   140.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.55
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.12
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   8.60
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.60
 RAINFALL INTENSITY(INCH/HR) =   3.22
 TOTAL STREAM AREA(ACRES) =     3.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.12

****************************************************************************
 FLOW PROCESS FROM NODE    914.20 TO NODE    914.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    516.00
 DOWNSTREAM ELEVATION(FEET) =    513.78
 ELEVATION DIFFERENCE(FEET) =      2.22
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.760
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    914.40 TO NODE    914.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  513.28  DOWNSTREAM ELEVATION(FEET) =  505.13
  STREET LENGTH(FEET) =   122.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   6.50
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.560
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.10      SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =       0.20       PEAK FLOW RATE(CFS) =       0.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.18   HALFSTREET FLOOD WIDTH(FEET) =   2.62
  FLOW VELOCITY(FEET/SEC.) =  3.47   DEPTH*VELOCITY(FT*FT/SEC.) =   0.62
  LONGEST FLOWPATH FROM NODE    914.20 TO NODE    914.00 =   222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.50
  RAINFALL INTENSITY(INCH/HR) =   3.56
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.65

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1        11.12      8.60         3.224          3.80
      2         0.65      6.50         3.560          0.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1        10.72      6.50         3.560
      2        11.71      8.60         3.224

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     11.71   Tc(MIN.) =    8.60
  TOTAL AREA(ACRES) =      4.00
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    954.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   499.50  DOWNSTREAM(FEET) =   498.71
  FLOW LENGTH(FEET) =    79.37   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =    11.71
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   8.79
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    954.20 =  1265.09 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    954.20 TO NODE    954.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.194
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.15
 TOTAL AREA(ACRES) =      4.40   TOTAL RUNOFF(CFS) =   12.86
 TC(MIN.) =   8.79

****************************************************************************
 FLOW PROCESS FROM NODE    954.20 TO NODE    918.80 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.61  DOWNSTREAM(FEET) =   497.39
 FLOW LENGTH(FEET) =   121.84   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.13
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    12.86
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   9.07
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    918.80 =  1386.93 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.80 TO NODE    918.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.148
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.28
 TOTAL AREA(ACRES) =      4.50   TOTAL RUNOFF(CFS) =   13.14
 TC(MIN.) =   9.07

****************************************************************************
 FLOW PROCESS FROM NODE    918.80 TO NODE    918.60 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   497.29  DOWNSTREAM(FEET) =   495.55
 FLOW LENGTH(FEET) =   173.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    13.14
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   9.48
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    918.60 =  1560.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.60 TO NODE    918.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.084
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    2.78
 TOTAL AREA(ACRES) =      5.50   TOTAL RUNOFF(CFS) =   15.92
 TC(MIN.) =   9.48

****************************************************************************
 FLOW PROCESS FROM NODE    918.60 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   495.44  DOWNSTREAM(FEET) =   495.06
 FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.47
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     15.92
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   9.56
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.56
 RAINFALL INTENSITY(INCH/HR) =   3.07
 TOTAL STREAM AREA(ACRES) =     5.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.92

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    512.74
 DOWNSTREAM ELEVATION(FEET) =    511.74
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.600
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      2.29
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      2.29

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.74  DOWNSTREAM(FEET) =   504.69
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.59
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.29
 PIPE TRAVEL TIME(MIN.) =   1.47    Tc(MIN.) =   7.47
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.20 =   505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.405
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     3.30   SUBAREA RUNOFF(CFS) =   10.11
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =   12.40
 TC(MIN.) =   7.47

****************************************************************************
 FLOW PROCESS FROM NODE    918.20 TO NODE    918.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   504.59  DOWNSTREAM(FEET) =   499.00
 FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
```

```
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.40
 PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   8.80
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.40 =  1065.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.40 TO NODE    918.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.90  DOWNSTREAM(FEET) =   495.36
 FLOW LENGTH(FEET) =   259.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.40
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   9.42
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.50 =  1324.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.50 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.26  DOWNSTREAM(FEET) =   495.16
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.40
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   9.47
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    916.00 =  1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.47
 RAINFALL INTENSITY(INCH/HR) =   3.09
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.40

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        15.92      9.56         3.070          5.50
     2        12.40      9.47         3.085          4.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        28.24      9.47         3.085
     2        28.26      9.56         3.070

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     28.26   Tc(MIN.) =    9.56
 TOTAL AREA(ACRES) =      9.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.070
 *USER SPECIFIED(SUBAREA):
```

```
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    6.63
 TOTAL AREA(ACRES) =     11.90   TOTAL RUNOFF(CFS) =   34.89
 TC(MIN.) =   9.56

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    919.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    495.06  DOWNSTREAM(FEET) =    494.56
 CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.0036
 CHANNEL BASE(FEET) =   45.50   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   6.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    34.89
 FLOW VELOCITY(FEET/SEC.) =   2.60   FLOW DEPTH(FEET) =   0.29
 TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =  10.46
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    919.00 =  1739.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    919.00 TO NODE    920.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   494.51  DOWNSTREAM(FEET) =   493.67
 FLOW LENGTH(FEET) =    88.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    34.89
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  10.63
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    920.00 =  1827.82 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    920.00 TO NODE    921.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   493.57  DOWNSTREAM(FEET) =   493.09
 FLOW LENGTH(FEET) =    56.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.37
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    34.89
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  10.74
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    921.00 =  1884.12 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    921.00 TO NODE    952.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.99  DOWNSTREAM(FEET) =   491.45
 FLOW LENGTH(FEET) =   187.54   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.22
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    34.89
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  11.12
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    952.20 =  2071.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    952.20 TO NODE    990.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   491.15  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.49
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    34.89
```

```
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.14
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 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.) =  11.14
 RAINFALL INTENSITY(INCH/HR) =   2.89
 TOTAL STREAM AREA(ACRES) =    11.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.89

****************************************************************************
 FLOW PROCESS FROM NODE    988.00 TO NODE    989.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    503.87
 DOWNSTREAM ELEVATION(FEET) =    503.75
 ELEVATION DIFFERENCE(FEET) =      0.12
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.096
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.66
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
 FLOW PROCESS FROM NODE    989.00 TO NODE    990.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  503.75  DOWNSTREAM ELEVATION(FEET) =  500.48
 STREET LENGTH(FEET) =   375.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.09
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    6.78
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.80
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
 STREET FLOW TRAVEL TIME(MIN.) =   3.47   Tc(MIN.) =   9.47
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.085
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.86
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       1.52

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.22
 FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.59
 LONGEST FLOWPATH FROM NODE    988.00 TO NODE    990.00 =   425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.47
 RAINFALL INTENSITY(INCH/HR) =   3.09
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.52

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1         34.89     11.14         2.886         11.90
    2          1.52      9.47         3.085          0.60

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1         34.15      9.47         3.085
    2         36.31     11.14         2.886

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     36.31   Tc(MIN.) =   11.14
 TOTAL AREA(ACRES) =     12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   491.21  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.56
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     36.31
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.16
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    957.00 TO NODE    958.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    503.59
 DOWNSTREAM ELEVATION(FEET) =    501.59
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    958.00 TO NODE    955.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
 STREET LENGTH(FEET) =   304.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    6.75
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.83
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
 STREET FLOW TRAVEL TIME(MIN.) =   2.77   Tc(MIN.) =   8.77
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.196
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    1.44
 TOTAL AREA(ACRES) =       0.60        PEAK FLOW RATE(CFS) =       1.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.68
 FLOW VELOCITY(FEET/SEC.) =  2.03   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    955.00 =   404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    955.00 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.76  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.25
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.77
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   8.89
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.89
 RAINFALL INTENSITY(INCH/HR) =   3.18
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.77

****************************************************************************
 FLOW PROCESS FROM NODE    959.00 TO NODE    960.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    503.59
 DOWNSTREAM ELEVATION(FEET) =    501.59
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    960.00 TO NODE    956.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
```

```
 UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
 STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.22
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    6.96
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
 STREET FLOW TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =   8.05
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.312
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.60      SUBAREA RUNOFF(CFS) =    1.79
 TOTAL AREA(ACRES) =       0.70        PEAK FLOW RATE(CFS) =       2.12

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.99
 FLOW VELOCITY(FEET/SEC.) =  2.29   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.20 =   350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.20 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.48  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.12
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.06
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.00 =   352.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.06
 RAINFALL INTENSITY(INCH/HR) =   3.31
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.12

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1          1.77      8.89         3.177          0.60
    2          2.12      8.06         3.310          0.70

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          3.81      8.06         3.310
    2          3.80      8.89         3.177

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      3.81   Tc(MIN.) =    8.06
```

```
 TOTAL AREA(ACRES) =      1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.46  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.54
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.81
 PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   8.79
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          3.81      8.79         3.193         1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         36.31     11.16         2.884        12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1        36.61        8.79         3.193
    2        39.75       11.16         2.884

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     39.75   Tc(MIN.) =   11.16
 TOTAL AREA(ACRES) =     13.80

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  11.16
 RAINFALL INTENSITY(INCH/HR) =   2.88
 TOTAL STREAM AREA(ACRES) =    13.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.75

****************************************************************************
 FLOW PROCESS FROM NODE    994.20 TO NODE    994.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    501.47
 DOWNSTREAM ELEVATION(FEET) =    500.54
 ELEVATION DIFFERENCE(FEET) =      0.93
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.688
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
```

```
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
SUBAREA RUNOFF(CFS) =      0.33
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    994.40 TO NODE    994.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  500.54  DOWNSTREAM ELEVATION(FEET) =  498.52
 STREET LENGTH(FEET) =   205.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 51.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.92
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    6.93
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.54
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.41
 STREET FLOW TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =   8.22
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.284
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     1.18
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.51

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.73
 FLOW VELOCITY(FEET/SEC.) =  1.72   DEPTH*VELOCITY(FT*FT/SEC.) =   0.52
 LONGEST FLOWPATH FROM NODE    994.20 TO NODE    994.00 =   305.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    994.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.61  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   4.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.43
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.51
 PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   9.34
 LONGEST FLOWPATH FROM NODE    994.20 TO NODE    991.00 =   535.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.34
 RAINFALL INTENSITY(INCH/HR) =   3.11
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.51

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)     (ACRE)
    1        39.75    11.16        2.884          13.80
    2         1.51     9.34        3.105           0.50

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

```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc       INTENSITY
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)
    1        38.43     9.34        3.105
    2        41.15    11.16        2.884

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     41.15   Tc(MIN.) =   11.16
 TOTAL AREA(ACRES) =     14.30
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    987.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   490.73  DOWNSTREAM(FEET) =   490.40
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  22.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.85
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     41.15
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  11.23
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    987.00 =  2133.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    987.00 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.) =  11.23
 RAINFALL INTENSITY(INCH/HR) =   2.88
 TOTAL STREAM AREA(ACRES) =    14.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.15

****************************************************************************
 FLOW PROCESS FROM NODE    985.00 TO NODE    986.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    505.80
 DOWNSTREAM ELEVATION(FEET) =    505.60
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.228
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.877
 SUBAREA RUNOFF(CFS) =      0.13
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.13

****************************************************************************
 FLOW PROCESS FROM NODE    986.00 TO NODE    987.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    505.60  DOWNSTREAM(FEET) =    501.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   330.00   CHANNEL SLOPE =  0.0124
 CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.396
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.29
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.08
 AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   5.07
 Tc(MIN.) =  16.30
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.32
 TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       0.45
```

```
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   1.25
 LONGEST FLOWPATH FROM NODE    985.00 TO NODE    987.00 =   380.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    987.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  16.30
 RAINFALL INTENSITY(INCH/HR) =   2.40
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.45

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        41.15     11.23         2.877         14.30
    2         0.45     16.30         2.396          0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1        41.53     11.23         2.877
    2        34.73     16.30         2.396

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     41.53   Tc(MIN.) =   11.23
 TOTAL AREA(ACRES) =     14.70
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    987.00 =  2133.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    983.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   490.07  DOWNSTREAM(FEET) =   489.98
 FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  21.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.56
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     41.53
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.25
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    983.00 =  2142.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    983.00 TO NODE    983.00 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.) =  11.25
 RAINFALL INTENSITY(INCH/HR) =   2.88
 TOTAL STREAM AREA(ACRES) =    14.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.53

****************************************************************************
 FLOW PROCESS FROM NODE    981.00 TO NODE    982.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    505.41
 DOWNSTREAM ELEVATION(FEET) =    505.21
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.873
```

```
*CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
 DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
SUBAREA RUNOFF(CFS) =      0.28
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
FLOW PROCESS FROM NODE    982.00 TO NODE    983.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  505.21  DOWNSTREAM ELEVATION(FEET) =  502.12
STREET LENGTH(FEET) =   360.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 51.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
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) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.50
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.23
  HALFSTREET FLOOD WIDTH(FEET) =    5.13
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.31
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.30
STREET FLOW TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =  10.58
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.942
*USER SPECIFIED(SUBAREA):
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7600
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.45
TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       0.72

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.30
FLOW VELOCITY(FEET/SEC.) =  1.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.35
LONGEST FLOWPATH FROM NODE    981.00 TO NODE    983.00 =   410.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    983.00 TO NODE    983.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  10.58
RAINFALL INTENSITY(INCH/HR) =   2.94
TOTAL STREAM AREA(ACRES) =     0.30
PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.72

** CONFLUENCE DATA **
STREAM      RUNOFF       Tc       INTENSITY       AREA
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        41.53    11.25         2.875         14.70
    2         0.72    10.58         2.942          0.30

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc       INTENSITY
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1        41.31    10.58         2.942
    2        42.24    11.25         2.875

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     42.24   Tc(MIN.) =   11.25
TOTAL AREA(ACRES) =     15.00
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    983.00 =  2142.66 FEET.
```

```
**********************************************************************
 FLOW PROCESS FROM NODE    983.00 TO NODE    999.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   489.65  DOWNSTREAM(FEET) =   489.10
 FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.58
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     42.24
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  11.39
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    999.00 =  2215.66 FEET.
======================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     15.00  TC(MIN.) =     11.39
 PEAK FLOW RATE(CFS)   =     42.24
======================================================================
======================================================================
 END OF RATIONAL METHOD ANALYSIS

♀
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10-Year

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**************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                          Rick Engineering Company
                        1223 University Ave., Suite 240
                          Riverside, California 92507


 ************************** DESCRIPTION OF STUDY **************************
* J-16630 BMR North Village East Unit 14                                  *
* Construction Change 'F'                                                 *
* Basin 900A - 10 Year Storm Event                                        *
 **************************************************************************

  FILE NAME: BMR9AP10.DAT
  TIME/DATE OF STUDY: 14:45 06/20/2014
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION USED

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  ======  =========  ==================  ======  ======  ======  ======  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00  0.0313  0.167  0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50  0.0313  0.125  0.0180
  3   51.0     46.0    0.020/0.020/0.020   0.50    1.50  0.0313  0.125  0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE     911.00 TO NODE     912.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
  UPSTREAM ELEVATION(FEET) =  544.00
  DOWNSTREAM ELEVATION(FEET) =  539.81
  ELEVATION DIFFERENCE(FEET) =  4.19
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.233
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
  SUBAREA RUNOFF(CFS) =  0.28
  TOTAL AREA(ACRES) =  0.10   TOTAL RUNOFF(CFS) =  0.28

**************************************************************************
  FLOW PROCESS FROM NODE     912.00 TO NODE     913.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  539.81  DOWNSTREAM ELEVATION(FEET) =  527.37
```

```
 STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.22
   HALFSTREET FLOOD WIDTH(FEET) =    4.64
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
 STREET FLOW TRAVEL TIME(MIN.) =   3.24   Tc(MIN.) =   9.24
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.673
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    0.96
 TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS) =       1.25

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.19
 FLOW VELOCITY(FEET/SEC.) =  2.48   DEPTH*VELOCITY(FT*FT/SEC.) =   0.62
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.24
 RAINFALL INTENSITY(INCH/HR) =   2.67
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.25

****************************************************************************
 FLOW PROCESS FROM NODE    913.40 TO NODE    913.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.28
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    913.50 TO NODE    913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   368.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
```

```
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.28
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.94
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.45
 STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   9.17
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.682
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.97
 TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS) =       1.25

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.85
 FLOW VELOCITY(FEET/SEC.) =  2.13   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE    913.40 TO NODE    913.00 =   468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.17
 RAINFALL INTENSITY(INCH/HR) =   2.68
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.25

****************************************************************************
 FLOW PROCESS FROM NODE    912.20 TO NODE    912.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    545.00
 DOWNSTREAM ELEVATION(FEET) =    542.00
 ELEVATION DIFFERENCE(FEET) =      3.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.28
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    912.40 TO NODE    913.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   542.00  DOWNSTREAM(FEET) =   532.00
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.59
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.28
 PIPE TRAVEL TIME(MIN.) =   1.58    Tc(MIN.) =   7.58
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.20 =   440.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.20 TO NODE    913.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.914
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    2.00   SUBAREA RUNOFF(CFS) =     5.24
```

```
 TOTAL AREA(ACRES) =      2.10   TOTAL RUNOFF(CFS) =     5.53
 TC(MIN.) =   7.58

****************************************************************************
 FLOW PROCESS FROM NODE     913.20 TO NODE     913.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.84  DOWNSTREAM(FEET) =   523.69
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.74
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.53
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   7.62
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.00 =   455.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     913.00 TO NODE     913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.62
 RAINFALL INTENSITY(INCH/HR) =   2.91
 TOTAL STREAM AREA(ACRES) =     2.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.53

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
    1          1.25      9.24        2.673          0.50
    2          1.25      9.17        2.682          0.50
    3          5.53      7.62        2.907          2.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)
    1          7.83      7.62        2.907
    2          7.59      9.17        2.682
    3          7.58      9.24        2.673

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      7.83   Tc(MIN.) =    7.62
 TOTAL AREA(ACRES) =      3.10
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     913.00 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.69  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =    27.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.23
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.83
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   7.68
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     909.00 TO NODE     909.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.68
 RAINFALL INTENSITY(INCH/HR) =   2.90
 TOTAL STREAM AREA(ACRES) =     3.10
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.83

****************************************************************************
 FLOW PROCESS FROM NODE     913.60 TO NODE     913.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
 UPSTREAM ELEVATION(FEET) =  536.26
 DOWNSTREAM ELEVATION(FEET) =  534.26
 ELEVATION DIFFERENCE(FEET) =  2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =  0.28
 TOTAL AREA(ACRES) =  0.10  TOTAL RUNOFF(CFS) =  0.28

****************************************************************************
 FLOW PROCESS FROM NODE     913.70 TO NODE     909.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =  385.00  CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =  0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =  0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  0.64
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.22
   HALFSTREET FLOOD WIDTH(FEET) =  4.81
   AVERAGE FLOW VELOCITY(FEET/SEC.) =  1.84
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =  0.41
 STREET FLOW TRAVEL TIME(MIN.) =  3.49  Tc(MIN.) =  9.49
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.647
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =  0.30  SUBAREA RUNOFF(CFS) =  0.71
 TOTAL AREA(ACRES) =  0.40  PEAK FLOW RATE(CFS) =  1.00

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25  HALFSTREET FLOOD WIDTH(FEET) =  6.19
 FLOW VELOCITY(FEET/SEC.) =  1.99  DEPTH*VELOCITY(FT*FT/SEC.) =  0.50
 LONGEST FLOWPATH FROM NODE  913.60 TO NODE  909.20 =  485.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     909.20 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  523.25  DOWNSTREAM(FEET) =  523.14
 FLOW LENGTH(FEET) =  5.25  MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  3.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  4.69
 GIVEN PIPE DIAMETER(INCH) =  18.00  NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  1.00
 PIPE TRAVEL TIME(MIN.) =  0.02  Tc(MIN.) =  9.50
 LONGEST FLOWPATH FROM NODE  913.60 TO NODE  909.00 =  490.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     909.00 TO NODE     909.00 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.50
 RAINFALL INTENSITY(INCH/HR) =   2.64
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.00

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)     (ACRE)
    1          7.83     7.68        2.899          3.10
    2          1.00     9.50        2.645          0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1          8.74     7.68        2.899
    2          8.14     9.50        2.645

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      8.74   Tc(MIN.) =    7.68
 TOTAL AREA(ACRES) =      3.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    910.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.64  DOWNSTREAM(FEET) =   521.73
 FLOW LENGTH(FEET) =    91.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      8.74
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   7.91
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.00 =   665.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.00 TO NODE    910.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   521.40  DOWNSTREAM(FEET) =   512.91
 FLOW LENGTH(FEET) =   256.12   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.04
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      8.74
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   8.34
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.20 =   921.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.20 TO NODE    910.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   511.29  DOWNSTREAM(FEET) =   506.34
 FLOW LENGTH(FEET) =   123.77   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.73
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      8.74
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   8.53
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.53
 RAINFALL INTENSITY(INCH/HR) =    2.77
 TOTAL STREAM AREA(ACRES) =      3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.74

****************************************************************************
 FLOW PROCESS FROM NODE     910.40 TO NODE     910.60 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
 UPSTREAM ELEVATION(FEET) =     528.83
 DOWNSTREAM ELEVATION(FEET) =     525.33
 ELEVATION DIFFERENCE(FEET) =       3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     2.371
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =       0.28
 TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.28

****************************************************************************
 FLOW PROCESS FROM NODE     910.60 TO NODE     910.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  527.40  DOWNSTREAM ELEVATION(FEET) =  513.28
 STREET LENGTH(FEET) =   312.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.54
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.18
   HALFSTREET FLOOD WIDTH(FEET) =    2.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
 STREET FLOW TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   7.82
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.877
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.52
 TOTAL AREA(ACRES) =       0.30        PEAK FLOW RATE(CFS) =       0.80

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.04
 FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.59
 LONGEST FLOWPATH FROM NODE     910.40 TO NODE     910.30 =   412.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     910.30 TO NODE     910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.82
 RAINFALL INTENSITY(INCH/HR) =   2.88
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.80
```

```
** CONFLUENCE DATA **
STREAM      RUNOFF       Tc       INTENSITY       AREA
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
   1          8.74      8.53        2.771          3.50
   2          0.80      7.82        2.877          0.30

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc       INTENSITY
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
   1          9.22      7.82        2.877
   2          9.51      8.53        2.771

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      9.51   Tc(MIN.) =    8.53
TOTAL AREA(ACRES) =      3.80
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    910.30 TO NODE    914.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   505.84  DOWNSTREAM(FEET) =   499.83
FLOW LENGTH(FEET) =   140.08   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS   7.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.03
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      9.51
PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   8.74
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   8.74
RAINFALL INTENSITY(INCH/HR) =   2.74
TOTAL STREAM AREA(ACRES) =     3.80
PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.51

****************************************************************************
FLOW PROCESS FROM NODE    914.20 TO NODE    914.40 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
UPSTREAM ELEVATION(FEET) =    516.00
DOWNSTREAM ELEVATION(FEET) =    513.78
ELEVATION DIFFERENCE(FEET) =      2.22
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   2.760
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
SUBAREA RUNOFF(CFS) =      0.28
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
FLOW PROCESS FROM NODE    914.40 TO NODE    914.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  513.28  DOWNSTREAM ELEVATION(FEET) =  505.13
STREET LENGTH(FEET) =   122.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

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

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   6.50
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.080
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.10      SUBAREA RUNOFF(CFS) =     0.28
  TOTAL AREA(ACRES) =       0.20        PEAK FLOW RATE(CFS) =       0.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
  FLOW VELOCITY(FEET/SEC.) =  4.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
  LONGEST FLOWPATH FROM NODE    914.20 TO NODE    914.00 =   222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.50
  RAINFALL INTENSITY(INCH/HR) =   3.08
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.56

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1         9.51      8.74         2.739          3.80
      2         0.56      6.50         3.080          0.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1         9.02      6.50         3.080
      2        10.01      8.74         2.739

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     10.01   Tc(MIN.) =    8.74
  TOTAL AREA(ACRES) =      4.00
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    954.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   499.50  DOWNSTREAM(FEET) =   498.71
  FLOW LENGTH(FEET) =    79.37   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.64
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.01
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   8.94
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    954.20 =  1265.09 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    954.20 TO NODE    954.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.709
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.98
 TOTAL AREA(ACRES) =      4.40   TOTAL RUNOFF(CFS) =   10.99
 TC(MIN.) =   8.94

****************************************************************************
 FLOW PROCESS FROM NODE    954.20 TO NODE    918.80 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.61  DOWNSTREAM(FEET) =   497.39
 FLOW LENGTH(FEET) =   121.84   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.99
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   9.24
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    918.80 =  1386.93 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.80 TO NODE    918.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.674
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.24
 TOTAL AREA(ACRES) =      4.50   TOTAL RUNOFF(CFS) =   11.23
 TC(MIN.) =   9.24

****************************************************************************
 FLOW PROCESS FROM NODE    918.80 TO NODE    918.60 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   497.29  DOWNSTREAM(FEET) =   495.55
 FLOW LENGTH(FEET) =   173.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.87
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.23
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   9.66
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    918.60 =  1560.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.60 TO NODE    918.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.628
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    2.36
 TOTAL AREA(ACRES) =      5.50   TOTAL RUNOFF(CFS) =   13.59
 TC(MIN.) =   9.66

****************************************************************************
 FLOW PROCESS FROM NODE    918.60 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.44  DOWNSTREAM(FEET) =   495.06
 FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.16
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     13.59
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   9.75
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.75
 RAINFALL INTENSITY(INCH/HR) =   2.62
 TOTAL STREAM AREA(ACRES) =     5.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.59

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    512.74
 DOWNSTREAM ELEVATION(FEET) =    511.74
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.600
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      1.99
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      1.99

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.74  DOWNSTREAM(FEET) =   504.69
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =      1.99
 PIPE TRAVEL TIME(MIN.) =   1.53    Tc(MIN.) =   7.53
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.20 =   505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.920
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =     3.30   SUBAREA RUNOFF(CFS) =     8.67
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =   10.66
 TC(MIN.) =   7.53

****************************************************************************
 FLOW PROCESS FROM NODE    918.20 TO NODE    918.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   504.59  DOWNSTREAM(FEET) =   499.00
 FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.03
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =     10.66
 PIPE TRAVEL TIME(MIN.) =   1.55    Tc(MIN.) =   9.08
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.40 =  1065.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.40 TO NODE    918.50 IS CODE =  41
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.90  DOWNSTREAM(FEET) =   495.36
 FLOW LENGTH(FEET) =   259.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.66
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   9.65
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.50 =  1324.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.50 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.26  DOWNSTREAM(FEET) =   495.16
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.03
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.66
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   9.71
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    916.00 =  1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.71
 RAINFALL INTENSITY(INCH/HR) =   2.62
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.66

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1        13.59      9.75         2.618          5.50
    2        10.66      9.71         2.621          4.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1        24.24      9.71         2.621
    2        24.24      9.75         2.618

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     24.24   Tc(MIN.) =    9.75
 TOTAL AREA(ACRES) =      9.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.618
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    5.65
 TOTAL AREA(ACRES) =     11.90   TOTAL RUNOFF(CFS) =   29.90
 TC(MIN.) =   9.75

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    919.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    495.06  DOWNSTREAM(FEET) =    494.56
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.0036
  CHANNEL BASE(FEET) =   45.50   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   6.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     29.90
  FLOW VELOCITY(FEET/SEC.) =   2.43   FLOW DEPTH(FEET) =   0.27
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =  10.71
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    919.00 =  1739.52 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    919.00 TO NODE    920.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.51  DOWNSTREAM(FEET) =   493.67
  FLOW LENGTH(FEET) =    88.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.58
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.90
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  10.88
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    920.00 =  1827.82 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    920.00 TO NODE    921.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   493.57  DOWNSTREAM(FEET) =   493.09
  FLOW LENGTH(FEET) =    56.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.21
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.90
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  10.99
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    921.00 =  1884.12 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    921.00 TO NODE    952.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   492.99  DOWNSTREAM(FEET) =   491.45
  FLOW LENGTH(FEET) =   187.54   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.08
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.90
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =  11.38
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    952.20 =  2071.66 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    952.20 TO NODE    990.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   491.15  DOWNSTREAM(FEET) =   491.06
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.90
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.40
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 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.) =  11.40
 RAINFALL INTENSITY(INCH/HR) =   2.44
 TOTAL STREAM AREA(ACRES) =    11.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.90

****************************************************************************
 FLOW PROCESS FROM NODE    988.00 TO NODE    989.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    503.87
 DOWNSTREAM ELEVATION(FEET) =    503.75
 ELEVATION DIFFERENCE(FEET) =      0.12
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.096
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.57
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
 FLOW PROCESS FROM NODE    989.00 TO NODE    990.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  503.75  DOWNSTREAM ELEVATION(FEET) =  500.48
 STREET LENGTH(FEET) =   375.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.94
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    6.22
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
 STREET FLOW TRAVEL TIME(MIN.) =   3.59   Tc(MIN.) =   9.59
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.636
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.74
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       1.31

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.59
 FLOW VELOCITY(FEET/SEC.) =  1.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
 LONGEST FLOWPATH FROM NODE    988.00 TO NODE    990.00 =   425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.59
 RAINFALL INTENSITY(INCH/HR) =   2.64
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.31

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

NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	29.90	11.40	2.440	11.90
2	1.31	9.59	2.636	0.60

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	28.98	9.59	2.636
2	31.11	11.40	2.440

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 31.11 Tc(MIN.) = 11.40
TOTAL AREA(ACRES) = 12.50
LONGEST FLOWPATH FROM NODE 911.00 TO NODE 990.00 = 2082.66 FEET.

****
FLOW PROCESS FROM NODE 990.00 TO NODE 991.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 491.21 DOWNSTREAM(FEET) = 491.06
FLOW LENGTH(FEET) = 11.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.90
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.11
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 11.42
LONGEST FLOWPATH FROM NODE 911.00 TO NODE 991.00 = 2093.66 FEET.

****
FLOW PROCESS FROM NODE 991.00 TO NODE 991.00 IS CODE = 10

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

****
FLOW PROCESS FROM NODE 957.00 TO NODE 958.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 503.59
DOWNSTREAM ELEVATION(FEET) = 501.59
ELEVATION DIFFERENCE(FEET) = 2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.857
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.160
SUBAREA RUNOFF(CFS) = 0.28
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.28

****
FLOW PROCESS FROM NODE 958.00 TO NODE 955.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 2 USED)<<<<<
==
UPSTREAM ELEVATION(FEET) = 501.59 DOWNSTREAM ELEVATION(FEET) = 497.41
STREET LENGTH(FEET) = 304.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.90

```
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.25
  HALFSTREET FLOOD WIDTH(FEET) =    6.24
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.77
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
STREET FLOW TRAVEL TIME(MIN.) =   2.87   Tc(MIN.) =   8.87
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.720
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    1.22
TOTAL AREA(ACRES) =      0.60       PEAK FLOW RATE(CFS) =       1.51

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =  8.07
FLOW VELOCITY(FEET/SEC.) =  1.96   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
LONGEST FLOWPATH FROM NODE    957.00 TO NODE    955.00 =   404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    955.00 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   492.76  DOWNSTREAM(FEET) =   492.46
  FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.51
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   8.99
  LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.99
  RAINFALL INTENSITY(INCH/HR) =   2.70
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.51

****************************************************************************
  FLOW PROCESS FROM NODE    959.00 TO NODE    960.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    503.59
  DOWNSTREAM ELEVATION(FEET) =    501.59
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    960.00 TO NODE    956.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
  STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

```
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    6.45
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.97
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
 STREET FLOW TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =   8.12
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.832
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.60      SUBAREA RUNOFF(CFS) =    1.53
 TOTAL AREA(ACRES) =       0.70        PEAK FLOW RATE(CFS) =       1.81

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.38
 FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.20 =   350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.20 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.48  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.11
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.81
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.13
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.00 =   352.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.13
 RAINFALL INTENSITY(INCH/HR) =   2.83
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.81

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1         1.51      8.99         2.701          0.60
     2         1.81      8.13         2.831          0.70

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1         3.25      8.13         2.831
     2         3.24      8.99         2.701

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      3.25   Tc(MIN.) =    8.13
 TOTAL AREA(ACRES) =      1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.46  DOWNSTREAM(FEET) =   491.06
```

```
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.25
 PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   8.89
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          3.25      8.89         2.716         1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         31.11     11.42         2.438        12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1        31.17        8.89         2.716
    2        34.03       11.42         2.438

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     34.03   Tc(MIN.) =   11.42
 TOTAL AREA(ACRES) =     13.80

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 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.) =  11.42
 RAINFALL INTENSITY(INCH/HR) =   2.44
 TOTAL STREAM AREA(ACRES) =    13.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.03

****************************************************************************
 FLOW PROCESS FROM NODE    994.20 TO NODE    994.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    501.47
 DOWNSTREAM ELEVATION(FEET) =    500.54
 ELEVATION DIFFERENCE(FEET) =      0.93
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.688
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.28
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    994.40 TO NODE    994.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
```

```
 UPSTREAM ELEVATION(FEET) =  500.54  DOWNSTREAM ELEVATION(FEET) =  498.52
 STREET LENGTH(FEET) =   205.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 51.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.79
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.39
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.50
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.38
 STREET FLOW TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =   8.28
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.809
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    1.01
 TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS) =       1.30

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.10
 FLOW VELOCITY(FEET/SEC.) =  1.67   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
 LONGEST FLOWPATH FROM NODE    994.20 TO NODE    994.00 =   305.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    994.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.61  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.29
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.30
 PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =   9.44
 LONGEST FLOWPATH FROM NODE    994.20 TO NODE    991.00 =   535.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.44
 RAINFALL INTENSITY(INCH/HR) =   2.65
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.30

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        34.03    11.42        2.438         13.80
     2         1.30     9.44        2.651          0.50

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
     1        32.59     9.44        2.651
     2        35.22    11.42        2.438

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     35.22   Tc(MIN.) =   11.42
 TOTAL AREA(ACRES) =     14.30
```

```
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    987.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   490.73  DOWNSTREAM(FEET) =   490.40
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.55
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     35.22
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  11.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    987.00 =  2133.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    987.00 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.) =  11.50
 RAINFALL INTENSITY(INCH/HR) =   2.43
 TOTAL STREAM AREA(ACRES) =    14.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     35.22

****************************************************************************
 FLOW PROCESS FROM NODE    985.00 TO NODE    986.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    505.80
 DOWNSTREAM ELEVATION(FEET) =    505.60
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.228
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.457
 SUBAREA RUNOFF(CFS) =      0.11
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
 FLOW PROCESS FROM NODE    986.00 TO NODE    987.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    505.60  DOWNSTREAM(FEET) =    501.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   330.00   CHANNEL SLOPE =  0.0124
 CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.034
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.06
 AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   5.20
 Tc(MIN.) =  16.43
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.27
 TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       0.39

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.19
 LONGEST FLOWPATH FROM NODE    985.00 TO NODE    987.00 =   380.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    987.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  16.43
RAINFALL INTENSITY(INCH/HR) =   2.03
TOTAL STREAM AREA(ACRES) =    0.40
PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.39

** CONFLUENCE DATA **
STREAM      RUNOFF       Tc       INTENSITY       AREA
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        35.22    11.50         2.430         14.30
    2         0.39    16.43         2.034          0.40

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc       INTENSITY
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1        35.54    11.50         2.430
    2        29.86    16.43         2.034

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     35.54   Tc(MIN.) =   11.50
TOTAL AREA(ACRES) =     14.70
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    987.00 =  2133.66 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    987.00 TO NODE    983.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   490.07  DOWNSTREAM(FEET) =   489.98
FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   9.22
GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     35.54
PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.51
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    983.00 =  2142.66 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    983.00 TO NODE    983.00 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.) =  11.51
RAINFALL INTENSITY(INCH/HR) =   2.43
TOTAL STREAM AREA(ACRES) =    14.70
PEAK FLOW RATE(CFS) AT CONFLUENCE =     35.54

****************************************************************************
FLOW PROCESS FROM NODE    981.00 TO NODE    982.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7600
S.C.S. CURVE NUMBER (AMC II) =  0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
UPSTREAM ELEVATION(FEET) =    505.41
DOWNSTREAM ELEVATION(FEET) =    505.21
ELEVATION DIFFERENCE(FEET) =      0.20
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.873
*CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
 DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
SUBAREA RUNOFF(CFS) =      0.24
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
FLOW PROCESS FROM NODE    982.00 TO NODE    983.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  3 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  505.21  DOWNSTREAM ELEVATION(FEET) =  502.12
  STREET LENGTH(FEET) =   360.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
  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) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.28
  STREET FLOW TRAVEL TIME(MIN.) =   4.71   Tc(MIN.) =  10.71
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.512
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =      0.30       PEAK FLOW RATE(CFS) =       0.62

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.85
  FLOW VELOCITY(FEET/SEC.) =  1.35   DEPTH*VELOCITY(FT*FT/SEC.) =   0.33
  LONGEST FLOWPATH FROM NODE    981.00 TO NODE    983.00 =   410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    983.00 TO NODE    983.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.71
  RAINFALL INTENSITY(INCH/HR) =   2.51
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.62

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       35.54    11.51       2.429         14.70
     2        0.62    10.71       2.512          0.30

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       34.99    10.71       2.512
     2       36.14    11.51       2.429

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     36.14   Tc(MIN.) =   11.51
  TOTAL AREA(ACRES) =     15.00
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    983.00 =  2142.66 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    983.00 TO NODE    999.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   489.65  DOWNSTREAM(FEET) =   489.10
  FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.30
```

```
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     36.14
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  11.66
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    999.00 =  2215.66 FEET.
```

```
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =      15.00  TC(MIN.) =      11.66
 PEAK FLOW RATE(CFS)    =      36.14
```

```
 END OF RATIONAL METHOD ANALYSIS
```

♀

2-Year

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                          Rick Engineering Company
                       1223 University Ave., Suite 240
                         Riverside, California 92507


 ************************** DESCRIPTION OF STUDY **************************
* J-16630 BMR North Village East Unit 14                                  *
* Construction Change 'F'                                                 *
* Basin 900A - 2 Year Storm Event                                         *
 **************************************************************************

  FILE NAME: BMR9AP02.DAT
  TIME/DATE OF STUDY: 09:04 06/26/2014
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  4
   1)   5.000;  2.500
   2)  10.000;  1.800
   3)  15.000;  1.500
   4)  20.000;  1.200
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)   (FT)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00  0.0313  0.167  0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50  0.0313  0.125  0.0180
  3   51.0     46.0    0.020/0.020/0.020   0.50    1.50  0.0313  0.125  0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE     911.00 TO NODE     912.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    544.00
  DOWNSTREAM ELEVATION(FEET) =    539.81
  ELEVATION DIFFERENCE(FEET) =      4.19
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.233
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

**************************************************************************
  FLOW PROCESS FROM NODE     912.00 TO NODE     913.00 IS CODE =  62
--------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  539.81  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.55
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    3.61
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.23
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
 STREET FLOW TRAVEL TIME(MIN.) =   3.34   Tc(MIN.) =   9.34
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.892
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.68
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       0.89

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.13
 FLOW VELOCITY(FEET/SEC.) =  2.35   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.34
 RAINFALL INTENSITY(INCH/HR) =   1.89
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.89

****************************************************************************
 FLOW PROCESS FROM NODE    913.40 TO NODE    913.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE    913.50 TO NODE    913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   368.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.26
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.85
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
  STREET FLOW TRAVEL TIME(MIN.) =   3.31   Tc(MIN.) =   9.31
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.896
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.68
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       0.90

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.74
  FLOW VELOCITY(FEET/SEC.) =  2.00   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
  LONGEST FLOWPATH FROM NODE    913.40 TO NODE    913.00 =   468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.31
  RAINFALL INTENSITY(INCH/HR) =   1.90
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.90

****************************************************************************
  FLOW PROCESS FROM NODE    912.20 TO NODE    912.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    545.00
  DOWNSTREAM ELEVATION(FEET) =    542.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    912.40 TO NODE    913.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   542.00  DOWNSTREAM(FEET) =   532.00
  FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.33
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.21
  PIPE TRAVEL TIME(MIN.) =   1.70    Tc(MIN.) =   7.70
  LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.20 =   440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    913.20 TO NODE    913.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.122
```

```
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =  2.00   SUBAREA RUNOFF(CFS) =  3.82
 TOTAL AREA(ACRES) =  2.10   TOTAL RUNOFF(CFS) =  4.03
 TC(MIN.) =  7.70

****************************************************************************
 FLOW PROCESS FROM NODE   913.20 TO NODE   913.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  523.84  DOWNSTREAM(FEET) =  523.69
 FLOW LENGTH(FEET) =  15.00  MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  7.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  5.25
 GIVEN PIPE DIAMETER(INCH) =  24.00   NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  4.03
 PIPE TRAVEL TIME(MIN.) =  0.05   Tc(MIN.) =  7.75
 LONGEST FLOWPATH FROM NODE   912.20 TO NODE   913.00 =  455.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   913.00 TO NODE   913.00 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =  7.75
 RAINFALL INTENSITY(INCH/HR) =  2.12
 TOTAL STREAM AREA(ACRES) =  2.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =  4.03

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        0.89     9.34        1.892         0.50
    2        0.90     9.31        1.896         0.50
    3        4.03     7.75        2.115         2.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1        5.63     7.75        2.115
    2        5.40     9.31        1.896
    3        5.39     9.34        1.892

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =  5.63   Tc(MIN.) =  7.75
 TOTAL AREA(ACRES) =  3.10
 LONGEST FLOWPATH FROM NODE   911.00 TO NODE   913.00 =  547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   913.00 TO NODE   909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  523.69  DOWNSTREAM(FEET) =  523.14
 FLOW LENGTH(FEET) =  27.25  MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  7.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  7.57
 GIVEN PIPE DIAMETER(INCH) =  18.00   NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  5.63
 PIPE TRAVEL TIME(MIN.) =  0.06   Tc(MIN.) =  7.81
 LONGEST FLOWPATH FROM NODE   911.00 TO NODE   909.00 =  574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   909.00 TO NODE   909.00 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
```

```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.81
 RAINFALL INTENSITY(INCH/HR) =   2.11
 TOTAL STREAM AREA(ACRES) =      3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.63

****************************************************************************
 FLOW PROCESS FROM NODE     913.60 TO NODE     913.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE     913.70 TO NODE     909.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.46
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    3.77
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.78
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.36
 STREET FLOW TRAVEL TIME(MIN.) =   3.60   Tc(MIN.) =   9.60
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.856
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.50
 TOTAL AREA(ACRES) =      0.40       PEAK FLOW RATE(CFS) =       0.71

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.13
 FLOW VELOCITY(FEET/SEC.) =  1.87   DEPTH*VELOCITY(FT*FT/SEC.) =   0.43
 LONGEST FLOWPATH FROM NODE     913.60 TO NODE     909.20 =   485.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     909.20 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.25  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =     5.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.25
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.71
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   9.62
 LONGEST FLOWPATH FROM NODE     913.60 TO NODE     909.00 =   490.25 FEET.

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

```
 FLOW PROCESS FROM NODE    909.00 TO NODE    909.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.62
 RAINFALL INTENSITY(INCH/HR) =   1.85
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.71

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
    1          5.63      7.81        2.107          3.10
    2          0.71      9.62        1.853          0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)
    1          6.26      7.81        2.107
    2          5.67      9.62        1.853

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      6.26   Tc(MIN.) =    7.81
 TOTAL AREA(ACRES) =      3.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    910.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.64  DOWNSTREAM(FEET) =   521.73
 FLOW LENGTH(FEET) =    91.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.26
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   8.07
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.00 =   665.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.00 TO NODE    910.20 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   521.40  DOWNSTREAM(FEET) =   512.91
 FLOW LENGTH(FEET) =   256.12   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.13
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.26
 PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   8.53
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.20 =   921.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.20 TO NODE    910.30 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   511.29  DOWNSTREAM(FEET) =   506.34
 FLOW LENGTH(FEET) =   123.77   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.76
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.26
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   8.75
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

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

```
 FLOW PROCESS FROM NODE     910.30 TO NODE     910.30 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.75
 RAINFALL INTENSITY(INCH/HR) =    1.98
 TOTAL STREAM AREA(ACRES) =      3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.26

**********************************************************************
 FLOW PROCESS FROM NODE     910.40 TO NODE     910.60 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
 UPSTREAM ELEVATION(FEET) =     528.83
 DOWNSTREAM ELEVATION(FEET) =     525.33
 ELEVATION DIFFERENCE(FEET) =       3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     2.371
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =       0.21
 TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.21

**********************************************************************
 FLOW PROCESS FROM NODE     910.60 TO NODE     910.30 IS CODE =  62
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
 UPSTREAM ELEVATION(FEET) =  527.40  DOWNSTREAM ELEVATION(FEET) =  513.28
 STREET LENGTH(FEET) =   312.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    1.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.34
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.52
 STREET FLOW TRAVEL TIME(MIN.) =   1.56   Tc(MIN.) =   7.56
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.142
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.39
 TOTAL AREA(ACRES) =       0.30        PEAK FLOW RATE(CFS) =       0.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =   3.06
 FLOW VELOCITY(FEET/SEC.) =  2.83   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
 LONGEST FLOWPATH FROM NODE     910.40 TO NODE     910.30 =   412.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     910.30 TO NODE     910.30 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.56
```

```
 RAINFALL INTENSITY(INCH/HR) =   2.14
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.60

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1         6.26      8.75        1.976         3.50
    2         0.60      7.56        2.142         0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
    1         6.37      7.56        2.142
    2         6.81      8.75        1.976

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      6.81   Tc(MIN.) =    8.75
 TOTAL AREA(ACRES) =      3.80
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    914.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   505.84  DOWNSTREAM(FEET) =   499.83
 FLOW LENGTH(FEET) =   140.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.01
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.81
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   8.98
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.98
 RAINFALL INTENSITY(INCH/HR) =   1.94
 TOTAL STREAM AREA(ACRES) =     3.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.81

****************************************************************************
 FLOW PROCESS FROM NODE    914.20 TO NODE    914.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    516.00
 DOWNSTREAM ELEVATION(FEET) =    513.78
 ELEVATION DIFFERENCE(FEET) =      2.22
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.760
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE    914.40 TO NODE    914.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  513.28  DOWNSTREAM ELEVATION(FEET) =  505.13
 STREET LENGTH(FEET) =   122.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.32
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    1.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.06
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
 STREET FLOW TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   6.50
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.290
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.21
 TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.42

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
 FLOW VELOCITY(FEET/SEC.) =  4.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
 LONGEST FLOWPATH FROM NODE    914.20 TO NODE    914.00 =   222.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   6.50
 RAINFALL INTENSITY(INCH/HR) =   2.29
 TOTAL STREAM AREA(ACRES) =     0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.42

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         6.81     8.98        1.943         3.80
    2         0.42     6.50        2.290         0.20

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1         6.20     6.50        2.290
    2         7.17     8.98        1.943

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      7.17   Tc(MIN.) =    8.98
 TOTAL AREA(ACRES) =      4.00
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    954.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   499.50  DOWNSTREAM(FEET) =   498.71
 FLOW LENGTH(FEET) =    79.37   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.05
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.17
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   9.20
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    954.20 =  1265.09 FEET.

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

```
 FLOW PROCESS FROM NODE     954.20 TO NODE     954.20 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.912
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40   SUBAREA RUNOFF(CFS) =     0.69
 TOTAL AREA(ACRES) =       4.40   TOTAL RUNOFF(CFS) =     7.86
 TC(MIN.) =   9.20

**********************************************************************
 FLOW PROCESS FROM NODE     954.20 TO NODE     918.80 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.61  DOWNSTREAM(FEET) =   497.39
 FLOW LENGTH(FEET) =   121.84   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   9.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.22
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.86
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   9.52
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     918.80 =  1386.93 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     918.80 TO NODE     918.80 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.867
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.10   SUBAREA RUNOFF(CFS) =     0.17
 TOTAL AREA(ACRES) =       4.50   TOTAL RUNOFF(CFS) =     8.02
 TC(MIN.) =   9.52

**********************************************************************
 FLOW PROCESS FROM NODE     918.80 TO NODE     918.60 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   497.29  DOWNSTREAM(FEET) =   495.55
 FLOW LENGTH(FEET) =   173.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   9.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.26
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      8.02
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   9.99
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     918.60 =  1560.52 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     918.60 TO NODE     918.60 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.802
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     1.00   SUBAREA RUNOFF(CFS) =     1.62
 TOTAL AREA(ACRES) =       5.50   TOTAL RUNOFF(CFS) =     9.65
 TC(MIN.) =   9.99

**********************************************************************
 FLOW PROCESS FROM NODE     918.60 TO NODE     916.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.44  DOWNSTREAM(FEET) =   495.06
 FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.52
```

```
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      9.65
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  10.09
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.09
 RAINFALL INTENSITY(INCH/HR) =   1.79
 TOTAL STREAM AREA(ACRES) =     5.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.65

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    512.74
 DOWNSTREAM ELEVATION(FEET) =    511.74
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.600
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      1.49
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      1.49

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.74  DOWNSTREAM(FEET) =   504.69
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.05
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.49
 PIPE TRAVEL TIME(MIN.) =   1.67    Tc(MIN.) =   7.67
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.20 =   505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.127
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     3.30   SUBAREA RUNOFF(CFS) =     6.32
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =    7.80
 TC(MIN.) =   7.67

****************************************************************************
 FLOW PROCESS FROM NODE    918.20 TO NODE    918.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   504.59  DOWNSTREAM(FEET) =   499.00
 FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.25
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.80
 PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   9.16
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.40 =  1065.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    918.40 TO NODE    918.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.90  DOWNSTREAM(FEET) =   495.36
 FLOW LENGTH(FEET) =   259.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.08
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.80
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   9.77
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.50 =  1324.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.50 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.26  DOWNSTREAM(FEET) =   495.16
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.80
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   9.85
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    916.00 =  1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.85
 RAINFALL INTENSITY(INCH/HR) =   1.82
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.80

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1         9.65     10.09         1.795          5.50
     2         7.80      9.85         1.820          4.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        17.31      9.85        1.820
     2        17.34     10.09        1.795

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     17.34   Tc(MIN.) =   10.09
 TOTAL AREA(ACRES) =      9.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.795
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    3.88
 TOTAL AREA(ACRES) =     11.90   TOTAL RUNOFF(CFS) =   21.22
 TC(MIN.) =  10.09

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

```
 FLOW PROCESS FROM NODE    916.00 TO NODE    919.00 IS CODE =  51
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    495.06  DOWNSTREAM(FEET) =    494.56
 CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.0036
 CHANNEL BASE(FEET) =   45.50   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   6.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     21.22
 FLOW VELOCITY(FEET/SEC.) =   2.14   FLOW DEPTH(FEET) =   0.22
 TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =  11.18
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    919.00 =  1739.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    919.00 TO NODE    920.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   494.51  DOWNSTREAM(FEET) =   493.67
 FLOW LENGTH(FEET) =    88.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.96
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     21.22
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =  11.36
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    920.00 =  1827.82 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    920.00 TO NODE    921.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   493.57  DOWNSTREAM(FEET) =   493.09
 FLOW LENGTH(FEET) =    56.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.64
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     21.22
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  11.49
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    921.00 =  1884.12 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    921.00 TO NODE    952.20 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.99  DOWNSTREAM(FEET) =   491.45
 FLOW LENGTH(FEET) =   187.54   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.53
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     21.22
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =  11.90
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    952.20 =  2071.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    952.20 TO NODE    990.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   491.15  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     21.22
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.93
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 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.) =  11.93
 RAINFALL INTENSITY(INCH/HR) =   1.68
 TOTAL STREAM AREA(ACRES) =    11.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.22

****************************************************************************
 FLOW PROCESS FROM NODE     988.00 TO NODE     989.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    503.87
 DOWNSTREAM ELEVATION(FEET) =    503.75
 ELEVATION DIFFERENCE(FEET) =      0.12
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.096
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.42
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
 FLOW PROCESS FROM NODE     989.00 TO NODE     990.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  503.75  DOWNSTREAM ELEVATION(FEET) =  500.48
 STREET LENGTH(FEET) =   375.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.68
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    4.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.70
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.42
 STREET FLOW TRAVEL TIME(MIN.) =   3.68   Tc(MIN.) =   9.68
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.844
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.52
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       0.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.22
 FLOW VELOCITY(FEET/SEC.) =  1.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
 LONGEST FLOWPATH FROM NODE    988.00 TO NODE    990.00 =   425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     990.00 TO NODE     990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.68
 RAINFALL INTENSITY(INCH/HR) =   1.84
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.94
```

```
** CONFLUENCE DATA **
STREAM      RUNOFF      TC       INTENSITY      AREA
NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
   1         21.22     11.93       1.684        11.90
   2          0.94      9.68       1.844         0.60

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF      TC       INTENSITY
NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
   1         20.32      9.68       1.844
   2         22.07     11.93       1.684

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     22.07   Tc(MIN.) =   11.93
TOTAL AREA(ACRES) =     12.50
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    990.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   491.21  DOWNSTREAM(FEET) =   491.06
FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   9.02
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     22.07
PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.95
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  10
----------------------------------------------------------------------------
>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    957.00 TO NODE    958.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =  0
INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
UPSTREAM ELEVATION(FEET) =    503.59
DOWNSTREAM ELEVATION(FEET) =    501.59
ELEVATION DIFFERENCE(FEET) =      2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
SUBAREA RUNOFF(CFS) =      0.21
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
FLOW PROCESS FROM NODE    958.00 TO NODE    955.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
STREET LENGTH(FEET) =   304.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.23
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.38
  STREET FLOW TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =   9.05
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.933
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    0.87
  TOTAL AREA(ACRES) =       0.60        PEAK FLOW RATE(CFS) =       1.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.85
  FLOW VELOCITY(FEET/SEC.) =  1.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
  LONGEST FLOWPATH FROM NODE    957.00 TO NODE    955.00 =   404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    955.00 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   492.76  DOWNSTREAM(FEET) =   492.46
  FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.70
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.08
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   9.19
  LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.19
  RAINFALL INTENSITY(INCH/HR) =   1.91
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.08

****************************************************************************
  FLOW PROCESS FROM NODE    959.00 TO NODE    960.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    503.59
  DOWNSTREAM ELEVATION(FEET) =    501.59
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    960.00 TO NODE    956.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
  STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

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

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.43
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
 STREET FLOW TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   8.25
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.046
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.60      SUBAREA RUNOFF(CFS) =    1.10
 TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       1.32

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.21
 FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.20 =   350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.20 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.48  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.76
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.32
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.26
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.00 =   352.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.26
 RAINFALL INTENSITY(INCH/HR) =   2.04
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.32

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.08      9.19         1.914          0.60
    2          1.32      8.26         2.044          0.70

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          2.33      8.26         2.044
    2          2.31      9.19         1.914

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      2.33   Tc(MIN.) =    8.26
 TOTAL AREA(ACRES) =      1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   492.46  DOWNSTREAM(FEET) =   491.06
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.95
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.33
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =   9.10
  LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1          2.33      9.10         1.926         1.30
  LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         22.07     11.95         1.683        12.50
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1       21.62       9.10         1.926
     2       24.11      11.95         1.683

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     24.11   Tc(MIN.) =   11.95
  TOTAL AREA(ACRES) =     13.80

****************************************************************************
  FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 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.) =  11.95
  RAINFALL INTENSITY(INCH/HR) =   1.68
  TOTAL STREAM AREA(ACRES) =    13.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.11

****************************************************************************
  FLOW PROCESS FROM NODE    994.20 TO NODE    994.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    501.47
  DOWNSTREAM ELEVATION(FEET) =    500.54
  ELEVATION DIFFERENCE(FEET) =      0.93
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.688
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    994.40 TO NODE    994.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>(STREET TABLE SECTION #  3 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  500.54  DOWNSTREAM ELEVATION(FEET) =  498.52
  STREET LENGTH(FEET) =   205.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
  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) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.40
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.33
  STREET FLOW TRAVEL TIME(MIN.) =   2.43   Tc(MIN.) =   8.43
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.020
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.73
  TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS) =       0.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.93
  FLOW VELOCITY(FEET/SEC.) =  1.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.42
  LONGEST FLOWPATH FROM NODE    994.20 TO NODE    994.00 =   305.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    994.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   492.61  DOWNSTREAM(FEET) =   491.06
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.99
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.94
  PIPE TRAVEL TIME(MIN.) =   1.28    Tc(MIN.) =   9.71
  LONGEST FLOWPATH FROM NODE    994.20 TO NODE    991.00 =   535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.71
  RAINFALL INTENSITY(INCH/HR) =   1.84
  TOTAL STREAM AREA(ACRES) =    0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.94

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY      AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
      1        24.11     11.95         1.683        13.80
      2         0.94      9.71         1.841         0.50

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1        22.99      9.71         1.841
      2        24.97     11.95         1.683

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
 PEAK FLOW RATE(CFS) =    24.97   Tc(MIN.) =   11.95
 TOTAL AREA(ACRES) =     14.30
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    987.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   490.73  DOWNSTREAM(FEET) =   490.40
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.85
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     24.97
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  12.03
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    987.00 =  2133.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    987.00 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.) =  12.03
 RAINFALL INTENSITY(INCH/HR) =   1.68
 TOTAL STREAM AREA(ACRES) =    14.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.97

****************************************************************************
 FLOW PROCESS FROM NODE    985.00 TO NODE    986.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    505.80
 DOWNSTREAM ELEVATION(FEET) =    505.60
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.046
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.354
 SUBAREA RUNOFF(CFS) =      0.18
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
 FLOW PROCESS FROM NODE    986.00 TO NODE    987.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    505.60  DOWNSTREAM(FEET) =    501.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   330.00   CHANNEL SLOPE =  0.0124
 CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.737
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.30
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.10
 AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   5.00
 Tc(MIN.) =  11.05
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.23
 TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =      0.41

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.20
 LONGEST FLOWPATH FROM NODE    985.00 TO NODE    987.00 =   380.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    987.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  11.05
 RAINFALL INTENSITY(INCH/HR) =   1.74
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.41

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1         24.97     12.03         1.678         14.30
    2          0.41     11.05         1.737          0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1         24.53     11.05         1.737
    2         25.37     12.03         1.678

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     25.37   Tc(MIN.) =   12.03
 TOTAL AREA(ACRES) =     14.70
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    987.00 =  2133.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    987.00 TO NODE    983.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   490.07  DOWNSTREAM(FEET) =   489.98
 FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.47
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     25.37
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  12.05
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    983.00 =  2142.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    983.00 TO NODE    983.00 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.) =  12.05
 RAINFALL INTENSITY(INCH/HR) =   1.68
 TOTAL STREAM AREA(ACRES) =    14.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.37

****************************************************************************
 FLOW PROCESS FROM NODE    981.00 TO NODE    982.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    505.41
 DOWNSTREAM ELEVATION(FEET) =    505.21
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.873
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.18
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.18

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

```
 FLOW PROCESS FROM NODE     982.00 TO NODE     983.00 IS CODE =  62
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
======================================================================
 UPSTREAM ELEVATION(FEET) =  505.21  DOWNSTREAM ELEVATION(FEET) =  502.12
 STREET LENGTH(FEET) =   360.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 51.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  46.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.31
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    3.66
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.24
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.25
 STREET FLOW TRAVEL TIME(MIN.) =   4.84   Tc(MIN.) =  10.84
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.750
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =    0.27
 TOTAL AREA(ACRES) =       0.30        PEAK FLOW RATE(CFS) =       0.45

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.81
 FLOW VELOCITY(FEET/SEC.) =  1.27   DEPTH*VELOCITY(FT*FT/SEC.) =   0.28
 LONGEST FLOWPATH FROM NODE     981.00 TO NODE     983.00 =   410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     983.00 TO NODE     983.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.84
 RAINFALL INTENSITY(INCH/HR) =   1.75
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.45

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        25.37     12.05         1.677          14.70
     2         0.45     10.84         1.750           0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        24.76     10.84        1.750
     2        25.79     12.05        1.677

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     25.79   Tc(MIN.) =   12.05
 TOTAL AREA(ACRES) =     15.00
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     983.00 =  2142.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     983.00 TO NODE     999.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   489.65  DOWNSTREAM(FEET) =   489.10
 FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.65
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     25.79
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  12.21
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    999.00 =  2215.66 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     15.00  TC(MIN.) =     12.21
 PEAK FLOW RATE(CFS)   =     25.79
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

♀

Detained Flow

25-Year

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        Rick Engineering Company
                      1223 University Ave., Suite 240
                        Riverside, California 92507


 ************************** DESCRIPTION OF STUDY **************************
* J-16630 BMR North Village East Unit 14                                  *
* Construction Change 'F' - Basin 900A                                    *
* 25 Year - DETAINED - (Excluding Cam. Del Sur)                           *
 **************************************************************************

  FILE NAME: 9A_DET25.DAT
  TIME/DATE OF STUDY: 15:10 07/03/2014
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  3.800
   2)  10.000;  3.000
   3)  15.000;  2.500
   4)  20.000;  2.100
   5)  25.000;  1.900
   6)  30.000;  1.700
   7)  40.000;  1.450
   8)  50.000;  1.300
   9)  60.000;  1.150
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ====  ====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180
  3   51.0     46.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE     911.00 TO NODE     912.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
  UPSTREAM ELEVATION(FEET) =  544.00
  DOWNSTREAM ELEVATION(FEET) =  539.81
  ELEVATION DIFFERENCE(FEET) =  4.19
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.233
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
  SUBAREA RUNOFF(CFS) =  0.33
```

```
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE     912.00 TO NODE     913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  539.81  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.89
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.13
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.34
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
 STREET FLOW TRAVEL TIME(MIN.) =   3.18   Tc(MIN.) =   9.18
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.131
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    1.13
 TOTAL AREA(ACRES) =      0.50       PEAK FLOW RATE(CFS) =       1.45

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.70
 FLOW VELOCITY(FEET/SEC.) =  2.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     913.00 TO NODE     913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.18
 RAINFALL INTENSITY(INCH/HR) =   3.13
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.45

****************************************************************************
 FLOW PROCESS FROM NODE     913.40 TO NODE     913.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE     913.50 TO NODE     913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   368.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =    5.74
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.00
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
 STREET FLOW TRAVEL TIME(MIN.) =   3.06   Tc(MIN.) =   9.06
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.150
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    1.13
 TOTAL AREA(ACRES) =      0.50       PEAK FLOW RATE(CFS) =       1.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.36
 FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
 LONGEST FLOWPATH FROM NODE    913.40 TO NODE    913.00 =   468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.06
 RAINFALL INTENSITY(INCH/HR) =   3.15
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.46

****************************************************************************
 FLOW PROCESS FROM NODE    912.20 TO NODE    912.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    545.00
 DOWNSTREAM ELEVATION(FEET) =    542.00
 ELEVATION DIFFERENCE(FEET) =      3.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    912.40 TO NODE    913.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   542.00  DOWNSTREAM(FEET) =   532.00
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.82
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.33
 PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =   7.48
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.20 =   440.00 FEET.

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

```
 FLOW PROCESS FROM NODE     913.20 TO NODE     913.20 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.402
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     2.00   SUBAREA RUNOFF(CFS) =     6.12
 TOTAL AREA(ACRES) =       2.10   TOTAL RUNOFF(CFS) =     6.45
 TC(MIN.) =   7.48

**********************************************************************
 FLOW PROCESS FROM NODE     913.20 TO NODE     913.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.84  DOWNSTREAM(FEET) =   523.69
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.99
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.45
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   7.53
 LONGEST FLOWPATH FROM NODE     912.20 TO NODE     913.00 =   455.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     913.00 TO NODE     913.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.53
 RAINFALL INTENSITY(INCH/HR) =   3.40
 TOTAL STREAM AREA(ACRES) =      2.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.45

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1         1.45      9.18        3.131         0.50
     2         1.46      9.06        3.150         0.50
     3         6.45      7.53        3.396         2.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)
     1         9.15      7.53        3.396
     2         8.89      9.06        3.150
     3         8.86      9.18        3.131

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.15   Tc(MIN.) =    7.53
 TOTAL AREA(ACRES) =       3.10
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     913.00 =   547.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     913.00 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.69  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =    27.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.53
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.15
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   7.58
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     909.00 =   574.25 FEET.

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

```
 FLOW PROCESS FROM NODE     909.00 TO NODE     909.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.58
 RAINFALL INTENSITY(INCH/HR) =    3.39
 TOTAL STREAM AREA(ACRES) =      3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.15

**********************************************************************
 FLOW PROCESS FROM NODE     913.60 TO NODE     913.70 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =     536.26
 DOWNSTREAM ELEVATION(FEET) =     534.26
 ELEVATION DIFFERENCE(FEET) =       2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =       0.33
 TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.33

**********************************************************************
 FLOW PROCESS FROM NODE     913.70 TO NODE     909.20 IS CODE =  62
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.75
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
 STREET FLOW TRAVEL TIME(MIN.) =   3.36   Tc(MIN.) =   9.36
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.102
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.84
 TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.17

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.70
 FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
 LONGEST FLOWPATH FROM NODE    913.60 TO NODE    909.20 =   485.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     909.20 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.25  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =     5.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.92
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =      1.17
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   9.38
 LONGEST FLOWPATH FROM NODE    913.60 TO NODE    909.00 =   490.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    909.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.38
 RAINFALL INTENSITY(INCH/HR) =   3.10
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.17

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          9.15     7.58        3.387         3.10
    2          1.17     9.38        3.099         0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         10.22     7.58        3.387
    2          9.54     9.38        3.099

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     10.22   Tc(MIN.) =    7.58
 TOTAL AREA(ACRES) =      3.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    910.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.64  DOWNSTREAM(FEET) =   521.73
 FLOW LENGTH(FEET) =    91.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.22
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   7.81
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.00 =   665.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.00 TO NODE    910.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   521.40  DOWNSTREAM(FEET) =   512.91
 FLOW LENGTH(FEET) =   256.12   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.22
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   8.21
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.20 =   921.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.20 TO NODE    910.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   511.29  DOWNSTREAM(FEET) =   506.34
 FLOW LENGTH(FEET) =   123.77   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.22
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     10.22
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   8.40
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.40
 RAINFALL INTENSITY(INCH/HR) =   3.26
 TOTAL STREAM AREA(ACRES) =     3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.22

****************************************************************************
 FLOW PROCESS FROM NODE    910.40 TO NODE    910.60 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    528.83
 DOWNSTREAM ELEVATION(FEET) =    525.33
 ELEVATION DIFFERENCE(FEET) =      3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.371
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    910.60 TO NODE    910.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  527.40  DOWNSTREAM ELEVATION(FEET) =  513.28
 STREET LENGTH(FEET) =   312.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.63
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.19
   HALFSTREET FLOOD WIDTH(FEET) =    3.22
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.83
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
 STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   7.84
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.346
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.60
 TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       0.93

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.48
 FLOW VELOCITY(FEET/SEC.) =  2.92   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
 LONGEST FLOWPATH FROM NODE    910.40 TO NODE    910.30 =   412.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.84
 RAINFALL INTENSITY(INCH/HR) =   3.35
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.93

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         10.22     8.40        3.257         3.50
    2          0.93     7.84        3.346         0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         10.87     7.84        3.346
    2         11.12     8.40        3.257

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     11.12   Tc(MIN.) =    8.40
 TOTAL AREA(ACRES) =      3.80
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    914.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   505.84  DOWNSTREAM(FEET) =   499.83
 FLOW LENGTH(FEET) =   140.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.55
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.12
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   8.60
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.60
 RAINFALL INTENSITY(INCH/HR) =   3.22
 TOTAL STREAM AREA(ACRES) =     3.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.12

****************************************************************************
 FLOW PROCESS FROM NODE    914.20 TO NODE    914.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    516.00
 DOWNSTREAM ELEVATION(FEET) =    513.78
 ELEVATION DIFFERENCE(FEET) =      2.22
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.760
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    914.40 TO NODE    914.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  513.28  DOWNSTREAM ELEVATION(FEET) =  505.13
  STREET LENGTH(FEET) =   122.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   6.50
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.560
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.10      SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =       0.20        PEAK FLOW RATE(CFS) =       0.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.18   HALFSTREET FLOOD WIDTH(FEET) =   2.62
  FLOW VELOCITY(FEET/SEC.) =  3.47   DEPTH*VELOCITY(FT*FT/SEC.) =   0.62
  LONGEST FLOWPATH FROM NODE    914.20 TO NODE    914.00 =   222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.50
  RAINFALL INTENSITY(INCH/HR) =   3.56
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.65

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1        11.12      8.60         3.224          3.80
      2         0.65      6.50         3.560          0.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1        10.72      6.50         3.560
      2        11.71      8.60         3.224

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     11.71   Tc(MIN.) =    8.60
  TOTAL AREA(ACRES) =      4.00
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    954.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   499.50  DOWNSTREAM(FEET) =   498.71
  FLOW LENGTH(FEET) =    79.37   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     11.71
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   8.79
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    954.20 =  1265.09 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    954.20 TO NODE    954.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.194
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40   SUBAREA RUNOFF(CFS) =    1.15
 TOTAL AREA(ACRES) =       4.40   TOTAL RUNOFF(CFS) =   12.86
 TC(MIN.) =   8.79

****************************************************************************
 FLOW PROCESS FROM NODE    954.20 TO NODE    918.80 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.61  DOWNSTREAM(FEET) =   497.39
 FLOW LENGTH(FEET) =   121.84   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.13
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.86
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   9.07
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    918.80 =  1386.93 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.80 TO NODE    918.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.148
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.10   SUBAREA RUNOFF(CFS) =    0.28
 TOTAL AREA(ACRES) =       4.50   TOTAL RUNOFF(CFS) =   13.14
 TC(MIN.) =   9.07

****************************************************************************
 FLOW PROCESS FROM NODE    918.80 TO NODE    918.60 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   497.29  DOWNSTREAM(FEET) =   495.55
 FLOW LENGTH(FEET) =   173.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     13.14
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   9.48
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    918.60 =  1560.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.60 TO NODE    918.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.084
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     1.00   SUBAREA RUNOFF(CFS) =    2.78
 TOTAL AREA(ACRES) =       5.50   TOTAL RUNOFF(CFS) =   15.92
 TC(MIN.) =   9.48

****************************************************************************
 FLOW PROCESS FROM NODE    918.60 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   495.44  DOWNSTREAM(FEET) =   495.06
 FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.47
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     15.92
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   9.56
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.56
 RAINFALL INTENSITY(INCH/HR) =   3.07
 TOTAL STREAM AREA(ACRES) =      5.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.92

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    512.74
 DOWNSTREAM ELEVATION(FEET) =    511.74
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.600
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      2.29
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      2.29

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.74  DOWNSTREAM(FEET) =   504.69
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.59
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.29
 PIPE TRAVEL TIME(MIN.) =   1.47    Tc(MIN.) =   7.47
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.20 =   505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.405
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     3.30   SUBAREA RUNOFF(CFS) =   10.11
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =   12.40
 TC(MIN.) =   7.47

****************************************************************************
 FLOW PROCESS FROM NODE    918.20 TO NODE    918.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   504.59  DOWNSTREAM(FEET) =   499.00
 FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
```

```
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.40
 PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   8.80
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.40 =  1065.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.40 TO NODE    918.50 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.90  DOWNSTREAM(FEET) =   495.36
 FLOW LENGTH(FEET) =   259.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.40
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   9.42
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.50 =  1324.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.50 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.26  DOWNSTREAM(FEET) =   495.16
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.40
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   9.47
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    916.00 =  1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.47
 RAINFALL INTENSITY(INCH/HR) =   3.09
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.40

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1        15.92      9.56         3.070          5.50
    2        12.40      9.47         3.085          4.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1        28.24      9.47         3.085
    2        28.26      9.56         3.070

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     28.26   Tc(MIN.) =    9.56
 TOTAL AREA(ACRES) =      9.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.070
 *USER SPECIFIED(SUBAREA):
```

```
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  SUBAREA AREA(ACRES) =     2.40   SUBAREA RUNOFF(CFS) =     6.63
  TOTAL AREA(ACRES) =      11.90   TOTAL RUNOFF(CFS) =    34.89
  TC(MIN.) =   9.56

****************************************************************************
  FLOW PROCESS FROM NODE     916.00 TO NODE     919.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     495.06  DOWNSTREAM(FEET) =     494.56
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.0036
  CHANNEL BASE(FEET) =   45.50   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   6.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     34.89
  FLOW VELOCITY(FEET/SEC.) =   2.60   FLOW DEPTH(FEET) =   0.29
  TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =  10.46
  LONGEST FLOWPATH FROM NODE     911.00 TO NODE     919.00 =  1739.52 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     919.00 TO NODE     919.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  25.76   RAIN INTENSITY(INCH/HOUR) =  1.87
  TOTAL AREA(ACRES) =     11.90   TOTAL RUNOFF(CFS) =     11.10

****************************************************************************
  FLOW PROCESS FROM NODE     919.00 TO NODE     920.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.51  DOWNSTREAM(FEET) =   493.67
  FLOW LENGTH(FEET) =    88.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.72
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.10
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =  25.98
  LONGEST FLOWPATH FROM NODE     911.00 TO NODE     920.00 =  1827.82 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     920.00 TO NODE     921.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   493.57  DOWNSTREAM(FEET) =   493.09
  FLOW LENGTH(FEET) =    56.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.47
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.10
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  26.12
  LONGEST FLOWPATH FROM NODE     911.00 TO NODE     921.00 =  1884.12 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     921.00 TO NODE     952.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   492.99  DOWNSTREAM(FEET) =   491.45
  FLOW LENGTH(FEET) =   187.54   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.38
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.10
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =  26.61
  LONGEST FLOWPATH FROM NODE     911.00 TO NODE     952.20 =  2071.66 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     952.20 TO NODE     990.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   491.15  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.27
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.10
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  26.64
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  26.64
 RAINFALL INTENSITY(INCH/HR) =   1.83
 TOTAL STREAM AREA(ACRES) =    11.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.10

****************************************************************************
 FLOW PROCESS FROM NODE    988.00 TO NODE    989.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    503.87
 DOWNSTREAM ELEVATION(FEET) =    503.75
 ELEVATION DIFFERENCE(FEET) =      0.12
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.096
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.66
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
 FLOW PROCESS FROM NODE    989.00 TO NODE    990.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
 UPSTREAM ELEVATION(FEET) =  503.75  DOWNSTREAM ELEVATION(FEET) =  500.48
 STREET LENGTH(FEET) =   375.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.09
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    6.78
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.80
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
 STREET FLOW TRAVEL TIME(MIN.) =   3.47   Tc(MIN.) =   9.47
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.085
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.86
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       1.52

 END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.22
 FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.59
 LONGEST FLOWPATH FROM NODE    988.00 TO NODE    990.00 =   425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.47
 RAINFALL INTENSITY(INCH/HR) =   3.09
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.52

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      TC       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        11.10     26.64        1.834        11.90
    2         1.52      9.47        3.085         0.60

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      TC       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         8.12      9.47        3.085
    2        12.00     26.64        1.834

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     12.00   TC(MIN.) =   26.64
 TOTAL AREA(ACRES) =     12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   491.21  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.91
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.00
 PIPE TRAVEL TIME(MIN.) =   0.02    TC(MIN.) =  26.67
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    957.00 TO NODE    958.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    503.59
 DOWNSTREAM ELEVATION(FEET) =    501.59
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    958.00 TO NODE    955.00 IS CODE =  62
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
STREET LENGTH(FEET) =   304.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.26
  HALFSTREET FLOOD WIDTH(FEET) =    6.75
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.83
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
STREET FLOW TRAVEL TIME(MIN.) =   2.77   Tc(MIN.) =   8.77
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.196
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    1.44
TOTAL AREA(ACRES) =       0.60        PEAK FLOW RATE(CFS) =       1.77

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.68
FLOW VELOCITY(FEET/SEC.) =  2.03   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
LONGEST FLOWPATH FROM NODE    957.00 TO NODE    955.00 =   404.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    955.00 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   492.76  DOWNSTREAM(FEET) =   492.46
FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.25
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      1.77
PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   8.89
LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   8.89
RAINFALL INTENSITY(INCH/HR) =   3.18
TOTAL STREAM AREA(ACRES) =     0.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.77

****************************************************************************
FLOW PROCESS FROM NODE    959.00 TO NODE    960.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
UPSTREAM ELEVATION(FEET) =    503.59
DOWNSTREAM ELEVATION(FEET) =    501.59
ELEVATION DIFFERENCE(FEET) =      2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
```

```
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE     960.00 TO NODE     956.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
 STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.22
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    6.96
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
 STREET FLOW TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =   8.05
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.312
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.60      SUBAREA RUNOFF(CFS) =    1.79
 TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       2.12

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.99
 FLOW VELOCITY(FEET/SEC.) =  2.29   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
 LONGEST FLOWPATH FROM NODE     959.00 TO NODE     956.20 =   350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     956.20 TO NODE     956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.48  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.12
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.06
 LONGEST FLOWPATH FROM NODE     959.00 TO NODE     956.00 =   352.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     956.00 TO NODE     956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.06
 RAINFALL INTENSITY(INCH/HR) =   3.31
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.12

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       TC       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1          1.77      8.89         3.177          0.60
    2          2.12      8.06         3.310          0.70

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

```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc       INTENSITY
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)
    1         3.81      8.06        3.310
    2         3.80      8.89        3.177

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      3.81   Tc(MIN.) =    8.06
 TOTAL AREA(ACRES) =      1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.46  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.54
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.81
 PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   8.79
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
    1         3.81      8.79        3.193        1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
    1        12.00     26.67        1.833       12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc       INTENSITY
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)
    1        10.70      8.79        3.193
    2        14.19     26.67        1.833

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     14.19   Tc(MIN.) =   26.67
 TOTAL AREA(ACRES) =     13.80

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    919.00 TO NODE    919.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.833
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.17
 TOTAL AREA(ACRES) =     13.90   TOTAL RUNOFF(CFS) =   14.36
 TC(MIN.) =  26.67
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     13.90  TC(MIN.) =     26.67
 PEAK FLOW RATE(CFS)   =     14.36
============================================================================
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

♀

10-Year

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        Rick Engineering Company
                      1223 University Ave., Suite 240
                        Riverside, California 92507


 ************************** DESCRIPTION OF STUDY **************************
* J-16630 BMR North Village East Unit 14                                  *
* Construction Change 'F' - Basin 900A                                    *
* 10 Year - DETAINED - (Excluding Cam. Del Sur)                           *
 **************************************************************************

  FILE NAME: 9A_DET10.DAT
  TIME/DATE OF STUDY: 15:08 07/03/2014
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION USED

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:   MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE   FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180
  3   51.0     46.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE     911.00 TO NODE     912.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
  UPSTREAM ELEVATION(FEET) =  544.00
  DOWNSTREAM ELEVATION(FEET) =  539.81
  ELEVATION DIFFERENCE(FEET) =  4.19
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.233
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
  SUBAREA RUNOFF(CFS) =  0.28
  TOTAL AREA(ACRES) =  0.10  TOTAL RUNOFF(CFS) =  0.28

**************************************************************************
  FLOW PROCESS FROM NODE     912.00 TO NODE     913.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  539.81  DOWNSTREAM ELEVATION(FEET) =  527.37
```

```
STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.77
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.22
  HALFSTREET FLOOD WIDTH(FEET) =    4.64
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
STREET FLOW TRAVEL TIME(MIN.) =   3.24   Tc(MIN.) =   9.24
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.673
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    0.96
TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS) =       1.25

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.19
FLOW VELOCITY(FEET/SEC.) =  2.48   DEPTH*VELOCITY(FT*FT/SEC.) =   0.62
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.24
  RAINFALL INTENSITY(INCH/HR) =   2.67
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.25

****************************************************************************
  FLOW PROCESS FROM NODE    913.40 TO NODE    913.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    536.26
  DOWNSTREAM ELEVATION(FEET) =    534.26
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    913.50 TO NODE    913.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
  STREET LENGTH(FEET) =   368.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
```

```
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.28
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.94
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.45
 STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   9.17
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.682
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.97
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.25

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.85
 FLOW VELOCITY(FEET/SEC.) =  2.13   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE    913.40 TO NODE    913.00 =   468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.17
 RAINFALL INTENSITY(INCH/HR) =   2.68
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.25

****************************************************************************
 FLOW PROCESS FROM NODE    912.20 TO NODE    912.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    545.00
 DOWNSTREAM ELEVATION(FEET) =    542.00
 ELEVATION DIFFERENCE(FEET) =      3.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.28
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    912.40 TO NODE    913.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   542.00  DOWNSTREAM(FEET) =   532.00
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.59
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.28
 PIPE TRAVEL TIME(MIN.) =   1.58    Tc(MIN.) =   7.58
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.20 =   440.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.20 TO NODE    913.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.914
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    2.00   SUBAREA RUNOFF(CFS) =    5.24
```

```
 TOTAL AREA(ACRES) =      2.10   TOTAL RUNOFF(CFS) =    5.53
 TC(MIN.) =   7.58

****************************************************************************
 FLOW PROCESS FROM NODE    913.20 TO NODE    913.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.84  DOWNSTREAM(FEET) =   523.69
 FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.74
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.53
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   7.62
 LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.00 =   455.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.62
 RAINFALL INTENSITY(INCH/HR) =   2.91
 TOTAL STREAM AREA(ACRES) =     2.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.53

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         1.25     9.24         2.673          0.50
     2         1.25     9.17         2.682          0.50
     3         5.53     7.62         2.907          2.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
     1         7.83     7.62         2.907
     2         7.59     9.17         2.682
     3         7.58     9.24         2.673

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      7.83   Tc(MIN.) =    7.62
 TOTAL AREA(ACRES) =      3.10
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.69  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =    27.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.23
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.83
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   7.68
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    909.00 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    909.00 TO NODE    909.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.68
 RAINFALL INTENSITY(INCH/HR) =   2.90
 TOTAL STREAM AREA(ACRES) =     3.10
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.83

****************************************************************************
 FLOW PROCESS FROM NODE     913.60 TO NODE     913.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  100.00
 UPSTREAM ELEVATION(FEET) =  536.26
 DOWNSTREAM ELEVATION(FEET) =  534.26
 ELEVATION DIFFERENCE(FEET) =  2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =  0.28
 TOTAL AREA(ACRES) =  0.10   TOTAL RUNOFF(CFS) =  0.28

****************************************************************************
 FLOW PROCESS FROM NODE     913.70 TO NODE     909.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =  385.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =  0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =  0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  0.64
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.22
   HALFSTREET FLOOD WIDTH(FEET) =  4.81
   AVERAGE FLOW VELOCITY(FEET/SEC.) =  1.84
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =  0.41
 STREET FLOW TRAVEL TIME(MIN.) =  3.49   Tc(MIN.) =  9.49
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.647
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =  0.30   SUBAREA RUNOFF(CFS) =  0.71
 TOTAL AREA(ACRES) =  0.40   PEAK FLOW RATE(CFS) =  1.00

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =  6.19
 FLOW VELOCITY(FEET/SEC.) =  1.99   DEPTH*VELOCITY(FT*FT/SEC.) =  0.50
 LONGEST FLOWPATH FROM NODE     913.60 TO NODE     909.20 =  485.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     909.20 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  523.25  DOWNSTREAM(FEET) =  523.14
 FLOW LENGTH(FEET) =  5.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  3.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  4.69
 GIVEN PIPE DIAMETER(INCH) =  18.00   NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  1.00
 PIPE TRAVEL TIME(MIN.) =  0.02   Tc(MIN.) =  9.50
 LONGEST FLOWPATH FROM NODE     913.60 TO NODE     909.00 =  490.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     909.00 TO NODE     909.00 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.50
  RAINFALL INTENSITY(INCH/HR) =    2.64
  TOTAL STREAM AREA(ACRES) =      0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.00

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1          7.83      7.68         2.899          3.10
     2          1.00      9.50         2.645          0.40

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1          8.74      7.68         2.899
     2          8.14      9.50         2.645

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.74   Tc(MIN.) =     7.68
  TOTAL AREA(ACRES) =       3.50
  LONGEST FLOWPATH FROM NODE     911.00 TO NODE     909.00 =    574.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     909.00 TO NODE     910.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    522.64  DOWNSTREAM(FEET) =    521.73
  FLOW LENGTH(FEET) =     91.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.74
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    7.91
  LONGEST FLOWPATH FROM NODE     911.00 TO NODE     910.00 =    665.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     910.00 TO NODE     910.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    521.40  DOWNSTREAM(FEET) =    512.91
  FLOW LENGTH(FEET) =    256.12   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.04
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.74
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    8.34
  LONGEST FLOWPATH FROM NODE     911.00 TO NODE     910.20 =    921.87 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     910.20 TO NODE     910.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    511.29  DOWNSTREAM(FEET) =    506.34
  FLOW LENGTH(FEET) =    123.77   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.73
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.74
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    8.53
  LONGEST FLOWPATH FROM NODE     911.00 TO NODE     910.30 =   1045.64 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     910.30 TO NODE     910.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.53
 RAINFALL INTENSITY(INCH/HR) =   2.77
 TOTAL STREAM AREA(ACRES) =     3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.74

****************************************************************************
 FLOW PROCESS FROM NODE    910.40 TO NODE    910.60 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    528.83
 DOWNSTREAM ELEVATION(FEET) =    525.33
 ELEVATION DIFFERENCE(FEET) =      3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.371
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.28
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    910.60 TO NODE    910.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  527.40  DOWNSTREAM ELEVATION(FEET) =  513.28
 STREET LENGTH(FEET) =   312.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.54
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.18
   HALFSTREET FLOOD WIDTH(FEET) =    2.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
 STREET FLOW TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   7.82
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.877
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =     0.52
 TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       0.80

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.04
 FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.59
 LONGEST FLOWPATH FROM NODE    910.40 TO NODE    910.30 =   412.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.82
 RAINFALL INTENSITY(INCH/HR) =   2.88
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.80
```

```
 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
    1          8.74      8.53         2.771         3.50
    2          0.80      7.82         2.877         0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          9.22      7.82         2.877
    2          9.51      8.53         2.771

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.51   Tc(MIN.) =     8.53
 TOTAL AREA(ACRES) =      3.80
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    914.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   505.84  DOWNSTREAM(FEET) =   499.83
 FLOW LENGTH(FEET) =   140.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   7.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.03
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.51
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   8.74
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.74
 RAINFALL INTENSITY(INCH/HR) =   2.74
 TOTAL STREAM AREA(ACRES) =      3.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.51

****************************************************************************
 FLOW PROCESS FROM NODE    914.20 TO NODE    914.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    516.00
 DOWNSTREAM ELEVATION(FEET) =    513.78
 ELEVATION DIFFERENCE(FEET) =      2.22
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.760
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =       0.28
 TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.28

****************************************************************************
 FLOW PROCESS FROM NODE    914.40 TO NODE    914.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  513.28  DOWNSTREAM ELEVATION(FEET) =  505.13
 STREET LENGTH(FEET) =   122.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   6.50
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.080
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.28
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
  FLOW VELOCITY(FEET/SEC.) =  4.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
  LONGEST FLOWPATH FROM NODE    914.20 TO NODE    914.00 =   222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.50
  RAINFALL INTENSITY(INCH/HR) =   3.08
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.56

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1         9.51      8.74         2.739          3.80
      2         0.56      6.50         3.080          0.20

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

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1         9.02      6.50         3.080
      2        10.01      8.74         2.739

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     10.01   Tc(MIN.) =    8.74
  TOTAL AREA(ACRES) =      4.00
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    914.00 TO NODE    954.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   499.50  DOWNSTREAM(FEET) =   498.71
  FLOW LENGTH(FEET) =    79.37   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.64
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.01
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   8.94
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    954.20 =  1265.09 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    954.20 TO NODE    954.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.709
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40   SUBAREA RUNOFF(CFS) =     0.98
 TOTAL AREA(ACRES) =       4.40   TOTAL RUNOFF(CFS) =    10.99
 TC(MIN.) =   8.94

****************************************************************************
 FLOW PROCESS FROM NODE     954.20 TO NODE     918.80 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.61  DOWNSTREAM(FEET) =   497.39
 FLOW LENGTH(FEET) =   121.84   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.99
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   9.24
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     918.80 =  1386.93 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     918.80 TO NODE     918.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.674
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.10   SUBAREA RUNOFF(CFS) =     0.24
 TOTAL AREA(ACRES) =       4.50   TOTAL RUNOFF(CFS) =    11.23
 TC(MIN.) =   9.24

****************************************************************************
 FLOW PROCESS FROM NODE     918.80 TO NODE     918.60 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   497.29  DOWNSTREAM(FEET) =   495.55
 FLOW LENGTH(FEET) =   173.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.87
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.23
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   9.66
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     918.60 =  1560.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     918.60 TO NODE     918.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.628
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     1.00   SUBAREA RUNOFF(CFS) =     2.36
 TOTAL AREA(ACRES) =       5.50   TOTAL RUNOFF(CFS) =    13.59
 TC(MIN.) =   9.66

****************************************************************************
 FLOW PROCESS FROM NODE     918.60 TO NODE     916.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.44  DOWNSTREAM(FEET) =   495.06
 FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.16
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     13.59
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   9.75
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     916.00 =  1599.52 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.75
 RAINFALL INTENSITY(INCH/HR) =   2.62
 TOTAL STREAM AREA(ACRES) =     5.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.59

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    512.74
 DOWNSTREAM ELEVATION(FEET) =    511.74
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.600
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      1.99
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      1.99

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.74  DOWNSTREAM(FEET) =   504.69
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.99
 PIPE TRAVEL TIME(MIN.) =   1.53    Tc(MIN.) =   7.53
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.20 =   505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.920
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    3.30   SUBAREA RUNOFF(CFS) =    8.67
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =   10.66
 TC(MIN.) =   7.53

****************************************************************************
 FLOW PROCESS FROM NODE    918.20 TO NODE    918.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   504.59  DOWNSTREAM(FEET) =   499.00
 FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.03
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.66
 PIPE TRAVEL TIME(MIN.) =   1.55    Tc(MIN.) =   9.08
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.40 =  1065.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.40 TO NODE    918.50 IS CODE =  41
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   498.90  DOWNSTREAM(FEET) =   495.36
FLOW LENGTH(FEET) =   259.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     10.66
PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   9.65
LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.50 =  1324.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    918.50 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   495.26  DOWNSTREAM(FEET) =   495.16
FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.03
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     10.66
PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   9.71
LONGEST FLOWPATH FROM NODE    917.00 TO NODE    916.00 =  1346.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   9.71
RAINFALL INTENSITY(INCH/HR) =   2.62
TOTAL STREAM AREA(ACRES) =     4.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.66

** CONFLUENCE DATA **
STREAM      RUNOFF       Tc       INTENSITY       AREA
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
   1         13.59      9.75        2.618          5.50
   2         10.66      9.71        2.621          4.00

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc       INTENSITY
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
   1         24.24      9.71        2.621
   2         24.24      9.75        2.618

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     24.24   Tc(MIN.) =    9.75
TOTAL AREA(ACRES) =      9.50
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.618
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =  0
SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    5.65
TOTAL AREA(ACRES) =     11.90   TOTAL RUNOFF(CFS) =   29.90
TC(MIN.) =   9.75

****************************************************************************
FLOW PROCESS FROM NODE    916.00 TO NODE    919.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    495.06  DOWNSTREAM(FEET) =    494.56
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.0036
  CHANNEL BASE(FEET) =   45.50   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   6.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     29.90
  FLOW VELOCITY(FEET/SEC.) =   2.43   FLOW DEPTH(FEET) =   0.27
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =  10.71
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    919.00 =  1739.52 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    919.00 TO NODE    919.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  27.15   RAIN INTENSITY(INCH/HOUR) =  1.55
  TOTAL AREA(ACRES) =    11.90   TOTAL RUNOFF(CFS) =     9.30

****************************************************************************
  FLOW PROCESS FROM NODE    919.00 TO NODE    920.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.51  DOWNSTREAM(FEET) =   493.67
  FLOW LENGTH(FEET) =    88.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.40
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     9.30
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =  27.38
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    920.00 =  1827.82 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    920.00 TO NODE    921.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   493.57  DOWNSTREAM(FEET) =   493.09
  FLOW LENGTH(FEET) =    56.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.16
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     9.30
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  27.53
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    921.00 =  1884.12 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    921.00 TO NODE    952.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   492.99  DOWNSTREAM(FEET) =   491.45
  FLOW LENGTH(FEET) =   187.54   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     9.30
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =  28.05
  LONGEST FLOWPATH FROM NODE    911.00 TO NODE    952.20 =  2071.66 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    952.20 TO NODE    990.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   491.15  DOWNSTREAM(FEET) =   491.06
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     9.30
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  28.08
```

```
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  28.08
 RAINFALL INTENSITY(INCH/HR) =   1.52
 TOTAL STREAM AREA(ACRES) =    11.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.30

****************************************************************************
 FLOW PROCESS FROM NODE    988.00 TO NODE    989.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    503.87
 DOWNSTREAM ELEVATION(FEET) =    503.75
 ELEVATION DIFFERENCE(FEET) =      0.12
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.096
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.57
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
 FLOW PROCESS FROM NODE    989.00 TO NODE    990.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  503.75  DOWNSTREAM ELEVATION(FEET) =  500.48
 STREET LENGTH(FEET) =   375.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.94
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    6.22
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
 STREET FLOW TRAVEL TIME(MIN.) =   3.59   Tc(MIN.) =   9.59
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.636
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =    0.40     SUBAREA RUNOFF(CFS) =    0.74
 TOTAL AREA(ACRES) =      0.60       PEAK FLOW RATE(CFS) =       1.31

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.59
 FLOW VELOCITY(FEET/SEC.) =  1.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
 LONGEST FLOWPATH FROM NODE    988.00 TO NODE    990.00 =   425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.59
 RAINFALL INTENSITY(INCH/HR) =   2.64
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.31

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
    1          9.30     28.08         1.522         11.90
    2          1.31      9.59         2.636          0.60

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          6.68      9.59         2.636
    2         10.05     28.08         1.522

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     10.05   Tc(MIN.) =   28.08
 TOTAL AREA(ACRES) =     12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   491.21  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.55
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.05
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  28.10
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    957.00 TO NODE    958.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    503.59
 DOWNSTREAM ELEVATION(FEET) =    501.59
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.28
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    958.00 TO NODE    955.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
 STREET LENGTH(FEET) =   304.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

```
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.24
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.77
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
 STREET FLOW TRAVEL TIME(MIN.) =   2.87   Tc(MIN.) =   8.87
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.720
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    1.22
 TOTAL AREA(ACRES) =       0.60        PEAK FLOW RATE(CFS) =       1.51

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.07
 FLOW VELOCITY(FEET/SEC.) =  1.96   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    955.00 =   404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    955.00 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.76  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.51
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   8.99
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.99
 RAINFALL INTENSITY(INCH/HR) =   2.70
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.51

****************************************************************************
 FLOW PROCESS FROM NODE    959.00 TO NODE    960.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    503.59
 DOWNSTREAM ELEVATION(FEET) =    501.59
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.160
 SUBAREA RUNOFF(CFS) =      0.28
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    960.00 TO NODE    956.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
```

```
STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.26
  HALFSTREET FLOOD WIDTH(FEET) =    6.45
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.97
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
STREET FLOW TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =   8.12
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.832
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =     0.60      SUBAREA RUNOFF(CFS) =    1.53
TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       1.81

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.38
FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.20 =   350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.20 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.48  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.11
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.81
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.13
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.00 =   352.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.13
 RAINFALL INTENSITY(INCH/HR) =   2.83
 TOTAL STREAM AREA(ACRES) =      0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.81

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          1.51     8.99        2.701          0.60
    2          1.81     8.13        2.831          0.70

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1          3.25     8.13        2.831
    2          3.24     8.99        2.701

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       3.25   Tc(MIN.) =    8.13
 TOTAL AREA(ACRES) =      1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.46  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.25
 PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   8.89
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          3.25      8.89        2.716         1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         10.05     28.10        1.521        12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         8.88       8.89        2.716
    2        11.88      28.10        1.521

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     11.88   Tc(MIN.) =   28.10
 TOTAL AREA(ACRES) =     13.80

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.521
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.14
 TOTAL AREA(ACRES) =     13.90   TOTAL RUNOFF(CFS) =   12.01
 TC(MIN.) =  28.10
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     13.90  TC(MIN.) =     28.10
 PEAK FLOW RATE(CFS)   =     12.01
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

2-Year

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        Rick Engineering Company
                      1223 University Ave., Suite 240
                        Riverside, California 92507

 ************************** DESCRIPTION OF STUDY **************************
* J-16630 BMR North Village East Unit 14                                  *
* Construction Change 'F'  - Basin 900A                                   *
* 2 Year - DETAINED - (Excluding Cam. Del Sur)                            *
 ************************************************************************

  FILE NAME: 9A_DET02.DAT
  TIME/DATE OF STUDY: 15:04 07/03/2014
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  4
   1)   5.000;  2.500
   2)  10.000;  1.800
   3)  15.000;  1.500
   4)  20.000;  1.200
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE   FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ==================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020    0.50    1.50 0.0313 0.125 0.0180
  3   51.0     46.0    0.020/0.020/0.020    0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************************************************
  FLOW PROCESS FROM NODE     911.00 TO NODE     912.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    544.00
  DOWNSTREAM ELEVATION(FEET) =    539.81
  ELEVATION DIFFERENCE(FEET) =      4.19
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.233
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

************************************************************************
  FLOW PROCESS FROM NODE     912.00 TO NODE     913.00 IS CODE =  62
------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  539.81  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.55
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    3.61
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.23
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
 STREET FLOW TRAVEL TIME(MIN.) =   3.34   Tc(MIN.) =   9.34
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.892
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    0.68
 TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS) =       0.89

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.13
 FLOW VELOCITY(FEET/SEC.) =  2.35   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   547.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.34
 RAINFALL INTENSITY(INCH/HR) =   1.89
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.89

****************************************************************************
 FLOW PROCESS FROM NODE    913.40 TO NODE    913.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE    913.50 TO NODE    913.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   368.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.26
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.85
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
  STREET FLOW TRAVEL TIME(MIN.) =   3.31   Tc(MIN.) =   9.31
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.896
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.68
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       0.90

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   5.74
  FLOW VELOCITY(FEET/SEC.) =  2.00   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
  LONGEST FLOWPATH FROM NODE    913.40 TO NODE    913.00 =   468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    913.00 TO NODE    913.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.31
  RAINFALL INTENSITY(INCH/HR) =   1.90
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.90

****************************************************************************
  FLOW PROCESS FROM NODE    912.20 TO NODE    912.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    545.00
  DOWNSTREAM ELEVATION(FEET) =    542.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.496
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    912.40 TO NODE    913.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   542.00  DOWNSTREAM(FEET) =   532.00
  FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.33
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.21
  PIPE TRAVEL TIME(MIN.) =   1.70    Tc(MIN.) =   7.70
  LONGEST FLOWPATH FROM NODE    912.20 TO NODE    913.20 =   440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    913.20 TO NODE    913.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.122
```

```
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) =  0
SUBAREA AREA(ACRES) =     2.00   SUBAREA RUNOFF(CFS) =     3.82
TOTAL AREA(ACRES) =       2.10   TOTAL RUNOFF(CFS) =     4.03
TC(MIN.) =   7.70

****************************************************************************
FLOW PROCESS FROM NODE     913.20 TO NODE     913.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   523.84  DOWNSTREAM(FEET) =   523.69
FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      4.03
PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   7.75
LONGEST FLOWPATH FROM NODE     912.20 TO NODE     913.00 =   455.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     913.00 TO NODE     913.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
TIME OF CONCENTRATION(MIN.) =   7.75
RAINFALL INTENSITY(INCH/HR) =   2.12
TOTAL STREAM AREA(ACRES) =      2.10
PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.03

** CONFLUENCE DATA **
STREAM      RUNOFF       Tc       INTENSITY       AREA
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
   1          0.89      9.34         1.892          0.50
   2          0.90      9.31         1.896          0.50
   3          4.03      7.75         2.115          2.10

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc       INTENSITY
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
   1          5.63      7.75         2.115
   2          5.40      9.31         1.896
   3          5.39      9.34         1.892

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      5.63   Tc(MIN.) =    7.75
TOTAL AREA(ACRES) =      3.10
LONGEST FLOWPATH FROM NODE     911.00 TO NODE     913.00 =   547.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     913.00 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   523.69  DOWNSTREAM(FEET) =   523.14
FLOW LENGTH(FEET) =    27.25   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.57
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      5.63
PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   7.81
LONGEST FLOWPATH FROM NODE     911.00 TO NODE     909.00 =   574.25 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     909.00 TO NODE     909.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
```

```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.81
 RAINFALL INTENSITY(INCH/HR) =   2.11
 TOTAL STREAM AREA(ACRES) =      3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.63

****************************************************************************
 FLOW PROCESS FROM NODE     913.60 TO NODE     913.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    536.26
 DOWNSTREAM ELEVATION(FEET) =    534.26
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE     913.70 TO NODE     909.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  534.26  DOWNSTREAM ELEVATION(FEET) =  527.37
 STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.46
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    3.77
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.78
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.36
 STREET FLOW TRAVEL TIME(MIN.) =   3.60   Tc(MIN.) =   9.60
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.856
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.50
 TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       0.71

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.13
 FLOW VELOCITY(FEET/SEC.) =  1.87   DEPTH*VELOCITY(FT*FT/SEC.) =   0.43
 LONGEST FLOWPATH FROM NODE    913.60 TO NODE    909.20 =   485.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     909.20 TO NODE     909.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   523.25  DOWNSTREAM(FEET) =   523.14
 FLOW LENGTH(FEET) =     5.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.25
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.71
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   9.62
 LONGEST FLOWPATH FROM NODE    913.60 TO NODE    909.00 =   490.25 FEET.

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

```
 FLOW PROCESS FROM NODE     909.00 TO NODE     909.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.62
 RAINFALL INTENSITY(INCH/HR) =   1.85
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.71

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
    1          5.63      7.81        2.107         3.10
    2          0.71      9.62        1.853         0.40

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          6.26      7.81        2.107
    2          5.67      9.62        1.853

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      6.26   Tc(MIN.) =     7.81
 TOTAL AREA(ACRES) =      3.50
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     909.00 =   574.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     909.00 TO NODE     910.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.64  DOWNSTREAM(FEET) =   521.73
 FLOW LENGTH(FEET) =    91.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.26
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   8.07
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     910.00 =   665.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     910.00 TO NODE     910.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   521.40  DOWNSTREAM(FEET) =   512.91
 FLOW LENGTH(FEET) =   256.12   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.13
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.26
 PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   8.53
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     910.20 =   921.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     910.20 TO NODE     910.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   511.29  DOWNSTREAM(FEET) =   506.34
 FLOW LENGTH(FEET) =   123.77   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.76
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.26
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   8.75
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     910.30 =  1045.64 FEET.

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

```
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.75
 RAINFALL INTENSITY(INCH/HR) =   1.98
 TOTAL STREAM AREA(ACRES) =     3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.26

**********************************************************************
 FLOW PROCESS FROM NODE    910.40 TO NODE    910.60 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    528.83
 DOWNSTREAM ELEVATION(FEET) =    525.33
 ELEVATION DIFFERENCE(FEET) =      3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.371
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

**********************************************************************
 FLOW PROCESS FROM NODE    910.60 TO NODE    910.30 IS CODE =  62
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
 UPSTREAM ELEVATION(FEET) =  527.40  DOWNSTREAM ELEVATION(FEET) =  513.28
 STREET LENGTH(FEET) =   312.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    1.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.34
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.52
 STREET FLOW TRAVEL TIME(MIN.) =   1.56   Tc(MIN.) =   7.56
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.142
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.20      SUBAREA RUNOFF(CFS) =    0.39
 TOTAL AREA(ACRES) =      0.30       PEAK FLOW RATE(CFS) =       0.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =   3.06
 FLOW VELOCITY(FEET/SEC.) =  2.83   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
 LONGEST FLOWPATH FROM NODE    910.40 TO NODE    910.30 =   412.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   7.56
```

```
 RAINFALL INTENSITY(INCH/HR) =   2.14
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.60

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1          6.26     8.75        1.976         3.50
    2          0.60     7.56        2.142         0.30

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc      INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1          6.37     7.56        2.142
    2          6.81     8.75        1.976

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      6.81   Tc(MIN.) =    8.75
 TOTAL AREA(ACRES) =      3.80
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    910.30 =  1045.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    910.30 TO NODE    914.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   505.84  DOWNSTREAM(FEET) =   499.83
 FLOW LENGTH(FEET) =   140.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.01
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.81
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    8.98
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.98
 RAINFALL INTENSITY(INCH/HR) =   1.94
 TOTAL STREAM AREA(ACRES) =     3.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.81

****************************************************************************
 FLOW PROCESS FROM NODE    914.20 TO NODE    914.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    516.00
 DOWNSTREAM ELEVATION(FEET) =    513.78
 ELEVATION DIFFERENCE(FEET) =      2.22
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.760
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE    914.40 TO NODE    914.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  513.28  DOWNSTREAM ELEVATION(FEET) =  505.13
 STREET LENGTH(FEET) =   122.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.32
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    1.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.06
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
 STREET FLOW TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   6.50
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.290
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.10      SUBAREA RUNOFF(CFS) =     0.21
 TOTAL AREA(ACRES) =       0.20        PEAK FLOW RATE(CFS) =       0.42

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
 FLOW VELOCITY(FEET/SEC.) =  4.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
 LONGEST FLOWPATH FROM NODE    914.20 TO NODE    914.00 =   222.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    914.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   6.50
 RAINFALL INTENSITY(INCH/HR) =   2.29
 TOTAL STREAM AREA(ACRES) =     0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.42

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          6.81     8.98         1.943          3.80
    2          0.42     6.50         2.290          0.20

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1          6.20     6.50         2.290
    2          7.17     8.98         1.943

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       7.17   Tc(MIN.) =    8.98
 TOTAL AREA(ACRES) =      4.00
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    914.00 =  1185.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    914.00 TO NODE    954.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   499.50  DOWNSTREAM(FEET) =   498.71
 FLOW LENGTH(FEET) =    79.37   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.05
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.17
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   9.20
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    954.20 =  1265.09 FEET.

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

```
 FLOW PROCESS FROM NODE     954.20 TO NODE     954.20 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.912
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.40   SUBAREA RUNOFF(CFS) =     0.69
 TOTAL AREA(ACRES) =       4.40   TOTAL RUNOFF(CFS) =     7.86
 TC(MIN.) =   9.20

**********************************************************************
 FLOW PROCESS FROM NODE     954.20 TO NODE     918.80 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.61  DOWNSTREAM(FEET) =   497.39
 FLOW LENGTH(FEET) =   121.84   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   9.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.22
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.86
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   9.52
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     918.80 =  1386.93 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     918.80 TO NODE     918.80 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.867
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.10   SUBAREA RUNOFF(CFS) =     0.17
 TOTAL AREA(ACRES) =       4.50   TOTAL RUNOFF(CFS) =     8.02
 TC(MIN.) =   9.52

**********************************************************************
 FLOW PROCESS FROM NODE     918.80 TO NODE     918.60 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   497.29  DOWNSTREAM(FEET) =   495.55
 FLOW LENGTH(FEET) =   173.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   9.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.26
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      8.02
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   9.99
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     918.60 =  1560.52 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     918.60 TO NODE     918.60 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.802
 *USER SPECIFIED(SUBAREA):
 CHAPARRAL(BROADLEAF) POOR COVER RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     1.00   SUBAREA RUNOFF(CFS) =     1.62
 TOTAL AREA(ACRES) =       5.50   TOTAL RUNOFF(CFS) =     9.65
 TC(MIN.) =   9.99

**********************************************************************
 FLOW PROCESS FROM NODE     918.60 TO NODE     916.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.44  DOWNSTREAM(FEET) =   495.06
 FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.52
```

```
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      9.65
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  10.09
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.09
 RAINFALL INTENSITY(INCH/HR) =   1.79
 TOTAL STREAM AREA(ACRES) =     5.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.65

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    512.74
 DOWNSTREAM ELEVATION(FEET) =    511.74
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.600
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      1.49
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      1.49

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   508.74  DOWNSTREAM(FEET) =   504.69
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.05
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.49
 PIPE TRAVEL TIME(MIN.) =   1.67    Tc(MIN.) =   7.67
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.20 =   505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    918.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.127
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     3.30   SUBAREA RUNOFF(CFS) =     6.32
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =    7.80
 TC(MIN.) =   7.67

****************************************************************************
 FLOW PROCESS FROM NODE    918.20 TO NODE    918.40 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   504.59  DOWNSTREAM(FEET) =   499.00
 FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.25
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.80
 PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   9.16
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.40 =  1065.00 FEET.
```

```
**********************************************************************
 FLOW PROCESS FROM NODE    918.40 TO NODE    918.50 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.90  DOWNSTREAM(FEET) =   495.36
 FLOW LENGTH(FEET) =   259.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.08
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.80
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   9.77
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    918.50 =  1324.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE    918.50 TO NODE    916.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   495.26  DOWNSTREAM(FEET) =   495.16
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.80
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   9.85
 LONGEST FLOWPATH FROM NODE    917.00 TO NODE    916.00 =  1346.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.85
 RAINFALL INTENSITY(INCH/HR) =   1.82
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.80

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          9.65    10.09         1.795          5.50
    2          7.80     9.85         1.820          4.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1         17.31     9.85         1.820
    2         17.34    10.09         1.795

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     17.34   Tc(MIN.) =   10.09
 TOTAL AREA(ACRES) =      9.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    916.00 =  1599.52 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    916.00 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.795
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    3.88
 TOTAL AREA(ACRES) =     11.90   TOTAL RUNOFF(CFS) =   21.22
 TC(MIN.) =  10.09

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

```
 FLOW PROCESS FROM NODE     916.00 TO NODE     919.00 IS CODE =  51
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    495.06  DOWNSTREAM(FEET) =    494.56
 CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.0036
 CHANNEL BASE(FEET) =   45.50   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   6.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     21.22
 FLOW VELOCITY(FEET/SEC.) =   2.14   FLOW DEPTH(FEET) =   0.22
 TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =  11.18
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     919.00 =  1739.52 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     919.00 TO NODE     919.00 IS CODE =   7
----------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
======================================================================
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  26.29   RAIN INTENSITY(INCH/HOUR) =  1.20
 TOTAL AREA(ACRES) =    11.90   TOTAL RUNOFF(CFS) =      6.40

****************************************************************************
 FLOW PROCESS FROM NODE     919.00 TO NODE     920.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   494.51  DOWNSTREAM(FEET) =   493.67
 FLOW LENGTH(FEET) =    88.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.40
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  26.55
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     920.00 =  1827.82 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     920.00 TO NODE     921.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   493.57  DOWNSTREAM(FEET) =   493.09
 FLOW LENGTH(FEET) =    56.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.55
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.40
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  26.71
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     921.00 =  1884.12 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     921.00 TO NODE     952.20 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.99  DOWNSTREAM(FEET) =   491.45
 FLOW LENGTH(FEET) =   187.54   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.47
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.40
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  27.29
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     952.20 =  2071.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     952.20 TO NODE     990.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   491.15  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS   8.1 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.35
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.40
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  27.32
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  27.32
 RAINFALL INTENSITY(INCH/HR) =   1.20
 TOTAL STREAM AREA(ACRES) =    11.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.40

****************************************************************************
 FLOW PROCESS FROM NODE    988.00 TO NODE    989.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    503.87
 DOWNSTREAM ELEVATION(FEET) =    503.75
 ELEVATION DIFFERENCE(FEET) =      0.12
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.096
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.42
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
 FLOW PROCESS FROM NODE    989.00 TO NODE    990.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  503.75  DOWNSTREAM ELEVATION(FEET) =  500.48
 STREET LENGTH(FEET) =   375.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.68
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    4.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.70
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.42
 STREET FLOW TRAVEL TIME(MIN.) =   3.68   Tc(MIN.) =   9.68
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.844
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.52
 TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =      0.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.22
 FLOW VELOCITY(FEET/SEC.) =  1.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
 LONGEST FLOWPATH FROM NODE    988.00 TO NODE    990.00 =   425.00 FEET.

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

```
 FLOW PROCESS FROM NODE    990.00 TO NODE    990.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.68
 RAINFALL INTENSITY(INCH/HR) =   1.84
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.94

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
      1        6.40    27.32         1.200          11.90
      2        0.94     9.68         1.844           0.60
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)
      1        5.11     9.68         1.844
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
      2        7.01    27.32         1.200

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      7.01   Tc(MIN.) =   27.32
 TOTAL AREA(ACRES) =     12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    990.00 =  2082.66 FEET.
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE

****************************************************************************
 FLOW PROCESS FROM NODE    990.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   491.21  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.01
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  27.35
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    957.00 TO NODE    958.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    503.59
 DOWNSTREAM ELEVATION(FEET) =    501.59
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     958.00 TO NODE     955.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
 STREET LENGTH(FEET) =   304.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.65
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.66
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.38
 STREET FLOW TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =   9.05
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.933
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    0.87
 TOTAL AREA(ACRES) =       0.60        PEAK FLOW RATE(CFS) =       1.08

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.85
 FLOW VELOCITY(FEET/SEC.) =  1.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    955.00 =   404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     955.00 TO NODE     956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.76  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =    30.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.70
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.08
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   9.19
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     956.00 TO NODE     956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.19
 RAINFALL INTENSITY(INCH/HR) =   1.91
 TOTAL STREAM AREA(ACRES) =     0.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.08

****************************************************************************
 FLOW PROCESS FROM NODE     959.00 TO NODE     960.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    503.59
 DOWNSTREAM ELEVATION(FEET) =    501.59
 ELEVATION DIFFERENCE(FEET) =      2.00
```

```
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.857
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE    960.00 TO NODE    956.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  501.59  DOWNSTREAM ELEVATION(FEET) =  497.41
 STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.43
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
 STREET FLOW TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   8.25
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.046
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.10
 TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       1.32

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.21
 FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.20 =   350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.20 TO NODE    956.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.48  DOWNSTREAM(FEET) =   492.46
 FLOW LENGTH(FEET) =     2.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.76
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.32
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.26
 LONGEST FLOWPATH FROM NODE    959.00 TO NODE    956.00 =   352.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    956.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.26
 RAINFALL INTENSITY(INCH/HR) =   2.04
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.32

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         1.08     9.19        1.914         0.60
    2         1.32     8.26        2.044         0.70
```

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

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
    1          2.33      8.26        2.044
    2          2.31      9.19        1.914

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.33   Tc(MIN.) =    8.26
 TOTAL AREA(ACRES) =       1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    956.00 =   434.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    991.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   492.46  DOWNSTREAM(FEET) =   491.06
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.95
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.33
 PIPE-TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =   9.10
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
    1          2.33      9.10        1.926         1.30
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    991.00 =   634.25 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
    1          7.01     27.35        1.200        12.50
 LONGEST FLOWPATH FROM NODE    911.00 TO NODE    991.00 =  2093.66 FEET.
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         6.70      9.10        1.926
    2         8.46     27.35        1.200

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       8.46   Tc(MIN.) =   27.35
 TOTAL AREA(ACRES) =      13.80
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    991.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
*ERROR-TIME OF CONCENTRATION EXCEEDS RAINFALL TABLE
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.200
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =     0.10   SUBAREA RUNOFF(CFS) =     0.11
 TOTAL AREA(ACRES) =     13.90   TOTAL RUNOFF(CFS) =     8.57
```

```
 TC(MIN.) =  27.35
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =      13.90  TC(MIN.) =      27.35
 PEAK FLOW RATE(CFS)    =       8.57
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Appendix G

AES Pipe Flow Hydraulic Analyses

For

Ultimate Condition

Basin 700

STARTING HGL FOR LATERAL PIPEFLOW

HGL at Node	743	For Pipe Flow	743.PIP

$EGL_{MAIN} = HGL_{LAT} + V^2/2g$

$HGL_{LAT} = EGL_{MAIN} - V^2/2g$

$g =$ 32.2 Ft/S^2

$EGL_{MAIN} =$	497.054	From Pipe Flow	7422.PIP

$V_{LAT} = Q_{LAT} / A_{LAT}$

$Q_{LAT} =$	20.47	CFS

$A_{LAT} = \Pi D_{LAT}^2/4$

$D_{LAT} =$	30	Inches

$HGL_{MAIN} =$	496.784

```
**************************************************************************
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
          (Reference: LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
        (c) Copyright 1982-2000 Advanced Engineering Software (aes)
            Ver. 8.0  Release Date: 01/01/2000  License ID 1261

                              Analysis prepared by:

                                 RICK ENGINEERING COMPANY
                               1223 University Avenue, Suite 240
                                Riverside, California 92507-3418
                               (909) 782-0707  Fax (909) 782-0723

 ************************** DESCRIPTION OF STUDY **************************
* J - 16630 - Construction Change "F"                                     *
* BMRNV East Town Center and Paseo Del Sur Phase 5 Improvements           *
* Starting HGL taken from J-16630 (Pipe flow 7422.PIP)                    *
 *************************************************************************

  FILE NAME: 743.PIP
  TIME/DATE OF STUDY: 15:51 09/29/2014

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                          UPSTREAM RUN                    DOWNSTREAM RUN
   NODE      MODEL     PRESSURE      PRESSURE+            FLOW        PRESSURE+
  NUMBER    PROCESS   HEAD(FT)   MOMENTUM(POUNDS)     DEPTH(FT)   MOMENTUM(POUNDS)
  743.00-                3.99*          1004.70          1.02           479.90
        } FRICTION           } HYDRAULIC JUMP
  743.10-                1.54 Dc         388.12          0.99*          497.91
        } JUNCTION
  743.10-                1.54 Dc         388.12          1.08*          455.93
        } FRICTION
  730.50-                1.54 Dc         388.12          0.80*          627.80
        } JUNCTION
  730.50-                1.62 Dc         423.43          0.92*          610.14
        } FRICTION
  730.40-                1.62 Dc         423.43          0.95*          590.58
        } JUNCTION
  730.40-                1.58 Dc         390.56          0.86*          587.72
        } FRICTION
  743.20-                1.58 Dc         390.56          0.97*          515.17
        } JUNCTION
  743.20-                1.59 Dc         390.56          0.99*          504.60
        } FRICTION
  725.70-                1.58*Dc         390.56          1.58*Dc        390.56
        } JUNCTION
  725.70-                2.64*           432.03          0.99           262.52
        } FRICTION           } HYDRAULIC JUMP
  725.80-                1.31*Dc         235.83          1.31*Dc        235.84
        } JUNCTION
  725.80-                1.84            187.21          0.45*          273.95
        } FRICTION
  725.90-                1.08*Dc         127.54          1.08*Dc        127.54
        } CATCH BASIN
  725.90-                4.64*           429.18          1.08 Dc         40.98
--------------------------------------------------------------------------
 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25
```

```
--------------------------------------------------------------------------------
 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
********************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   743.00            FLOWLINE ELEVATION =   492.79
 PIPE FLOW =      20.47 CFS        PIPE DIAMETER =  30.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   496.780 FEET
--------------------------------------------------------------------------------
 NODE   743.00 : HGL = <  496.780>;EGL= <  497.050>;FLOWLINE= <  492.790>

********************************************************************************
 FLOW PROCESS FROM NODE   743.00 TO NODE   743.10 IS CODE =  1
 UPSTREAM NODE   743.10     ELEVATION =   496.03  (HYDRAULIC JUMP OCCURS)
--------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      20.47 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =     162.00 FEET          MANNING'S N  =  0.01300
--------------------------------------------------------------------------------
 HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS
--------------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      1.03          CRITICAL DEPTH(FT) =      1.54
================================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.99
================================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------------
 DISTANCE FROM    FLOW DEPTH  VELOCITY     SPECIFIC      PRESSURE+
  CONTROL(FT)        (FT)    (FT/SEC)   ENERGY(FT)   MOMENTUM(POUNDS)
       0.000         0.985     11.385        2.999          497.91
       2.329         0.987     11.360        2.992          497.10
       4.749         0.988     11.335        2.985          496.29
       7.268         0.990     11.310        2.978          495.50
       9.894         0.992     11.286        2.971          494.70
      12.638         0.993     11.261        2.964          493.91
      15.512         0.995     11.237        2.957          493.12
      18.531         0.997     11.212        2.950          492.34
      21.711         0.998     11.188        2.943          491.56
      25.071         1.000     11.164        2.936          490.79
      28.635         1.001     11.140        2.930          490.02
      32.432         1.003     11.116        2.923          489.26
      36.494         1.005     11.092        2.916          488.50
      40.866         1.006     11.068        2.910          487.74
      45.600         1.008     11.045        2.903          486.99
      50.767         1.009     11.021        2.897          486.24
      56.458         1.011     10.998        2.890          485.50
      62.796         1.013     10.974        2.884          484.76
      69.954         1.014     10.951        2.878          484.02
      78.187         1.016     10.928        2.871          483.29
      87.887         1.018     10.905        2.865          482.56
      99.715         1.019     10.882        2.859          481.84
     114.906         1.021     10.859        2.853          481.12
     136.238         1.022     10.836        2.847          480.40
     162.000         1.024     10.820        2.843          479.90
--------------------------------------------------------------------------------
 HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
================================================================================
 DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     3.99
================================================================================
 PRESSURE FLOW PROFILE COMPUTED INFORMATION:
```

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	3.990	4.170	4.260	1004.70
85.097	2.500	4.170	2.770	548.30

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
85.097	2.500	4.169	2.770	548.30
87.184	2.461	4.182	2.733	537.05
89.170	2.423	4.207	2.698	526.30
91.095	2.384	4.239	2.664	515.92
92.969	2.346	4.278	2.630	505.89
94.798	2.307	4.322	2.598	496.20
96.585	2.269	4.372	2.566	486.84
98.329	2.230	4.426	2.535	477.82
100.033	2.192	4.486	2.504	469.15
101.693	2.153	4.551	2.475	460.83
103.310	2.115	4.621	2.446	452.87
104.881	2.076	4.697	2.419	445.29
106.403	2.037	4.777	2.392	438.10
107.872	1.999	4.864	2.366	431.31
109.284	1.960	4.956	2.342	424.94
110.635	1.922	5.054	2.319	419.01
111.917	1.883	5.159	2.297	413.52
113.124	1.845	5.270	2.276	408.50
114.248	1.806	5.389	2.257	403.98
115.278	1.768	5.515	2.240	399.96
116.203	1.729	5.650	2.225	396.48
117.008	1.690	5.793	2.212	393.57
117.677	1.652	5.946	2.201	391.24
118.189	1.613	6.109	2.193	389.53
118.520	1.575	6.283	2.188	388.48
118.638	1.536	6.468	2.186	388.12
162.000	1.536	6.468	2.186	388.12

----------END OF HYDRAULIC JUMP ANALYSIS----------

PRESSURE+MOMENTUM BALANCE OCCURS AT 97.03 FEET UPSTREAM OF NODE 743.00
DOWNSTREAM DEPTH = 2.259 FEET, UPSTREAM CONJUGATE DEPTH = 1.013 FEET

NODE 743.10 : HGL = < 497.015>;EGL= < 499.029>;FLOWLINE= < 496.030>

****

FLOW PROCESS FROM NODE 743.10 TO NODE 743.10 IS CODE = 5

UPSTREAM NODE 743.10 ELEVATION = 496.53 (FLOW IS SUPERCRITICAL)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	20.47	30.00	0.00	496.53	1.54	10.032
DOWNSTREAM	20.47	30.00	-	496.03	1.54	11.388
LATERAL #1	0.00	0.00	0.00	0.00	0.00	0.000
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:

DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES

```
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01639
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02316
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01977
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.079 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.148)+( 0.000) =   0.148
-------------------------------------------------------------------------------
 NODE   743.10 : HGL = <  497.614>;EGL= <  499.177>;FLOWLINE= <  496.530>

*******************************************************************************
 FLOW PROCESS FROM NODE   743.10 TO NODE   730.50 IS CODE =  1
 UPSTREAM NODE   730.50     ELEVATION =   499.00  (FLOW IS SUPERCRITICAL)
-------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      20.47 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =     165.09 FEET          MANNING'S N  =  0.01300
-------------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      1.11          CRITICAL DEPTH(FT) =      1.54
===============================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.80
===============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------------
 DISTANCE FROM    FLOW DEPTH  VELOCITY     SPECIFIC      PRESSURE+
  CONTROL(FT)       (FT)    (FT/SEC)   ENERGY(FT)  MOMENTUM(POUNDS)
        0.000       0.800      15.117       4.351          627.80
        3.964       0.812      14.798       4.215          616.21
        8.010       0.825      14.491       4.088          605.12
       12.146       0.837      14.196       3.968          594.50
       16.380       0.850      13.911       3.856          584.33
       20.724       0.862      13.636       3.751          574.59
       25.188       0.875      13.371       3.653          565.26
       29.788       0.887      13.116       3.560          556.33
       34.538       0.900      12.869       3.473          547.76
       39.458       0.912      12.631       3.391          539.55
       44.572       0.925      12.400       3.314          531.69
       49.906       0.937      12.178       3.241          524.15
       55.494       0.950      11.962       3.173          516.92
       61.379       0.962      11.754       3.109          509.99
       67.614       0.975      11.552       3.048          503.35
       74.265       0.987      11.357       2.991          496.99
       81.424       1.000      11.167       2.937          490.90
       89.211       1.012      10.984       2.887          485.05
       97.798       1.025      10.806       2.839          479.46
      107.432       1.037      10.633       2.794          474.10
      118.500       1.049      10.466       2.751          468.97
      131.651       1.062      10.303       2.711          464.05
      148.097       1.074      10.146       2.674          459.35
      165.090       1.084      10.029       2.647          455.93
-------------------------------------------------------------------------------
 NODE   730.50 : HGL = <  499.800>;EGL= <  503.351>;FLOWLINE= <  499.000>

*******************************************************************************
 FLOW PROCESS FROM NODE   730.50 TO NODE   730.50 IS CODE =  5
 UPSTREAM NODE   730.50     ELEVATION =   499.50  (FLOW IS SUPERCRITICAL)
-------------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER    ANGLE    FLOWLINE   CRITICAL   VELOCITY
                  (CFS)   (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM      20.47     24.00       0.00     499.50       1.62      14.521
```

```
   DOWNSTREAM      20.47    30.00        -       499.00       1.54        15.122
   LATERAL #1       0.00     0.00     0.00         0.00       0.00         0.000
   LATERAL #2       0.00     0.00     0.00         0.00       0.00         0.000
      Q5            0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.04379
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.05070
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.04725
  JUNCTION LENGTH =   4.00 FEET
  FRICTION LOSSES =  0.189 FEET          ENTRANCE LOSSES =  0.000 FEET
  JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES = ( 0.343)+( 0.000) =   0.343
-------------------------------------------------------------------------------
  NODE   730.50 : HGL = <  500.419>;EGL= <  503.694>;FLOWLINE= <  499.500>

*******************************************************************************
  FLOW PROCESS FROM NODE   730.50 TO NODE   730.40 IS CODE =  1
  UPSTREAM NODE   730.40     ELEVATION =   502.92  (FLOW IS SUPERCRITICAL)
-------------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      20.47 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =       76.00 FEET          MANNING'S N  =  0.01300
-------------------------------------------------------------------------------
  NORMAL DEPTH(FT) =      0.91           CRITICAL DEPTH(FT) =      1.62
===============================================================================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.95
===============================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          0.948     13.960          3.976          590.58
         1.872          0.946     13.987          3.986          591.52
         3.829          0.945     14.014          3.996          592.46
         5.879          0.943     14.041          4.007          593.41
         8.031          0.942     14.068          4.017          594.36
        10.294          0.940     14.096          4.028          595.31
        12.681          0.939     14.123          4.038          596.27
        15.204          0.938     14.151          4.049          597.24
        17.879          0.936     14.178          4.060          598.21
        20.724          0.935     14.206          4.070          599.18
        23.762          0.933     14.234          4.081          600.16
        27.019          0.932     14.262          4.092          601.14
        30.527          0.931     14.290          4.103          602.13
        34.328          0.929     14.318          4.114          603.12
        38.471          0.928     14.346          4.126          604.12
        43.023          0.926     14.375          4.137          605.12
        48.069          0.925     14.403          4.148          606.12
        53.727          0.924     14.432          4.160          607.13
        60.159          0.922     14.460          4.171          608.15
        67.607          0.921     14.489          4.183          609.16
        76.000          0.919     14.517          4.194          610.14
-------------------------------------------------------------------------------
  NODE   730.40 : HGL = <  503.868>;EGL= <  506.896>;FLOWLINE= <  502.920>

*******************************************************************************
  FLOW PROCESS FROM NODE   730.40 TO NODE   730.40 IS CODE =  5
  UPSTREAM NODE   730.40     ELEVATION =   503.25  (FLOW IS SUPERCRITICAL)
```

```
CALCULATE JUNCTION LOSSES:
     PIPE          FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES)  (DEGREES)  ELEVATION  DEPTH(FT.)  (FT/SEC)
   UPSTREAM        19.32      24.00       0.00      503.25       1.58       14.917
  DOWNSTREAM       20.47      24.00         -       502.92       1.62       13.964
  LATERAL #1        1.15      18.00      90.00      503.75       0.40        3.033
  LATERAL #2        0.00       0.00       0.00        0.00       0.00        0.000
     Q5             0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
    Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.04906
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03941
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.04424
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.177 FEET          ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.671)+( 0.000) =   0.671
-------------------------------------------------------------------------------
 NODE   730.40 : HGL = <  504.112>;EGL= <  507.567>;FLOWLINE= <  503.250>

*******************************************************************************
 FLOW PROCESS FROM NODE   730.40 TO NODE   743.20 IS CODE =  1
 UPSTREAM NODE   743.20     ELEVATION =   513.05  (FLOW IS SUPERCRITICAL)
-------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      19.32 CFS     PIPE DIAMETER =  24.00 INCHES
 PIPE LENGTH =     196.00 FEET          MANNING'S N  =  0.01300
-------------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      0.86          CRITICAL DEPTH(FT) =      1.58
===============================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.97
===============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------------
 DISTANCE FROM    FLOW DEPTH  VELOCITY    SPECIFIC      PRESSURE+
  CONTROL(FT)        (FT)    (FT/SEC)  ENERGY(FT)  MOMENTUM(POUNDS)
         0.000       0.974     12.711      3.485          515.17
         1.487       0.970     12.790      3.511          517.68
         3.055       0.965     12.869      3.538          520.23
         4.709       0.960     12.950      3.566          522.82
         6.459       0.956     13.032      3.594          525.44
         8.313       0.951     13.115      3.623          528.11
        10.283       0.946     13.199      3.653          530.83
        12.382       0.942     13.284      3.683          533.58
        14.623       0.937     13.370      3.714          536.38
        17.025       0.932     13.457      3.746          539.22
        19.609       0.927     13.545      3.778          542.10
        22.400       0.923     13.634      3.811          545.03
        25.428       0.918     13.725      3.845          548.01
        28.732       0.913     13.817      3.880          551.03
        32.361       0.909     13.909      3.915          554.11
        36.376       0.904     14.003      3.951          557.22
        40.860       0.899     14.099      3.988          560.39
        45.923       0.895     14.195      4.026          563.61
        51.720       0.890     14.293      4.064          566.88
        58.480       0.885     14.392      4.104          570.20
        66.555       0.881     14.493      4.144          573.57
        76.537       0.876     14.595      4.186          577.00
```

```
        89.535          0.871      14.698          4.228          580.48
       108.041          0.867      14.803          4.271          584.02
       140.049          0.862      14.909          4.315          587.61
       196.000          0.862      14.912          4.317          587.72
--------------------------------------------------------------------------------
  NODE   743.20 : HGL = <  514.024>;EGL= <  516.535>;FLOWLINE= <  513.050>

********************************************************************************
  FLOW PROCESS FROM NODE   743.20 TO NODE   743.20 IS CODE =  5
  UPSTREAM NODE   743.20     ELEVATION =   513.38  (FLOW IS SUPERCRITICAL)
--------------------------------------------------------------------------------
  CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)   (FT/SEC)
    UPSTREAM      19.32      24.00       0.00     513.38       1.58       12.380
   DOWNSTREAM     19.32      24.00          -     513.05       1.58       12.715
   LATERAL #1      0.00       0.00       0.00       0.00       0.00        0.000
   LATERAL #2      0.00       0.00       0.00       0.00       0.00        0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02969
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03188
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.03078
  JUNCTION LENGTH =   4.00 FEET
  FRICTION LOSSES =  0.123 FEET         ENTRANCE LOSSES =  0.000 FEET
  JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES = ( 0.220)+( 0.000) =   0.220
--------------------------------------------------------------------------------
  NODE   743.20 : HGL = <  514.375>;EGL= <  516.755>;FLOWLINE= <  513.380>

********************************************************************************
  FLOW PROCESS FROM NODE   743.20 TO NODE   725.70 IS CODE =  1
  UPSTREAM NODE   725.70     ELEVATION =   519.65  (FLOW IS SUPERCRITICAL)
--------------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      19.32 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =     194.95 FEET          MANNING'S N  =  0.01300
--------------------------------------------------------------------------------
  NORMAL DEPTH(FT) =      0.97          CRITICAL DEPTH(FT) =      1.58
================================================================================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.58
================================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC       PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)   ENERGY(FT)   MOMENTUM(POUNDS)
          0.000         1.576      7.274        2.398            390.56
          0.046         1.552      7.385        2.399            390.75
          0.165         1.528      7.502        2.402            391.21
          0.362         1.503      7.624        2.407            391.95
          0.646         1.479      7.753        2.413            392.98
          1.027         1.455      7.888        2.422            394.33
          1.514         1.431      8.030        2.433            395.99
          2.122         1.407      8.180        2.446            397.98
          2.864         1.383      8.336        2.462            400.33
          3.759         1.358      8.501        2.481            403.04
          4.828         1.334      8.674        2.503            406.13
          6.098         1.310      8.856        2.529            409.62
```

```
         7.600          1.286          9.047          2.558          413.53
         9.375          1.262          9.249          2.591          417.89
        11.473          1.238          9.461          2.628          422.71
        13.961          1.213          9.684          2.671          428.03
        16.924          1.189          9.919          2.718          433.88
        20.481          1.165         10.168          2.771          440.28
        24.796          1.141         10.430          2.831          447.27
        30.111          1.117         10.707          2.898          454.89
        36.802          1.093         11.000          2.973          463.18
        45.500          1.068         11.310          3.056          472.19
        57.387          1.044         11.639          3.149          481.96
        75.121          1.020         11.988          3.253          492.57
       107.232          0.996         12.358          3.369          504.05
       194.950          0.995         12.376          3.375          504.60
--------------------------------------------------------------------------------
  NODE   725.70 : HGL = <  521.226>;EGL= <  522.048>;FLOWLINE= <  519.650>

********************************************************************************
  FLOW PROCESS FROM NODE   725.70 TO NODE   725.70 IS CODE =  5
  UPSTREAM NODE   725.70     ELEVATION =   520.10  (FLOW IS AT CRITICAL DEPTH)
--------------------------------------------------------------------------------
  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER   ANGLE     FLOWLINE   CRITICAL   VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      13.33      24.00      90.00     520.10       1.31       4.243
    DOWNSTREAM     19.32      24.00          -     519.65       1.58       7.256
    LATERAL #1      4.81      18.00      90.00     520.15       0.84       2.722
    LATERAL #2      1.18      18.00       0.00     520.15       0.41       0.668
       Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00347
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00782
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00565
  JUNCTION LENGTH =   4.00 FEET
  FRICTION LOSSES =  0.023 FEET         ENTRANCE LOSSES =  0.000 FEET
  JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES = ( 0.976)+( 0.000) =   0.976
--------------------------------------------------------------------------------
  NODE   725.70 : HGL = <  522.745>;EGL= <  523.024>;FLOWLINE= <  520.100>

********************************************************************************
  FLOW PROCESS FROM NODE   725.70 TO NODE   725.80 IS CODE =  1
  UPSTREAM NODE   725.80     ELEVATION =   522.47  (HYDRAULIC JUMP OCCURS)
--------------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      13.33 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =     158.24 FEET          MANNING'S N  =  0.01300
--------------------------------------------------------------------------------
  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS
--------------------------------------------------------------------------------
  NORMAL DEPTH(FT) =      0.98          CRITICAL DEPTH(FT) =      1.31
================================================================================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.31
================================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
```

0.000	1.310	6.111	1.890	235.84
0.048	1.297	6.183	1.891	235.89
0.160	1.283	6.257	1.892	236.03
0.342	1.270	6.332	1.893	236.23
0.601	1.257	6.410	1.895	236.51
0.945	1.244	6.491	1.898	236.88
1.383	1.230	6.573	1.902	237.32
1.927	1.217	6.658	1.906	237.85
2.588	1.204	6.746	1.911	238.46
3.381	1.190	6.836	1.917	239.16
4.324	1.177	6.928	1.923	239.96
5.440	1.164	7.024	1.931	240.84
6.753	1.151	7.122	1.939	241.83
8.297	1.137	7.224	1.948	242.91
10.113	1.124	7.328	1.959	244.09
12.254	1.111	7.436	1.970	245.38
14.790	1.098	7.547	1.983	246.78
17.816	1.084	7.662	1.996	248.30
21.464	1.071	7.781	2.012	249.93
25.930	1.058	7.903	2.028	251.68
31.515	1.044	8.029	2.046	253.55
38.726	1.031	8.159	2.066	255.56
48.510	1.018	8.294	2.087	257.70
63.001	1.005	8.434	2.110	259.98
89.039	0.991	8.578	2.135	262.41
158.240	0.991	8.584	2.136	262.52

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.64

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.645	4.243	2.924	432.03
56.037	2.000	4.243	2.280	305.64

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.00

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
56.037	2.000	4.242	2.280	305.64
58.256	1.973	4.253	2.254	300.57
60.332	1.945	4.274	2.229	295.76
62.324	1.918	4.302	2.205	291.15
64.250	1.890	4.335	2.182	286.71
66.117	1.863	4.372	2.160	282.44
67.931	1.835	4.414	2.138	278.33
69.694	1.808	4.461	2.117	274.39
71.409	1.780	4.511	2.097	270.60
73.074	1.753	4.565	2.077	266.98
74.691	1.726	4.624	2.058	263.52
76.256	1.698	4.687	2.039	260.24
77.768	1.671	4.753	2.022	257.13
79.224	1.643	4.825	2.005	254.21
80.620	1.616	4.900	1.989	251.47
81.952	1.588	4.980	1.974	248.92
83.214	1.561	5.066	1.960	246.58

```
        84.400          1.534          5.156          1.946          244.44
        85.502          1.506          5.251          1.934          242.51
        86.511          1.479          5.352          1.924          240.81
        87.416          1.451          5.458          1.914          239.34
        88.203          1.424          5.571          1.906          238.11
        88.857          1.396          5.690          1.899          237.13
        89.357          1.369          5.816          1.894          236.42
        89.680          1.341          5.949          1.891          235.98
        89.795          1.314          6.090          1.890          235.83
       158.240          1.314          6.090          1.890          235.83
-------------------------END OF HYDRAULIC JUMP ANALYSIS-------------------------
| PRESSURE+MOMENTUM BALANCE OCCURS AT    75.50 FEET UPSTREAM OF NODE  725.70 |
|      DOWNSTREAM DEPTH = 1.711 FEET, UPSTREAM CONJUGATE DEPTH = 0.995 FEET  |
-------------------------------------------------------------------------------
 NODE   725.80 : HGL = <  523.780>;EGL= <  524.360>;FLOWLINE= <  522.470>

*******************************************************************************
 FLOW PROCESS FROM NODE   725.80 TO NODE   725.80 IS CODE =  5
 UPSTREAM NODE   725.80     ELEVATION =   522.97  (FLOW IS AT CRITICAL DEPTH)
 (NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)
-------------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM       7.81      18.00      90.00     522.97       1.08       17.768
   DOWNSTREAM     13.33      24.00          -     522.47       1.31        6.113
   LATERAL #1      5.52      18.00       0.00     522.97       0.91        4.948
   LATERAL #2      0.00       0.00       0.00       0.00       0.00        0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.15002
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00594
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.07798
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.312 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 3.957)+( 0.000) =   3.957
-------------------------------------------------------------------------------
 NODE   725.80 : HGL = <  523.415>;EGL= <  528.318>;FLOWLINE= <  522.970>

*******************************************************************************
 FLOW PROCESS FROM NODE   725.80 TO NODE   725.90 IS CODE =  1
 UPSTREAM NODE   725.90     ELEVATION =   531.82  (FLOW IS SUPERCRITICAL)
-------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =       7.81 CFS      PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =       59.00 FEET          MANNING'S N  =  0.01300
-------------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      0.45          CRITICAL DEPTH(FT) =      1.08
===============================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.08
===============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
         0.000         1.083       5.717         1.590           127.54
         0.009         1.057       5.866         1.592           127.64
```

```
        0.036          1.032          6.025          1.596          127.96
        0.085          1.006          6.196          1.603          128.51
        0.158          0.981          6.379          1.613          129.31
        0.258          0.955          6.575          1.627          130.36
        0.390          0.930          6.786          1.645          131.70
        0.558          0.904          7.014          1.668          133.34
        0.768          0.879          7.258          1.697          135.31
        1.026          0.853          7.522          1.732          137.63
        1.341          0.828          7.808          1.775          140.33
        1.724          0.802          8.117          1.826          143.45
        2.188          0.777          8.453          1.887          147.03
        2.749          0.751          8.818          1.959          151.11
        3.428          0.726          9.215          2.045          155.76
        4.253          0.700          9.650          2.147          161.03
        5.261          0.675         10.127          2.268          166.99
        6.504          0.649         10.652          2.412          173.74
        8.054          0.624         11.231          2.584          181.37
       10.019          0.598         11.872          2.788          190.00
       12.566          0.573         12.586          3.034          199.80
       15.979          0.547         13.384          3.331          210.92
       20.793          0.522         14.281          3.691          223.59
       28.211          0.496         15.294          4.131          238.09
       42.103          0.471         16.445          4.673          254.73
       59.000          0.445         17.762          5.348          273.95
------------------------------------------------------------------------------
  NODE   725.90 : HGL = <  532.903>;EGL= <  533.411>;FLOWLINE= <  531.820>

******************************************************************************
  FLOW PROCESS FROM NODE   725.90 TO NODE   725.90 IS CODE =  8
  UPSTREAM NODE   725.90     ELEVATION =   528.87  (FLOW IS AT CRITICAL DEPTH)
------------------------------------------------------------------------------
  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       7.81 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =   5.72 FEET/SEC.    VELOCITY HEAD =  0.508 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.508) =  0.102
------------------------------------------------------------------------------
  NODE   725.90 : HGL = <  533.512>;EGL= <  533.512>;FLOWLINE= <  528.870>

******************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   725.90          FLOWLINE ELEVATION =   528.87
  ASSUMED UPSTREAM CONTROL HGL =    529.95 FOR DOWNSTREAM RUN ANALYSIS

==============================================================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

```
**************************************************************************
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                              Analysis prepared by:

                                 RICK ENGINEERING COMPANY
                               1223 University Avenue, Suite 240
                                Riverside, California 92507-3418
                               (909) 782-0707  Fax (909) 782-0723

 ************************** DESCRIPTION OF STUDY **************************
* J-16630 Construction Change "F" (from 743.PIP)                          *
* BMRNV East Town Center and paseo Del Sur Phase 5 Improvements           *
* CVurb inlet along 'AN' Street, at Node 730.3                            *
 **************************************************************************

  FILE NAME: 7304.LAT
  TIME/DATE OF STUDY: 16:10 09/29/2014

**************************************************************************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                          NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                          UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+          FLOW         PRESSURE+
  NUMBER   PROCESS  HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  730.40-             0.45 Dc          14.05        0.22*            25.30
        } FRICTION
  730.30-             0.45*Dc          14.05        0.45*Dc          14.05
        } CATCH BASIN
  730.30-             0.64*             7.46        0.45 Dc           5.12
--------------------------------------------------------------------------
  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25
--------------------------------------------------------------------------
  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   730.40          FLOWLINE ELEVATION =   503.75
  PIPE FLOW =      1.43 CFS       PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =  504.112 FEET
  *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(  0.36 FT.)
         IS LESS THAN CRITICAL DEPTH(  0.45 FT.)
  ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
       FOR UPSTREAM RUN ANALYSIS
--------------------------------------------------------------------------
  NODE   730.40 : HGL = <  503.972>;EGL= <  505.174>;FLOWLINE= <  503.750>

**************************************************************************
  FLOW PROCESS FROM NODE   730.40 TO NODE   730.30 IS CODE =  1
  UPSTREAM NODE   730.30     ELEVATION =   506.78  (FLOW IS SUPERCRITICAL)
--------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      1.43 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =     30.25 FEET          MANNING'S N  =  0.01300
--------------------------------------------------------------------------
```

```
 NORMAL DEPTH(FT) =      0.21          CRITICAL DEPTH(FT) =      0.45
===============================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.45
===============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)         (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        0.000         0.448       3.224          0.610            14.05
        0.004         0.439       3.320          0.610            14.06
        0.018         0.429       3.423          0.611            14.10
        0.041         0.420       3.531          0.614            14.15
        0.076         0.410       3.645          0.617            14.23
        0.124         0.401       3.766          0.621            14.34
        0.187         0.392       3.894          0.627            14.48
        0.267         0.382       4.030          0.634            14.64
        0.366         0.373       4.174          0.643            14.84
        0.488         0.363       4.329          0.654            15.07
        0.637         0.354       4.493          0.667            15.33
        0.816         0.344       4.669          0.683            15.63
        1.031         0.335       4.857          0.701            15.98
        1.289         0.325       5.059          0.723            16.37
        1.600         0.316       5.276          0.748            16.81
        1.975         0.307       5.509          0.778            17.30
        2.429         0.297       5.761          0.813            17.85
        2.983         0.288       6.034          0.853            18.46
        3.667         0.278       6.331          0.901            19.15
        4.524         0.269       6.653          0.957            19.91
        5.623         0.259       7.005          1.022            20.76
        7.078         0.250       7.390          1.098            21.71
        9.102         0.240       7.813          1.189            22.77
       12.177         0.231       8.280          1.296            23.96
       17.852         0.222       8.797          1.424            25.30
       30.250         0.222       8.797          1.424            25.30
-------------------------------------------------------------------------------
 NODE   730.30 : HGL = <  507.228>;EGL= <  507.390>;FLOWLINE= <  506.780>

*******************************************************************************
 FLOW PROCESS FROM NODE   730.30 TO NODE   730.30 IS CODE =  8
 UPSTREAM NODE   730.30     ELEVATION =   506.78  (FLOW IS AT CRITICAL DEPTH)
-------------------------------------------------------------------------------
 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       1.43 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =   3.22 FEET/SEC.    VELOCITY HEAD =  0.161 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.161) =  0.032
-------------------------------------------------------------------------------
 NODE   730.30 : HGL = <  507.422>;EGL= <  507.422>;FLOWLINE= <  506.780>

*******************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   730.30           FLOWLINE ELEVATION =   506.78
 ASSUMED UPSTREAM CONTROL HGL =   507.23 FOR DOWNSTREAM RUN ANALYSIS

===============================================================================
 END OF GRADUALLY VARIED FLOW ANALYSIS
```

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Analysis prepared by:

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DESCRIPTION OF STUDY
* J-16630 Construction Change "F" (from 743.PIP)
* BMRNV East Town Center and Paseo Del Sur Phase 5 Improvements
* Storm drain along 'AN' Street, south of Del Sur Ridge Road

FILE NAME: 7257S.LAT
TIME/DATE OF STUDY: 09:34 07/10/2014

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
725.70-		2.59*	205.62	0.22	25.43
	} FRICTION		} HYDRAULIC JUMP		
725.40-		0.44*Dc	13.80	0.44*Dc	13.80
	} JUNCTION				
725.40-		0.46 Dc	13.83	0.32*	16.36
	} FRICTION				
725.30-		0.44*Dc	13.80	0.44*Dc	13.80
	} CATCH BASIN				
725.30-		0.63*	7.20	0.44 Dc	5.03

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 725.70 FLOWLINE ELEVATION = 520.15
PIPE FLOW = 1.41 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 522.745 FEET

NODE 725.70 : HGL = < 522.745>;EGL= < 522.755>;FLOWLINE= < 520.150>

FLOW PROCESS FROM NODE 725.70 TO NODE 725.40 IS CODE = 1
UPSTREAM NODE 725.40 ELEVATION = 527.00 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 1.41 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 76.06 FEET MANNING'S N = 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.22 CRITICAL DEPTH(FT) = 0.44

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.44

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.445	3.211	0.605	13.80
0.004	0.436	3.305	0.606	13.81
0.019	0.427	3.404	0.607	13.84
0.043	0.418	3.509	0.609	13.90
0.080	0.408	3.619	0.612	13.97
0.131	0.399	3.736	0.616	14.07
0.197	0.390	3.860	0.622	14.20

0.281	0.381	3.991	0.628	14.35
0.386	0.372	4.130	0.637	14.53
0.514	0.363	4.278	0.647	14.75
0.669	0.353	4.436	0.659	14.99
0.856	0.344	4.604	0.674	15.28
1.081	0.335	4.784	0.691	15.59
1.351	0.326	4.976	0.711	15.95
1.675	0.317	5.182	0.734	16.36
2.064	0.308	5.404	0.761	16.81
2.536	0.299	5.642	0.793	17.32
3.110	0.289	5.900	0.830	17.88
3.817	0.280	6.178	0.873	18.51
4.702	0.271	6.480	0.924	19.21
5.834	0.262	6.809	0.982	19.99
7.329	0.253	7.167	1.051	20.85
9.406	0.244	7.560	1.132	21.81
12.553	0.234	7.991	1.226	22.89
18.347	0.225	8.465	1.339	24.09
76.060	0.216	8.991	1.472	25.43

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.59

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.595	0.798	2.605	205.62
12.183	1.500	0.798	1.510	84.88

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
12.183	1.500	0.798	1.510	84.88
12.650	1.458	0.804	1.468	80.26
13.116	1.416	0.816	1.426	75.71
13.581	1.373	0.831	1.384	71.24
14.045	1.331	0.850	1.342	66.88
14.508	1.289	0.872	1.301	62.63
14.970	1.247	0.898	1.259	58.50
15.430	1.205	0.927	1.218	54.51
15.889	1.162	0.959	1.177	50.66
16.347	1.120	0.996	1.136	46.96
16.802	1.078	1.037	1.095	43.42
17.255	1.036	1.083	1.054	40.04
17.705	0.994	1.135	1.014	36.83
18.152	0.951	1.193	0.973	33.80
18.595	0.909	1.258	0.934	30.95
19.032	0.867	1.332	0.895	28.28
19.463	0.825	1.416	0.856	25.81
19.886	0.783	1.512	0.818	23.53
20.298	0.740	1.622	0.781	21.46
20.697	0.698	1.749	0.746	19.60
21.076	0.656	1.897	0.712	17.97
21.431	0.614	2.072	0.680	16.57
21.749	0.572	2.279	0.652	15.43
22.018	0.529	2.528	0.629	14.56
22.211	0.487	2.833	0.612	14.00
22.289	0.445	3.211	0.605	13.80
76.060	0.445	3.211	0.605	13.80

END OF HYDRAULIC JUMP ANALYSIS

PRESSURE+MOMENTUM BALANCE OCCURS AT 19.62 FEET UPSTREAM OF NODE 725.70
DOWNSTREAM DEPTH = 0.809 FEET, UPSTREAM CONJUGATE DEPTH = 0.219 FEET

NODE 725.40 : HGL = < 527.445>;EGL= < 527.605>;FLOWLINE= < 527.000>

FLOW PROCESS FROM NODE 725.40 TO NODE 725.40 IS CODE = 5
UPSTREAM NODE 725.40 ELEVATION = 527.33 (FLOW IS AT CRITICAL DEPTH)
(NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)

UPSTREAM	1.41	18.00	90.00	527.33	0.44	5.183
DOWNSTREAM	1.41	18.00	-	527.00	0.44	3.212
LATERAL #1	0.00	0.00	0.00	0.00	0.00	0.000
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.01884
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00491
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01187
JUNCTION LENGTH = 4.00 FEET
FRICTION LOSSES = 0.047 FEET ENTRANCE LOSSES = 0.000 FEET
JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES = (0.459)+(0.000) = 0.459

NODE 725.40 : HGL = < 527.647>;EGL= < 528.064>;FLOWLINE= < 527.330>

****

FLOW PROCESS FROM NODE 725.40 TO NODE 725.30 IS CODE = 1
UPSTREAM NODE 725.30 ELEVATION = 527.84 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 1.41 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 25.25 FEET MANNING'S N = 0.01300

NORMAL DEPTH(FT) = 0.31 CRITICAL DEPTH(FT) = 0.44

==========

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.44

==========

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.445	3.211	0.605	13.80
0.008	0.440	3.265	0.605	13.81
0.035	0.434	3.321	0.606	13.82
0.080	0.429	3.379	0.606	13.83
0.148	0.424	3.439	0.607	13.86
0.239	0.418	3.500	0.609	13.89
0.357	0.413	3.564	0.610	13.93
0.504	0.408	3.629	0.612	13.98
0.685	0.402	3.697	0.615	14.04
0.903	0.397	3.767	0.617	14.10
1.164	0.392	3.839	0.621	14.18
1.473	0.386	3.914	0.624	14.26
1.839	0.381	3.992	0.628	14.35
2.271	0.376	4.072	0.633	14.46
2.781	0.370	4.155	0.638	14.57
3.384	0.365	4.241	0.644	14.69
4.100	0.360	4.331	0.651	14.83
4.957	0.354	4.423	0.658	14.97
5.992	0.349	4.520	0.666	15.13
7.263	0.343	4.620	0.675	15.30
8.855	0.338	4.724	0.685	15.49
10.916	0.333	4.832	0.696	15.68
13.717	0.327	4.944	0.707	15.89
17.875	0.322	5.061	0.720	16.12
25.250	0.317	5.182	0.734	16.36

NODE 725.30 : HGL = < 528.285>;EGL= < 528.445>;FLOWLINE= < 527.840>

****

FLOW PROCESS FROM NODE 725.30 TO NODE 725.30 IS CODE = 8
UPSTREAM NODE 725.30 ELEVATION = 527.85 (FLOW IS AT CRITICAL DEPTH)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 1.41 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 3.21 FEET/SEC. VELOCITY HEAD = 0.160 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.160) = 0.032

NODE 725.30 : HGL = < 528.477>;EGL= < 528.477>;FLOWLINE= < 527.850>

****

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 725.30 FLOWLINE ELEVATION = 527.85
ASSUMED UPSTREAM CONTROL HGL = 528.29 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

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Analysis prepared by:

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DESCRIPTION OF STUDY
* J-16630 Construction Change "F" (from 743.PIP)
* BMRNV East Town Center and Paseo Del Sur Phase 5 Improvements
* Del Sur Ridge east of 'AN' Street

FILE NAME: 7257E.LAT
TIME/DATE OF STUDY: 09:39 07/10/2014

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
725.70-		2.60*	240.13	0.79	87.31
	} FRICTION		} HYDRAULIC JUMP		
735.50-		0.92*Dc	84.45	0.92*Dc	84.45
	} JUNCTION				
735.50-		1.28*	99.22	0.80	87.22
	} FRICTION		} HYDRAULIC JUMP		
726.30-		0.92*Dc	84.45	0.92*Dc	84.45
	} CATCH BASIN				
726.30-		1.38*	47.03	0.92 Dc	28.59

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 725.70 FLOWLINE ELEVATION = 520.15
PIPE FLOW = 5.74 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 522.750 FEET

NODE 725.70 : HGL = < 522.750>;EGL= < 522.914>;FLOWLINE= < 520.150>

FLOW PROCESS FROM NODE 725.70 TO NODE 735.50 IS CODE = 1
UPSTREAM NODE 735.50 ELEVATION = 523.05 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 5.74 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 289.91 FEET MANNING'S N = 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.79 CRITICAL DEPTH(FT) = 0.92

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.92

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.921	5.041	1.316	84.45
0.033	0.916	5.075	1.316	84.46
0.100	0.911	5.109	1.317	84.48
0.202	0.906	5.144	1.317	84.51
0.344	0.900	5.180	1.317	84.54
0.530	0.895	5.216	1.318	84.58
0.764	0.890	5.253	1.319	84.63

1.051	0.885	5.290	1.320	84.69
1.398	0.880	5.328	1.321	84.76
1.812	0.874	5.367	1.322	84.84
2.301	0.869	5.406	1.323	84.93
2.876	0.864	5.446	1.325	85.03
3.551	0.859	5.486	1.326	85.13
4.340	0.853	5.527	1.328	85.25
5.265	0.848	5.569	1.330	85.38
6.351	0.843	5.611	1.332	85.51
7.632	0.838	5.654	1.334	85.66
9.155	0.833	5.698	1.337	85.82
10.985	0.827	5.742	1.340	85.98
13.216	0.822	5.787	1.342	86.16
15.997	0.817	5.833	1.346	86.35
19.573	0.812	5.880	1.349	86.55
24.409	0.806	5.927	1.352	86.76
31.546	0.801	5.976	1.356	86.98
44.322	0.796	6.025	1.360	87.22
289.910	0.794	6.043	1.361	87.31

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.60

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.600	3.248	2.764	240.13
156.759	1.500	3.248	1.664	118.83

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
156.759	1.500	3.247	1.664	118.83
159.815	1.477	3.258	1.642	116.41
162.686	1.454	3.277	1.621	114.10
165.453	1.431	3.302	1.600	111.88
168.142	1.408	3.332	1.580	109.72
170.765	1.385	3.366	1.561	107.64
173.330	1.362	3.404	1.542	105.63
175.841	1.339	3.446	1.523	103.70
178.301	1.316	3.493	1.505	101.83
180.711	1.293	3.543	1.488	100.05
183.072	1.270	3.597	1.471	98.34
185.380	1.247	3.655	1.454	96.71
187.636	1.224	3.717	1.438	95.17
189.834	1.201	3.784	1.423	93.71
191.971	1.178	3.855	1.409	92.35
194.041	1.155	3.931	1.395	91.07
196.035	1.132	4.012	1.382	89.90
197.946	1.109	4.098	1.370	88.82
199.759	1.086	4.190	1.358	87.85
201.461	1.063	4.287	1.348	86.99
203.030	1.040	4.391	1.339	86.25
204.442	1.017	4.501	1.331	85.62
205.659	0.994	4.619	1.325	85.12
206.635	0.970	4.744	1.320	84.76
207.300	0.947	4.878	1.317	84.53
207.553	0.924	5.021	1.316	84.45
289.910	0.924	5.021	1.316	84.45

END OF HYDRAULIC JUMP ANALYSIS

PRESSURE+MOMENTUM BALANCE OCCURS AT 200.98 FEET UPSTREAM OF NODE 725.70
DOWNSTREAM DEPTH = 1.069 FEET, UPSTREAM CONJUGATE DEPTH = 0.796 FEET

NODE 735.50 : HGL = < 523.971>;EGL= < 524.366>;FLOWLINE= < 523.050>

****

FLOW PROCESS FROM NODE 735.50 TO NODE 735.50 IS CODE = 5
UPSTREAM NODE 735.50 ELEVATION = 523.38 (FLOW IS AT CRITICAL DEPTH)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	5.74	18.00	90.00	523.38	0.92	3.570

DOWNSTREAM	5.74	18.00	-	523.05	0.92	5.023
LATERAL #1	0.00	0.00	0.00	0.00	0.00	0.000
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00279
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00610
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00445
JUNCTION LENGTH = 4.00 FEET
FRICTION LOSSES = 0.018 FEET ENTRANCE LOSSES = 0.000 FEET
JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES = (0.493)+(0.000) = 0.493

NODE 735.50 : HGL = < 524.662>;EGL= < 524.860>;FLOWLINE= < 523.380>

****

FLOW PROCESS FROM NODE 735.50 TO NODE 726.30 IS CODE = 1
UPSTREAM NODE 726.30 ELEVATION = 524.00 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 5.74 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 62.00 FEET MANNING'S N = 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.79 CRITICAL DEPTH(FT) = 0.92

==========

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.92

==========

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.924	5.021	1.316	84.45
0.016	0.919	5.055	1.316	84.46
0.064	0.914	5.091	1.316	84.47
0.149	0.908	5.126	1.317	84.49
0.274	0.903	5.162	1.317	84.52
0.442	0.898	5.199	1.318	84.56
0.658	0.892	5.236	1.318	84.61
0.928	0.887	5.274	1.319	84.67
1.256	0.882	5.313	1.320	84.73
1.652	0.876	5.352	1.321	84.81
2.123	0.871	5.392	1.323	84.90
2.681	0.866	5.432	1.324	84.99
3.337	0.860	5.473	1.326	85.10
4.108	0.855	5.515	1.328	85.22
5.015	0.850	5.557	1.329	85.34
6.082	0.844	5.601	1.332	85.48
7.345	0.839	5.644	1.334	85.63
8.850	0.834	5.689	1.336	85.78
10.660	0.828	5.734	1.339	85.95
12.873	0.823	5.780	1.342	86.13
15.634	0.818	5.827	1.345	86.33
19.191	0.812	5.875	1.348	86.53
24.008	0.807	5.924	1.352	86.74
31.123	0.801	5.973	1.356	86.97
43.877	0.796	6.023	1.360	87.21
62.000	0.796	6.024	1.360	87.22

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

==========

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.28

==========

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.282	3.568	1.480	99.22
1.456	1.267	3.603	1.469	98.17
2.893	1.253	3.639	1.459	97.16
4.309	1.239	3.676	1.449	96.17
5.705	1.225	3.715	1.439	95.22
7.078	1.210	3.756	1.429	94.31
8.428	1.196	3.798	1.420	93.43

9.755	1.182	3.843	1.411	92.58
11.056	1.167	3.889	1.402	91.77
12.330	1.153	3.937	1.394	90.99
13.575	1.139	3.986	1.386	90.25
14.788	1.125	4.038	1.378	89.55
15.968	1.110	4.092	1.370	88.89
17.111	1.096	4.148	1.363	88.27
18.214	1.082	4.206	1.357	87.70
19.272	1.067	4.266	1.350	87.16
20.281	1.053	4.329	1.344	86.67
21.236	1.039	4.394	1.339	86.22
22.130	1.024	4.462	1.334	85.82
22.954	1.010	4.533	1.329	85.47
23.699	0.996	4.606	1.326	85.17
24.354	0.982	4.683	1.322	84.92
24.904	0.967	4.762	1.320	84.72
25.330	0.953	4.845	1.318	84.57
25.609	0.939	4.931	1.317	84.48
25.711	0.924	5.021	1.316	84.45
62.000	0.924	5.021	1.316	84.45

----------END OF HYDRAULIC JUMP ANALYSIS----------

| PRESSURE+MOMENTUM BALANCE OCCURS AT 19.21 FEET UPSTREAM OF NODE 735.50 |
| DOWNSTREAM DEPTH = 1.068 FEET, UPSTREAM CONJUGATE DEPTH = 0.797 FEET |

NODE 726.30 : HGL = < 524.924>;EGL= < 525.316>;FLOWLINE= < 524.000>

****

FLOW PROCESS FROM NODE 726.30 TO NODE 726.30 IS CODE = 8
UPSTREAM NODE 726.30 ELEVATION = 524.01 (FLOW IS AT CRITICAL DEPTH)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 5.74 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 5.02 FEET/SEC. VELOCITY HEAD = 0.392 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.392) = 0.078

NODE 726.30 : HGL = < 525.394>;EGL= < 525.394>;FLOWLINE= < 524.010>

****

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 726.30 FLOWLINE ELEVATION = 524.01
ASSUMED UPSTREAM CONTROL HGL = 524.93 FOR DOWNSTREAM RUN ANALYSIS

==========

END OF GRADUALLY VARIED FLOW ANALYSIS

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference: LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
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Analysis prepared by:

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DESCRIPTION OF STUDY
* J-16630 Construction Change "F" (from 743.PIP)
* BMRNV Town Center East and Paseo Del Sur Phase 5 Improvements
* Storm Drain along Del Sur Ridge, west of 'AN' Street

FILE NAME: 7258.LAT
TIME/DATE OF STUDY: 16:42 07/09/2014

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
725.80-		0.91 Dc	80.20	0.67*	90.68
	} FRICTION				
726.50-		0.91*Dc	80.20	0.90*Dc	80.20
	} JUNCTION				
726.50-		1.24*	81.61	0.60	71.83
	} FRICTION	} HYDRAULIC JUMP			
726.40-		0.82*Dc	62.76	0.82*Dc	62.76
	} CATCH BASIN				
726.40-		1.22*	34.40	0.82 Dc	21.74

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 725.80 FLOWLINE ELEVATION = 522.97
PIPE FLOW = 5.52 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 523.420 FEET
*NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(0.45 FT.)
IS LESS THAN CRITICAL DEPTH(0.91 FT.)
===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
FOR UPSTREAM RUN ANALYSIS

NODE 725.80 : HGL = < 523.641>;EGL= < 524.450>;FLOWLINE= < 522.970>

FLOW PROCESS FROM NODE 725.80 TO NODE 726.50 IS CODE = 1
UPSTREAM NODE 726.50 ELEVATION = 526.47 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 5.52 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 205.94 FEET MANNING'S N = 0.01300

NORMAL DEPTH(FT) = 0.66 CRITICAL DEPTH(FT) = 0.91

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.90

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.902	4.971	1.286	80.20
0.033	0.892	5.035	1.286	80.23
0.106	0.883	5.101	1.287	80.28
0.222	0.873	5.168	1.288	80.36
0.387	0.864	5.238	1.290	80.47

0.605	0.854	5.309	1.292	80.61
0.882	0.845	5.383	1.295	80.79
1.225	0.835	5.459	1.298	80.99
1.642	0.825	5.537	1.302	81.23
2.141	0.816	5.618	1.306	81.50
2.735	0.806	5.701	1.311	81.81
3.438	0.797	5.787	1.317	82.15
4.264	0.787	5.875	1.323	82.53
5.236	0.778	5.966	1.331	82.95
6.379	0.768	6.061	1.339	83.41
7.727	0.758	6.158	1.348	83.91
9.325	0.749	6.258	1.357	84.45
11.231	0.739	6.362	1.368	85.03
13.530	0.730	6.469	1.380	85.67
16.345	0.720	6.579	1.393	86.35
19.866	0.711	6.694	1.407	87.07
24.415	0.701	6.813	1.422	87.85
30.589	0.691	6.935	1.439	88.69
39.736	0.682	7.062	1.457	89.58
56.178	0.672	7.194	1.476	90.52
205.940	0.671	7.216	1.480	90.68

NODE 726.50 : HGL = < 527.372>;EGL= < 527.756>;FLOWLINE= < 526.470>

****

FLOW PROCESS FROM NODE 726.50 TO NODE 726.50 IS CODE = 5
UPSTREAM NODE 726.50 ELEVATION = 526.80 (FLOW IS AT CRITICAL DEPTH)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	4.58	18.00	90.00	526.80	0.82	2.926
DOWNSTREAM	5.52	18.00	-	526.47	0.91	4.948
LATERAL #1	0.94	18.00	90.00	526.80	0.36	0.839
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00187
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00600
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00393
JUNCTION LENGTH = 4.00 FEET
FRICTION LOSSES = 0.016 FEET ENTRANCE LOSSES = 0.000 FEET
JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES = (0.420)+(0.000) = 0.420

NODE 726.50 : HGL = < 528.043>;EGL= < 528.176>;FLOWLINE= < 526.800>

****

FLOW PROCESS FROM NODE 726.50 TO NODE 726.40 IS CODE = 1
UPSTREAM NODE 726.40 ELEVATION = 527.35 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 4.58 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 27.25 FEET MANNING'S N = 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.57 CRITICAL DEPTH(FT) = 0.82

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.82

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.822	4.621	1.153	62.76
0.017	0.812	4.692	1.154	62.78
0.069	0.801	4.766	1.154	62.82
0.159	0.791	4.841	1.156	62.90
0.293	0.781	4.920	1.157	63.01
0.474	0.771	5.001	1.160	63.15
0.708	0.761	5.084	1.163	63.32
1.001	0.751	5.171	1.167	63.53
1.360	0.741	5.261	1.171	63.77
1.795	0.731	5.353	1.176	64.06

2.314	0.721	5.449	1.182	64.38
2.931	0.711	5.549	1.189	64.74
3.661	0.701	5.652	1.197	65.14
4.522	0.691	5.759	1.206	65.59
5.540	0.681	5.870	1.216	66.08
6.744	0.671	5.985	1.227	66.61
8.175	0.661	6.105	1.240	67.20
9.889	0.651	6.229	1.254	67.84
11.962	0.641	6.358	1.269	68.53
14.508	0.631	6.492	1.286	69.27
17.702	0.621	6.632	1.304	70.08
21.839	0.610	6.778	1.324	70.94
27.250	0.601	6.924	1.346	71.83

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.24

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.243	2.925	1.376	81.61
0.738	1.226	2.962	1.362	80.30
1.466	1.209	3.000	1.349	79.02
2.184	1.192	3.040	1.336	77.79
2.891	1.175	3.082	1.323	76.59
3.587	1.158	3.127	1.310	75.43
4.271	1.142	3.173	1.298	74.32
4.941	1.125	3.221	1.286	73.24
5.598	1.108	3.272	1.274	72.21
6.239	1.091	3.325	1.263	71.22
6.864	1.074	3.381	1.252	70.28
7.471	1.057	3.439	1.241	69.39
8.060	1.041	3.500	1.231	68.54
8.627	1.024	3.564	1.221	67.74
9.172	1.007	3.630	1.212	67.00
9.692	0.990	3.700	1.203	66.31
10.184	0.973	3.774	1.194	65.67
10.646	0.956	3.850	1.187	65.09
11.074	0.939	3.931	1.180	64.57
11.465	0.923	4.015	1.173	64.11
11.814	0.906	4.104	1.168	63.71
12.117	0.889	4.197	1.163	63.38
12.367	0.872	4.295	1.159	63.11
12.556	0.855	4.398	1.156	62.92
12.678	0.838	4.507	1.154	62.80
12.721	0.822	4.621	1.153	62.76
27.250	0.822	4.621	1.153	62.76

END OF HYDRAULIC JUMP ANALYSIS

PRESSURE+MOMENTUM BALANCE OCCURS AT 6.59 FEET UPSTREAM OF NODE 726.50
DOWNSTREAM DEPTH = 1.082 FEET, UPSTREAM CONJUGATE DEPTH = 0.613 FEET

NODE 726.40 : HGL = < 528.172>;EGL= < 528.503>;FLOWLINE= < 527.350>

****

FLOW PROCESS FROM NODE 726.40 TO NODE 726.40 IS CODE = 8
UPSTREAM NODE 726.40 ELEVATION = 527.35 (FLOW IS AT CRITICAL DEPTH)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 4.58 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 4.62 FEET/SEC. VELOCITY HEAD = 0.332 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.332) = 0.066

NODE 726.40 : HGL = < 528.570>;EGL= < 528.570>;FLOWLINE= < 527.350>

****

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 726.40 FLOWLINE ELEVATION = 527.35
ASSUMED UPSTREAM CONTROL HGL = 528.17 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

Basin 900

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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********** DESCRIPTION OF STUDY **********
* J-16630 Construction Change "F" *
* BMRNV East Town Center and Paseo Del Sur Phase 5 Improvements *
* Storm drain along 'AR' Street (Node 904 - 903.3) *

FILE NAME: 904.LAT
TIME/DATE OF STUDY: 10:09 07/01/2014

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
904.00-		2.00*	338.55	1.41 Dc	281.26
	} FRICTION				
906.00-		1.62*	289.96	1.40 Dc	281.26
	} JUNCTION				
906.00-		2.33*	334.58	0.66	272.54
	} FRICTION	} HYDRAULIC JUMP			
906.10-		2.01	271.71	0.49*	396.20
	} FRICTION				
903.30-		1.19*Dc	182.81	1.19*Dc	182.81
	} CATCH BASIN				
903.30-		1.77*	101.01	1.19 Dc	62.37

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 904.00 FLOWLINE ELEVATION = 503.72
PIPE FLOW = 15.20 CFS PIPE DIAMETER = 24.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 505.720 FEET

NODE 904.00 : HGL = < 505.720>;EGL= < 506.083>;FLOWLINE= < 503.720>

FLOW PROCESS FROM NODE 904.00 TO NODE 906.00 IS CODE = 1
UPSTREAM NODE 906.00 ELEVATION = 504.83 (FLOW SEALS IN REACH)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 15.20 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 206.68 FEET MANNING'S N = 0.01300

NORMAL DEPTH(FT) = 1.51 CRITICAL DEPTH(FT) = 1.41

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.00

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.000	4.837	2.363	338.55
17.328	1.980	4.845	2.345	334.93
31.092	1.961	4.860	2.327	331.50
43.456	1.941	4.879	2.311	328.23
54.950	1.921	4.901	2.294	325.07
65.841	1.901	4.927	2.279	322.02
76.292	1.882	4.956	2.263	319.09

86.416	1.862	4.987	2.248	316.25
96.294	1.842	5.021	2.234	313.52
105.993	1.823	5.058	2.220	310.88
115.567	1.803	5.097	2.206	308.35
125.066	1.783	5.138	2.193	305.91
134.534	1.763	5.182	2.181	303.58
144.018	1.744	5.228	2.168	301.35
153.566	1.724	5.277	2.157	299.22
163.234	1.704	5.328	2.145	297.20
173.086	1.685	5.381	2.134	295.29
183.204	1.665	5.437	2.124	293.48
193.697	1.645	5.496	2.114	291.79
204.719	1.625	5.557	2.105	290.21
206.680	1.622	5.568	2.104	289.96

NODE 906.00 : HGL = < 506.452>;EGL= < 506.934>;FLOWLINE= < 504.830>

****

FLOW PROCESS FROM NODE 906.00 TO NODE 906.00 IS CODE = 5
UPSTREAM NODE 906.00 ELEVATION = 504.93 (FLOW UNSEALS IN REACH)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	11.00	24.00	90.00	504.93	1.19	3.502
DOWNSTREAM	15.20	24.00	-	504.83	1.41	5.569
LATERAL #1	4.20	18.00	0.00	504.93	0.79	2.377
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00236
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00460
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00348
JUNCTION LENGTH = 4.00 FEET
FRICTION LOSSES = 0.014 FEET ENTRANCE LOSSES = 0.000 FEET
JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES = (0.513)+(0.000) = 0.513

NODE 906.00 : HGL = < 507.256>;EGL= < 507.446>;FLOWLINE= < 504.930>

****

FLOW PROCESS FROM NODE 906.00 TO NODE 906.10 IS CODE = 1
UPSTREAM NODE 906.10 ELEVATION = 505.35 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 11.00 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 42.00 FEET MANNING'S N = 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.98 CRITICAL DEPTH(FT) = 1.19

==========

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.49

==========

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.494	18.223	5.654	396.20
4.586	0.513	17.250	5.137	376.22
9.222	0.533	16.366	4.695	358.16
13.911	0.553	15.559	4.314	341.79
18.656	0.572	14.820	3.985	326.92
23.462	0.592	14.141	3.699	313.38
28.337	0.611	13.516	3.450	301.02
33.286	0.631	12.939	3.232	289.74
38.319	0.651	12.405	3.042	279.42
42.000	0.665	12.046	2.919	272.54

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

==========

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.33

==========

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.326	3.501	2.516	334.58
42.000	2.005	3.501	2.196	271.71

----------END OF HYDRAULIC JUMP ANALYSIS----------

PRESSURE+MOMENTUM BALANCE OCCURS AT 16.91 FEET UPSTREAM OF NODE 906.00
DOWNSTREAM DEPTH = 2.197 FEET, UPSTREAM CONJUGATE DEPTH = 0.598 FEET

NODE 906.10 : HGL = < 505.844>;EGL= < 511.004>;FLOWLINE= < 505.350>

****

FLOW PROCESS FROM NODE 906.10 TO NODE 903.30 IS CODE = 1
UPSTREAM NODE 903.30 ELEVATION = 510.85 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 11.00 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 20.00 FEET MANNING'S N = 0.01300

NORMAL DEPTH(FT) = 0.41 CRITICAL DEPTH(FT) = 1.19

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.19

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.189	5.648	1.685	182.81
0.006	1.158	5.832	1.687	183.00
0.025	1.127	6.029	1.692	183.60
0.060	1.096	6.240	1.701	184.63
0.111	1.065	6.468	1.715	186.12
0.183	1.034	6.713	1.734	188.11
0.278	1.003	6.978	1.759	190.65
0.400	0.971	7.265	1.791	193.76
0.554	0.940	7.576	1.832	197.52
0.746	0.909	7.914	1.882	201.97
0.982	0.878	8.283	1.944	207.20
1.272	0.847	8.686	2.019	213.28
1.628	0.816	9.128	2.111	220.31
2.063	0.785	9.615	2.221	228.41
2.597	0.754	10.152	2.355	237.71
3.255	0.723	10.748	2.518	248.37
4.070	0.691	11.412	2.715	260.59
5.091	0.660	12.154	2.956	274.60
6.385	0.629	12.989	3.251	290.71
8.054	0.598	13.933	3.615	309.26
10.257	0.567	15.009	4.067	330.71
13.265	0.536	16.241	4.634	355.62
17.592	0.505	17.665	5.354	384.73
20.000	0.494	18.223	5.654	396.20

NODE 903.30 : HGL = < 512.039>;EGL= < 512.535>;FLOWLINE= < 510.850>

****

FLOW PROCESS FROM NODE 903.30 TO NODE 903.30 IS CODE = 8
UPSTREAM NODE 903.30 ELEVATION = 510.86 (FLOW IS AT CRITICAL DEPTH)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 11.00 CFS PIPE DIAMETER = 24.00 INCHES
FLOW VELOCITY = 5.65 FEET/SEC. VELOCITY HEAD = 0.496 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.496) = 0.099

NODE 903.30 : HGL = < 512.634>;EGL= < 512.634>;FLOWLINE= < 510.860>

****

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 903.30 FLOWLINE ELEVATION = 510.86
ASSUMED UPSTREAM CONTROL HGL = 512.05 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

STARTING HGL FOR LATERAL PIPEFLOW

HGL at Node	906	For Pipe Flow	906 LAT

$EGL_{MAIN} = HGL_{LAT} + V^2/2g$

$HGL_{LAT} = EGL_{MAIN} - V^2/2g$

$g =$ 32.2 Ft/S^2

EGL_{MAIN} =	507.446	From Pipe Flow	904 LAT

$V_{LAT} = Q_{LAT} / A_{LAT}$

Q_{LAT} =	4.4	CFS

$A_{LAT} = \Pi D_{LAT}^2/4$

D_{LAT} =	18	Inches

HGL_{MAIN} =	507.350

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* J - 16630 BMRNV East Town Center Improvements *
* Construction Change "F" *
* Southern Inlet along 'AR" Street *

FILE NAME: 906.LAT
TIME/DATE OF STUDY: 10:45 07/01/2014

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
906.00-		2.42*	205.38	0.80 Dc	59.56
	} FRICTION				
904.40-		2.18*	179.09	0.80 Dc	59.56
	} JUNCTION				
904.40-		2.28*	181.36	0.60	44.42
	} FRICTION				
904.30-		2.02*	152.76	0.70 Dc	42.61
	} CATCH BASIN				
904.30-		2.09*	147.69	0.70 Dc	15.06

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 906.00 FLOWLINE ELEVATION = 504.93
PIPE FLOW = 4.40 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 507.350 FEET

NODE 906.00 : HGL = < 507.350>;EGL= < 507.446>;FLOWLINE= < 504.930>

FLOW PROCESS FROM NODE 906.00 TO NODE 904.40 IS CODE = 1
UPSTREAM NODE 904.40 ELEVATION = 505.30 (FLOW IS UNDER PRESSURE)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 4.40 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 75.00 FEET MANNING'S N = 0.01300
SF=(Q/K)**2 = ((4.40)/(105.043))**2 = 0.00175
HF=L*SF = (75.00)*(0.00175) = 0.132

NODE 904.40 : HGL = < 507.482>;EGL= < 507.578>;FLOWLINE= < 505.300>

FLOW PROCESS FROM NODE 904.40 TO NODE 904.40 IS CODE = 5
UPSTREAM NODE 904.40 ELEVATION = 505.40 (FLOW IS UNDER PRESSURE)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	3.40	18.00	90.00	505.40	0.70	1.924
DOWNSTREAM	4.40	18.00	-	505.30	0.80	2.490
LATERAL #1	1.00	18.00	90.00	505.40	0.37	0.566
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

```
 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00105
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00175
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00140
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.006 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.159)+( 0.000) =   0.159
-------------------------------------------------------------------------------
 NODE   904.40 : HGL = <  507.680>;EGL= <  507.737>;FLOWLINE= <  505.400>

*******************************************************************************
 FLOW PROCESS FROM NODE   904.40 TO NODE   904.30 IS CODE =  1
 UPSTREAM NODE   904.30     ELEVATION =   505.69  (FLOW IS UNDER PRESSURE)
-------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =       3.40 CFS      PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =      29.25 FEET          MANNING'S N  =  0.01300
 SF=(Q/K)**2 = ((      3.40)/(   105.051))**2 = 0.00105
 HF=L*SF = (     29.25)*(0.00105) =      0.031
-------------------------------------------------------------------------------
 NODE   904.30 : HGL = <  507.710>;EGL= <  507.768>;FLOWLINE= <  505.690>

*******************************************************************************
 FLOW PROCESS FROM NODE   904.30 TO NODE   904.30 IS CODE =  8
 UPSTREAM NODE   904.30     ELEVATION =   505.69  (FLOW IS UNDER PRESSURE)
-------------------------------------------------------------------------------
 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       3.40 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =   1.92 FEET/SEC.    VELOCITY HEAD =  0.058 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.058) =  0.012
-------------------------------------------------------------------------------
 NODE   904.30 : HGL = <  507.779>;EGL= <  507.779>;FLOWLINE= <  505.690>

*******************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   904.30            FLOWLINE ELEVATION =   505.69
 ASSUMED UPSTREAM CONTROL HGL =    506.39 FOR DOWNSTREAM RUN ANALYSIS

===============================================================================
 END OF GRADUALLY VARIED FLOW ANALYSIS
♀
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STARTING HGL FOR LATERAL PIPEFLOW

HGL at Node	904.4	For Pipe Flow	9044 LAT

$EGL_{MAIN} = HGL_{LAT} + V^2/2g$

$HGL_{LAT} = EGL_{MAIN} - V^2/2g$

$g =$ 32.2 Ft/S^2

$EGL_{MAIN} =$	507.737	From Pipe Flow	906 LAT

$V_{LAT} = Q_{LAT} / A_{LAT}$

$Q_{LAT} =$ 1.1 CFS

$A_{LAT} = \Pi D_{LAT}^2/4$

$D_{LAT} =$ 18 Inches

$HGL_{MAIN} =$	507.731

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Analysis prepared by:

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DESCRIPTION OF STUDY
* J - 16630 BMRNV East Town Center Improvements *
* Construction Change "F" *
* Northern Inlet along "AR" Street *

FILE NAME: 9044.LAT
TIME/DATE OF STUDY: 10:53 07/01/2014

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
904.40-		2.33*	175.66	0.20	17.18
	} FRICTION				
904.50-		1.60*	95.20	0.39 Dc	10.07
	} CATCH BASIN				
904.50-		1.61*	94.67	0.39 Dc	3.68

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 904.40 FLOWLINE ELEVATION = 505.40
PIPE FLOW = 1.10 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 507.731 FEET

NODE 904.40 : HGL = < 507.731>;EGL= < 507.737>;FLOWLINE= < 505.400>

FLOW PROCESS FROM NODE 904.40 TO NODE 904.50 IS CODE = 1
UPSTREAM NODE 904.50 ELEVATION = 506.13 (FLOW IS UNDER PRESSURE)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 1.10 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 3.25 FEET MANNING'S N = 0.01300
SF=(Q/K)**2 = ((1.10)/(103.626))**2 = 0.00011
HF=L*SF = (3.25)*(0.00011) = 0.000

NODE 904.50 : HGL = < 507.731>;EGL= < 507.737>;FLOWLINE= < 506.130>

FLOW PROCESS FROM NODE 904.50 TO NODE 904.50 IS CODE = 8
UPSTREAM NODE 904.50 ELEVATION = 506.13 (FLOW IS UNDER PRESSURE)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 1.10 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 0.62 FEET/SEC. VELOCITY HEAD = 0.006 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.006) = 0.001

NODE 904.50 : HGL = < 507.739>;EGL= < 507.739>;FLOWLINE= < 506.130>

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 904.50 FLOWLINE ELEVATION = 506.13
ASSUMED UPSTREAM CONTROL HGL = 506.52 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

Basin 900A

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**************************************************************************
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                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* BMR NVE Unit 14 - Construction Change 'F'                               *
* Storm drain from Paseo Del Sur to underground detention basin 9A        *
* Basin 900A                                                              *
 **************************************************************************

  FILE NAME: 916.PIP
  TIME/DATE OF STUDY: 08:48 10/01/2014

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                          NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                          UPSTREAM RUN                    DOWNSTREAM RUN
  NODE      MODEL     PRESSURE      PRESSURE+          FLOW        PRESSURE+
  NUMBER    PROCESS   HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  916.00-                6.17*          1640.97        1.27            346.90
        } FRICTION
  918.60-                5.93*          1568.82        1.45 Dc         337.71
        } JUNCTION
  918.60-                6.32*          1644.87        1.11            273.60
        } FRICTION
  918.80-                5.10*          1270.70        1.31 Dc         262.63
        } JUNCTION
  918.80-                5.37*           994.19        1.26            277.07
        } FRICTION
  954.20-                4.88*           897.57        1.39 Dc         273.31
        } JUNCTION
  954.20-                4.91*           879.68        1.05            258.87
        } FRICTION
  914.00-                4.19*           739.38        1.32 Dc         240.81
        } JUNCTION
  914.00-                4.84*           855.38        0.72            333.04
        } FRICTION          } HYDRAULIC JUMP
  910.30-                1.29 Dc         224.82        0.85*           280.16
        } JUNCTION
  910.30-                1.55            217.88        0.70*           294.49
        } FRICTION
  910.20-                1.23 Dc         201.02        0.73*           278.84
        } JUNCTION
  910.20-                1.23 Dc         201.02        0.75*           272.00
        } FRICTION
  910.00-                1.23*Dc         201.02        1.23*Dc         201.02
        } JUNCTION
  910.00-                1.79*           247.05        0.86            239.34
        } FRICTION          } HYDRAULIC JUMP
  909.00-                1.23*Dc         201.02        1.23*Dc         201.02
```

```
      } JUNCTION
909.00-               1.89*          248.13          0.88            227.41
      } FRICTION          } HYDRAULIC JUMP
913.00-               1.25*Dc        194.22          1.25*Dc         194.22
      } JUNCTION
913.00-               1.83*          179.85          0.81            131.35
      } FRICTION
913.20-               1.54*          148.37          0.93            122.58
      } JUNCTION
913.20-               1.46*          139.45          1.06 Dc         119.86
--------------------------------------------------------------------------------
 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25
--------------------------------------------------------------------------------
 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
********************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   916.00          FLOWLINE ELEVATION =   495.74
 PIPE FLOW =      18.42 CFS      PIPE DIAMETER =  30.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   501.910 FEET
--------------------------------------------------------------------------------
 NODE   916.00 : HGL = <  501.910>;EGL= <  502.129>;FLOWLINE= <  495.740>

********************************************************************************
 FLOW PROCESS FROM NODE   916.00 TO NODE   918.60 IS CODE =  1
 UPSTREAM NODE   918.60     ELEVATION =   496.05  (FLOW IS UNDER PRESSURE)
--------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      18.42 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =       36.90 FEET          MANNING'S N  =  0.01300
 SF=(Q/K)**2 = ((     18.42)/(   410.214))**2 = 0.00202
 HF=L*SF = (     36.90)*(0.00202) =      0.074
--------------------------------------------------------------------------------
 NODE   918.60 : HGL = <  501.984>;EGL= <  502.203>;FLOWLINE= <  496.050>

********************************************************************************
 FLOW PROCESS FROM NODE   918.60 TO NODE   918.60 IS CODE =  5
 UPSTREAM NODE   918.60     ELEVATION =   496.15  (FLOW IS UNDER PRESSURE)
--------------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
     PIPE        FLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                 (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
   UPSTREAM      15.20     30.00     90.00     496.15      1.31       3.097
  DOWNSTREAM     18.42     30.00       -       496.05      1.45       3.752
  LATERAL #1      0.00      0.00      0.00       0.00      0.00       0.000
  LATERAL #2      0.00      0.00      0.00       0.00      0.00       0.000
     Q5           3.22===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
    Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00137
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00202
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00169
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.007 FEET         ENTRANCE LOSSES =  0.044 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.374)+( 0.044) =   0.418
--------------------------------------------------------------------------------
 NODE   918.60 : HGL = <  502.472>;EGL= <  502.621>;FLOWLINE= <  496.150>
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   918.60 TO NODE   918.80 IS CODE =  1
 UPSTREAM NODE   918.80     ELEVATION =   497.61  (FLOW IS UNDER PRESSURE)
----------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      15.20 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =     173.64 FEET          MANNING'S N  =  0.01300
 SF=(Q/K)**2 = ((     15.20)/(   410.163))**2 = 0.00137
 HF=L*SF = (    173.64)*(0.00137) =      0.238
----------------------------------------------------------------------------
 NODE   918.80 : HGL = <  502.711>;EGL= <  502.860>;FLOWLINE= <  497.610>

****************************************************************************
 FLOW PROCESS FROM NODE   918.80 TO NODE   918.80 IS CODE =  5
 UPSTREAM NODE   918.80     ELEVATION =   497.71  (FLOW IS UNDER PRESSURE)
----------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                  (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM      14.88     24.00     90.00     497.71      1.39       4.736
   DOWNSTREAM     15.20     30.00       -       497.61      1.31       3.097
   LATERAL #1      0.32     18.00      0.00     497.81      0.21       0.181
   LATERAL #2      0.00      0.00      0.00       0.00      0.00       0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00433
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00137
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00285
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.011 FEET        ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.574)+( 0.000) =   0.574
----------------------------------------------------------------------------
 NODE   918.80 : HGL = <  503.085>;EGL= <  503.433>;FLOWLINE= <  497.710>

****************************************************************************
 FLOW PROCESS FROM NODE   918.80 TO NODE   954.20 IS CODE =  1
 UPSTREAM NODE   954.20     ELEVATION =   498.73  (FLOW IS UNDER PRESSURE)
----------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      14.88 CFS     PIPE DIAMETER =  24.00 INCHES
 PIPE LENGTH =     121.84 FEET          MANNING'S N  =  0.01300
 SF=(Q/K)**2 = ((     14.88)/(   226.224))**2 = 0.00433
 HF=L*SF = (    121.84)*(0.00433) =      0.527
----------------------------------------------------------------------------
 NODE   954.20 : HGL = <  503.612>;EGL= <  503.960>;FLOWLINE= <  498.730>

****************************************************************************
 FLOW PROCESS FROM NODE   954.20 TO NODE   954.20 IS CODE =  5
 UPSTREAM NODE   954.20     ELEVATION =   498.83  (FLOW IS UNDER PRESSURE)
----------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                  (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM      13.54     24.00      0.00     498.83      1.32       4.310
   DOWNSTREAM     14.88     24.00       -       498.73      1.39       4.736
   LATERAL #1      1.34     18.00     45.00     498.84      0.43       0.758
```

```
   LATERAL #2      0.00      0.00      0.00      0.00      0.00         0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00358
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00433
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00395
  JUNCTION LENGTH =   4.00 FEET
  FRICTION LOSSES =  0.016 FEET         ENTRANCE LOSSES =  0.000 FEET
  JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES = ( 0.069)+( 0.000) =   0.069
-------------------------------------------------------------------------------
  NODE   954.20 : HGL = <  503.740>;EGL= <  504.029>;FLOWLINE= <  498.830>

*******************************************************************************
  FLOW PROCESS FROM NODE   954.20 TO NODE   914.00 IS CODE =  1
  UPSTREAM NODE   914.00     ELEVATION =   499.83  (FLOW IS UNDER PRESSURE)
-------------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      13.54 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =       79.37 FEET          MANNING'S N  =  0.01300
  SF=(Q/K)**2 = ((     13.54)/(   226.221))**2 = 0.00358
  HF=L*SF = (     79.37)*(0.00358) =      0.284
-------------------------------------------------------------------------------
  NODE   914.00 : HGL = <  504.025>;EGL= <  504.313>;FLOWLINE= <  499.830>

*******************************************************************************
  FLOW PROCESS FROM NODE   914.00 TO NODE   914.00 IS CODE =  5
  UPSTREAM NODE   914.00     ELEVATION =   499.83  (FLOW IS UNDER PRESSURE)
-------------------------------------------------------------------------------
  CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                  (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM      12.86     24.00     90.00     499.83      1.29       4.093
   DOWNSTREAM     13.54     24.00       -       499.83      1.32       4.310
   LATERAL #1      0.00      0.00      0.00       0.00      0.00       0.000
   LATERAL #2      0.00      0.00      0.00       0.00      0.00       0.000
      Q5           0.68===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00323
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00358
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00341
  JUNCTION LENGTH =   4.00 FEET
  FRICTION LOSSES =  0.014 FEET         ENTRANCE LOSSES =  0.058 FEET
  JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES = ( 0.562)+( 0.058) =   0.620
-------------------------------------------------------------------------------
  NODE   914.00 : HGL = <  504.673>;EGL= <  504.933>;FLOWLINE= <  499.830>

*******************************************************************************
  FLOW PROCESS FROM NODE   914.00 TO NODE   910.30 IS CODE =  1
  UPSTREAM NODE   910.30     ELEVATION =   505.84  (HYDRAULIC JUMP OCCURS)
-------------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      12.86 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =      140.08 FEET          MANNING'S N  =  0.01300
```

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.72 CRITICAL DEPTH(FT) = 1.29

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.85

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.850	10.102	2.436	280.16
1.079	0.845	10.187	2.457	281.85
2.223	0.840	10.273	2.479	283.59
3.437	0.834	10.361	2.502	285.35
4.727	0.829	10.450	2.526	287.16
6.101	0.823	10.541	2.550	289.01
7.569	0.818	10.633	2.575	290.90
9.140	0.813	10.727	2.601	292.83
10.826	0.807	10.822	2.627	294.81
12.643	0.802	10.919	2.654	296.82
14.605	0.797	11.017	2.683	298.88
16.735	0.791	11.117	2.712	300.99
19.058	0.786	11.219	2.742	303.14
21.603	0.781	11.323	2.772	305.34
24.411	0.775	11.428	2.804	307.59
27.533	0.770	11.535	2.837	309.89
31.034	0.764	11.644	2.871	312.24
35.005	0.759	11.755	2.906	314.64
39.571	0.754	11.868	2.942	317.09
44.919	0.748	11.983	2.980	319.60
51.335	0.743	12.101	3.018	322.16
59.298	0.738	12.220	3.058	324.78
69.711	0.732	12.341	3.099	327.46
84.598	0.727	12.465	3.141	330.19
110.454	0.721	12.591	3.185	332.99
140.080	0.721	12.593	3.185	333.04

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 4.84

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	4.843	4.093	5.103	855.38
71.661	2.000	4.093	2.260	298.05

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.00

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
71.661	2.000	4.092	2.260	298.05
72.338	1.972	4.104	2.233	292.78
72.979	1.943	4.125	2.208	287.78
73.598	1.915	4.153	2.183	282.97
74.199	1.886	4.187	2.159	278.34
74.782	1.858	4.225	2.135	273.87

```
        75.350          1.830          4.268          2.113          269.57
        75.902          1.801          4.315          2.090          265.43
        76.438          1.773          4.366          2.069          261.46
        76.959          1.744          4.422          2.048          257.66
        77.463          1.716          4.482          2.028          254.03
        77.950          1.688          4.546          2.009          250.58
        78.419          1.659          4.614          1.990          247.31
        78.869          1.631          4.687          1.972          244.23
        79.298          1.602          4.765          1.955          241.35
        79.705          1.574          4.848          1.939          238.67
        80.089          1.545          4.935          1.924          236.19
        80.447          1.517          5.028          1.910          233.93
        80.776          1.489          5.127          1.897          231.90
        81.075          1.460          5.231          1.885          230.10
        81.341          1.432          5.341          1.875          228.54
        81.569          1.403          5.458          1.866          227.24
        81.755          1.375          5.582          1.859          226.20
        81.896          1.347          5.714          1.854          225.44
        81.985          1.318          5.853          1.851          224.98
        82.016          1.290          6.001          1.849          224.82
       140.080          1.290          6.001          1.849          224.82
-------------------------END OF HYDRAULIC JUMP ANALYSIS-------------------------
| PRESSURE+MOMENTUM BALANCE OCCURS AT     67.82 FEET UPSTREAM OF NODE  914.00 |
|       DOWNSTREAM DEPTH = 2.152 FEET, UPSTREAM CONJUGATE DEPTH = 0.731 FEET |
----------------------------------------------------------------------------
  NODE    910.30 : HGL = <  506.690>;EGL= <  508.276>;FLOWLINE= <  505.840>

****************************************************************************
  FLOW PROCESS FROM NODE    910.30 TO NODE    910.30 IS CODE =  5
  UPSTREAM NODE   910.30     ELEVATION =    506.34  (FLOW IS SUPERCRITICAL)
----------------------------------------------------------------------------
  CALCULATE JUNCTION LOSSES:
      PIPE         FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)   (FT/SEC)
    UPSTREAM       11.82      24.00       0.00     506.34       1.23        12.083
   DOWNSTREAM      12.86      24.00         -      505.84       1.29        10.105
   LATERAL #1       0.00       0.00       0.00       0.00       0.00         0.000
   LATERAL #2       0.00       0.00       0.00       0.00       0.00         0.000
      Q5            1.04===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03968
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02281
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.03124
  JUNCTION LENGTH =    4.00 FEET
  FRICTION LOSSES =  0.125 FEET          ENTRANCE LOSSES =  0.317 FEET
  JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES = ( 0.713)+( 0.317) =   1.030
----------------------------------------------------------------------------
  NODE    910.30 : HGL = <  507.039>;EGL= <  509.306>;FLOWLINE= <  506.340>

****************************************************************************
  FLOW PROCESS FROM NODE    910.30 TO NODE    910.20 IS CODE =  1
  UPSTREAM NODE   910.20     ELEVATION =    511.29  (FLOW IS SUPERCRITICAL)
----------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      11.82 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =     123.78 FEET          MANNING'S N  =  0.01300
----------------------------------------------------------------------------
```

```
 NORMAL DEPTH(FT) =      0.70          CRITICAL DEPTH(FT) =      1.23
===============================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.73
===============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        0.000          0.734      11.299         2.718           278.84
        1.354          0.733      11.330         2.727           279.44
        2.772          0.731      11.361         2.737           280.05
        4.259          0.730      11.392         2.746           280.67
        5.821          0.728      11.423         2.756           281.28
        7.466          0.727      11.454         2.765           281.91
        9.203          0.726      11.485         2.775           282.53
       11.041          0.724      11.517         2.785           283.16
       12.992          0.723      11.549         2.795           283.80
       15.070          0.721      11.581         2.805           284.43
       17.290          0.720      11.613         2.815           285.07
       19.674          0.718      11.645         2.825           285.72
       22.244          0.717      11.677         2.835           286.37
       25.032          0.715      11.710         2.846           287.02
       28.074          0.714      11.743         2.856           287.68
       31.420          0.712      11.776         2.867           288.34
       35.133          0.711      11.809         2.877           289.01
       39.301          0.709      11.842         2.888           289.68
       44.044          0.708      11.875         2.899           290.35
       49.542          0.706      11.909         2.910           291.03
       56.071          0.705      11.943         2.921           291.71
       64.093          0.704      11.976         2.932           292.40
       74.476          0.702      12.011         2.943           293.09
       89.172          0.701      12.045         2.955           293.79
      114.436          0.699      12.079         2.966           294.49
      123.780          0.699      12.079         2.966           294.49
-------------------------------------------------------------------------------
 NODE   910.20 : HGL = <  512.024>;EGL= <  514.008>;FLOWLINE= <  511.290>

*******************************************************************************
 FLOW PROCESS FROM NODE   910.20 TO NODE   910.20 IS CODE =  5
 UPSTREAM NODE   910.20     ELEVATION =   511.62  (FLOW IS SUPERCRITICAL)
-------------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)   (FT/SEC)
    UPSTREAM       11.82      24.00       0.00     511.62        1.23       10.954
   DOWNSTREAM      11.82      24.00          -     511.29        1.23       11.303
   LATERAL #1       0.00       0.00       0.00       0.00        0.00        0.000
   LATERAL #2       0.00       0.00       0.00       0.00        0.00        0.000
      Q5            0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03027
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03300
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.03163
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.127 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.227)+( 0.000) =   0.227
-------------------------------------------------------------------------------
```

```
 NODE   910.20 : HGL = <  512.372>;EGL= <  514.235>;FLOWLINE= <  511.620>

****************************************************************************
 FLOW PROCESS FROM NODE   910.20 TO NODE   910.00 IS CODE =  1
 UPSTREAM NODE   910.00     ELEVATION =   520.37  (FLOW IS SUPERCRITICAL)
----------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      11.82 CFS     PIPE DIAMETER =  24.00 INCHES
 PIPE LENGTH =     265.11 FEET          MANNING'S N  =  0.01300
----------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      0.73          CRITICAL DEPTH(FT) =      1.23
============================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.23
============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
----------------------------------------------------------------------------
 DISTANCE FROM    FLOW DEPTH  VELOCITY     SPECIFIC      PRESSURE+
  CONTROL(FT)        (FT)    (FT/SEC)   ENERGY(FT)   MOMENTUM(POUNDS)
        0.000        1.235       5.805        1.758            201.02
        0.023        1.215       5.918        1.759            201.10
        0.097        1.195       6.037        1.761            201.34
        0.226        1.175       6.160        1.764            201.76
        0.417        1.155       6.290        1.769            202.35
        0.677        1.135       6.425        1.776            203.14
        1.014        1.115       6.567        1.785            204.11
        1.437        1.095       6.716        1.795            205.30
        1.959        1.074       6.871        1.808            206.69
        2.592        1.054       7.035        1.823            208.31
        3.354        1.034       7.206        1.841            210.17
        4.264        1.014       7.387        1.862            212.28
        5.346        0.994       7.576        1.886            214.65
        6.630        0.974       7.776        1.914            217.30
        8.156        0.954       7.986        1.945            220.24
        9.972        0.934       8.208        1.981            223.50
       12.143        0.914       8.442        2.022            227.09
       14.759        0.894       8.689        2.067            231.03
       17.945        0.874       8.951        2.119            235.35
       21.882        0.854       9.228        2.177            240.08
       26.855        0.834       9.522        2.243            245.24
       33.339        0.814       9.834        2.317            250.87
       42.228        0.794      10.166        2.400            257.01
       55.527        0.774      10.520        2.494            263.69
       79.676        0.754      10.897        2.599            270.95
      265.110        0.752      10.951        2.615            272.00
----------------------------------------------------------------------------
 NODE   910.00 : HGL = <  521.605>;EGL= <  522.128>;FLOWLINE= <  520.370>

****************************************************************************
 FLOW PROCESS FROM NODE   910.00 TO NODE   910.00 IS CODE =  5
 UPSTREAM NODE   910.00     ELEVATION =   520.70  (FLOW IS AT CRITICAL DEPTH)
----------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
     PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                 (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)   (FT/SEC)
   UPSTREAM       11.82      24.00      90.00     520.70        1.23       3.985
  DOWNSTREAM      11.82      24.00          -     520.37        1.23       5.806
  LATERAL #1       0.00       0.00       0.00       0.00        0.00       0.000
  LATERAL #2       0.00       0.00       0.00       0.00        0.00       0.000
     Q5            0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
```

```
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00242
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00555
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00398
  JUNCTION LENGTH =   4.00 FEET
  FRICTION LOSSES =  0.016 FEET         ENTRANCE LOSSES =  0.000 FEET
  JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES = ( 0.608)+( 0.000) =   0.608
-------------------------------------------------------------------------------
  NODE   910.00 : HGL = <  522.490>;EGL= <  522.736>;FLOWLINE= <  520.700>

*******************************************************************************
  FLOW PROCESS FROM NODE   910.00 TO NODE   909.00 IS CODE =  1
  UPSTREAM NODE   909.00     ELEVATION =   522.60  (HYDRAULIC JUMP OCCURS)
-------------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      11.82 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =       95.05 FEET          MANNING'S N  =  0.01300
-------------------------------------------------------------------------------
  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS
-------------------------------------------------------------------------------
  NORMAL DEPTH(FT) =       0.84           CRITICAL DEPTH(FT) =       1.23
===============================================================================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.23
===============================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          1.235       5.805          1.758           201.02
         0.027          1.219       5.893          1.759           201.07
         0.113          1.203       5.985          1.760           201.22
         0.263          1.187       6.080          1.762           201.47
         0.484          1.172       6.178          1.765           201.83
         0.784          1.156       6.280          1.769           202.30
         1.171          1.140       6.386          1.774           202.89
         1.655          1.125       6.495          1.780           203.60
         2.249          1.109       6.608          1.787           204.43
         2.968          1.093       6.726          1.796           205.38
         3.827          1.077       6.848          1.806           206.47
         4.849          1.062       6.975          1.818           207.70
         6.058          1.046       7.106          1.831           209.07
         7.487          1.030       7.243          1.845           210.59
         9.175          1.015       7.386          1.862           212.27
        11.173          0.999       7.534          1.881           214.10
        13.550          0.983       7.688          1.901           216.11
        16.397          0.967       7.848          1.924           218.30
        19.844          0.952       8.015          1.950           220.67
        24.080          0.936       8.190          1.978           223.23
        29.397          0.920       8.372          2.009           226.00
        36.288          0.905       8.562          2.043           228.98
        45.674          0.889       8.760          2.081           232.19
        59.626          0.873       8.967          2.123           235.64
        84.792          0.857       9.185          2.168           239.33
        95.050          0.857       9.185          2.168           239.34
-------------------------------------------------------------------------------
  HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
===============================================================================
  DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.79
===============================================================================
```

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.790	3.984	2.036	247.05
0.997	1.768	4.022	2.019	243.82
1.976	1.745	4.062	2.002	240.69
2.937	1.723	4.105	1.985	237.66
3.880	1.701	4.150	1.969	234.72
4.803	1.679	4.197	1.952	231.88
5.706	1.657	4.247	1.937	229.15
6.589	1.634	4.299	1.922	226.52
7.449	1.612	4.355	1.907	223.99
8.286	1.590	4.412	1.892	221.58
9.099	1.568	4.473	1.879	219.28
9.885	1.546	4.536	1.865	217.10
10.643	1.523	4.602	1.852	215.03
11.371	1.501	4.672	1.840	213.09
12.067	1.479	4.744	1.829	211.28
12.727	1.457	4.820	1.818	209.59
13.349	1.434	4.900	1.808	208.05
13.930	1.412	4.983	1.798	206.64
14.465	1.390	5.070	1.789	205.37
14.951	1.368	5.161	1.782	204.26
15.382	1.346	5.256	1.775	203.29
15.752	1.323	5.356	1.769	202.49
16.056	1.301	5.460	1.764	201.86
16.284	1.279	5.570	1.761	201.40
16.430	1.257	5.684	1.759	201.11
16.481	1.235	5.805	1.758	201.02
95.050	1.235	5.805	1.758	201.02

----------END OF HYDRAULIC JUMP ANALYSIS----------

PRESSURE+MOMENTUM BALANCE OCCURS AT 2.40 FEET UPSTREAM OF NODE 910.00
DOWNSTREAM DEPTH = 1.735 FEET, UPSTREAM CONJUGATE DEPTH = 0.857 FEET

NODE 909.00 : HGL = < 523.835>;EGL= < 524.358>;FLOWLINE= < 522.600>

****

FLOW PROCESS FROM NODE 909.00 TO NODE 909.00 IS CODE = 5

UPSTREAM NODE 909.00 ELEVATION = 523.10 (FLOW IS AT CRITICAL DEPTH)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	10.58	18.00	90.00	523.10	1.25	5.987
DOWNSTREAM	11.82	24.00	-	522.60	1.23	5.806
LATERAL #1	1.24	18.00	90.00	523.10	0.42	0.757
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:

DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES

UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.01014

DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00555

AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00785

JUNCTION LENGTH = 4.00 FEET

FRICTION LOSSES = 0.031 FEET ENTRANCE LOSSES = 0.000 FEET

JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)

JUNCTION LOSSES = (1.185)+(0.000) = 1.185

```
 NODE   909.00 : HGL = <  524.987>;EGL= <  525.544>;FLOWLINE= <  523.100>

****************************************************************************
 FLOW PROCESS FROM NODE   909.00 TO NODE   913.00 IS CODE =  1
 UPSTREAM NODE   913.00     ELEVATION =   524.05  (HYDRAULIC JUMP OCCURS)
----------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      10.58 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =       27.25 FEET          MANNING'S N  =  0.01300
----------------------------------------------------------------------------
 HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS
----------------------------------------------------------------------------
 NORMAL DEPTH(FT) =       0.78           CRITICAL DEPTH(FT) =       1.25
============================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.25
============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
----------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC       PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)   MOMENTUM(POUNDS)
        0.000          1.249       6.725          1.952           194.22
        0.026          1.231       6.816          1.953           194.28
        0.108          1.212       6.913          1.955           194.47
        0.251          1.194       7.015          1.958           194.80
        0.460          1.175       7.122          1.963           195.27
        0.741          1.156       7.235          1.970           195.88
        1.102          1.138       7.354          1.978           196.64
        1.554          1.119       7.479          1.988           197.55
        2.105          1.101       7.611          2.001           198.62
        2.770          1.082       7.749          2.015           199.86
        3.564          1.063       7.895          2.032           201.28
        4.506          1.045       8.048          2.051           202.88
        5.619          1.026       8.209          2.073           204.67
        6.933          1.008       8.378          2.098           206.67
        8.484          0.989       8.557          2.127           208.88
       10.321          0.971       8.745          2.159           211.31
       12.505          0.952       8.942          2.194           213.98
       15.123          0.933       9.151          2.234           216.90
       18.295          0.915       9.371          2.279           220.08
       22.196          0.896       9.603          2.329           223.55
       27.101          0.878       9.848          2.384           227.31
       27.250          0.877       9.854          2.386           227.41
----------------------------------------------------------------------------
 HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
============================================================================
 DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     1.89
============================================================================
 PRESSURE FLOW PROFILE COMPUTED INFORMATION:
----------------------------------------------------------------------------
 DISTANCE FROM      PRESSURE    VELOCITY      SPECIFIC       PRESSURE+
  CONTROL(FT)      HEAD(FT)    (FT/SEC)     ENERGY(FT)   MOMENTUM(POUNDS)
        0.000          1.887       5.987          2.444           248.13
       15.655          1.500       5.987          2.057           205.45
============================================================================
 ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =     1.50
============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
----------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC       PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)   MOMENTUM(POUNDS)
       15.655          1.500       5.985          2.057           205.45
```

```
        16.015          1.490          5.991          2.048          204.46
        16.334          1.480          6.001          2.039          203.57
        16.629          1.470          6.014          2.032          202.73
        16.904          1.460          6.030          2.025          201.96
        17.162          1.450          6.047          2.018          201.22
        17.406          1.440          6.067          2.012          200.53
        17.636          1.430          6.088          2.006          199.88
        17.852          1.420          6.111          2.000          199.27
        18.057          1.410          6.136          1.995          198.70
        18.249          1.400          6.162          1.990          198.16
        18.429          1.390          6.190          1.985          197.66
        18.598          1.380          6.219          1.981          197.19
        18.756          1.370          6.250          1.977          196.75
        18.902          1.360          6.282          1.973          196.35
        19.036          1.350          6.315          1.969          195.99
        19.159          1.340          6.350          1.966          195.65
        19.271          1.330          6.386          1.963          195.36
        19.370          1.320          6.424          1.961          195.09
        19.458          1.309          6.462          1.958          194.86
        19.533          1.299          6.503          1.956          194.67
        19.595          1.289          6.544          1.955          194.51
        19.644          1.279          6.587          1.954          194.38
        19.680          1.269          6.632          1.953          194.29
        19.702          1.259          6.677          1.952          194.23
        19.709          1.249          6.725          1.952          194.22
        27.250          1.249          6.725          1.952          194.22
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
| PRESSURE+MOMENTUM BALANCE OCCURS AT    11.07 FEET UPSTREAM OF NODE  909.00 |
|      DOWNSTREAM DEPTH = 1.613 FEET, UPSTREAM CONJUGATE DEPTH = 0.927 FEET |
-------------------------------------------------------------------------------
 NODE   913.00 : HGL = <  525.299>;EGL= <  526.002>;FLOWLINE= <  524.050>

****************************************************************************
 FLOW PROCESS FROM NODE   913.00 TO NODE   913.00 IS CODE =  5
 UPSTREAM NODE   913.00     ELEVATION =   524.38  (FLOW IS AT CRITICAL DEPTH)
----------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)   (FT/SEC)
    UPSTREAM       7.46      18.00       0.00     524.38       1.06        4.222
   DOWNSTREAM     10.58      18.00          -     524.05       1.25        6.727
   LATERAL #1      0.00       0.00       0.00       0.00       0.00        0.000
   LATERAL #2      0.00       0.00       0.00       0.00       0.00        0.000
      Q5           3.12===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00504
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00987
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00746
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.030 FEET          ENTRANCE LOSSES =  0.141 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.342)+( 0.141) =   0.482
----------------------------------------------------------------------------
 NODE   913.00 : HGL = <  526.208>;EGL= <  526.484>;FLOWLINE= <  524.380>

****************************************************************************
 FLOW PROCESS FROM NODE   913.00 TO NODE   913.20 IS CODE =  1
 UPSTREAM NODE   913.20     ELEVATION =   524.76  (FLOW IS UNDER PRESSURE)
```

```
------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =       7.46 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =      18.75 FEET          MANNING'S N  =  0.01300
 SF=(Q/K)**2 = ((      7.46)/(   105.057))**2 = 0.00504
 HF=L*SF = (     18.75)*(0.00504) =      0.095
------------------------------------------------------------------------------
 NODE   913.20 : HGL = <  526.302>;EGL= <  526.579>;FLOWLINE= <  524.760>

******************************************************************************
 FLOW PROCESS FROM NODE   913.20 TO NODE   913.20 IS CODE =  5
 UPSTREAM NODE   913.20     ELEVATION =   524.86  (FLOW SEALS IN REACH)
------------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                  (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM       7.46     18.00      0.00    524.86       1.06       4.257
   DOWNSTREAM      7.46     18.00         -    524.76       1.06       4.221
   LATERAL #1      0.00      0.00      0.00      0.00       0.00       0.000
   LATERAL #2      0.00      0.00      0.00      0.00       0.00       0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00445
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00504
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00474
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.019 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.019)+( 0.000) =   0.019
------------------------------------------------------------------------------
 NODE   913.20 : HGL = <  526.316>;EGL= <  526.598>;FLOWLINE= <  524.860>

******************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   913.20            FLOWLINE ELEVATION =   524.86
 ASSUMED UPSTREAM CONTROL HGL =    525.92 FOR DOWNSTREAM RUN ANALYSIS

==============================================================================
 END OF GRADUALLY VARIED FLOW ANALYSIS
```

```
**************************************************************************
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
          (Reference: LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
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                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* BMR NVE Unit 14 - Construction Change 'F'                               *
* Storm drain from underground detention basin 9A to Camino Del Sur       *
* Basin 900A     16630                                                    *
 **************************************************************************

  FILE NAME: 990.LAT
  TIME/DATE OF STUDY: 09:03 10/01/2014

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                          UPSTREAM RUN                  DOWNSTREAM RUN
   NODE      MODEL     PRESSURE      PRESSURE+          FLOW         PRESSURE+
  NUMBER    PROCESS   HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  990.00-                2.25          908.86         1.89*          909.20
        } FRICTION
  952.20-                2.07*Dc       899.03         2.07*Dc        899.03
        } JUNCTION
  952.20-                3.56*        1354.04         1.80           923.26
        } FRICTION
  921.00-                2.58*         968.69         2.07 Dc        899.03
        } JUNCTION
  921.00-                3.64*        1389.44         1.83           917.52
        } FRICTION
  920.00-                3.39*        1276.89         2.07 Dc        899.03
        } JUNCTION
  920.00-                3.60*        1369.16         1.80           923.97
        } FRICTION
  919.00-                3.15*        1172.23         1.85           913.96
        } JUNCTION
  919.00-                3.13         1163.05         1.30*         1169.96
        } FRICTION
  919.20-                2.07*Dc       899.03         2.07*Dc        899.03
        } CATCH BASIN
  919.20-                4.87*        1484.37         2.07 Dc        294.55
--------------------------------------------------------------------------
  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25
--------------------------------------------------------------------------
  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   990.00          FLOWLINE ELEVATION =   491.31
  PIPE FLOW =      40.23 CFS      PIPE DIAMETER =  36.00 INCHES
```

```
 ASSUMED DOWNSTREAM CONTROL HGL =   493.560 FEET
---------------------------------------------------------------------------
 NODE   990.00 : HGL = <  493.200>;EGL= <  494.342>;FLOWLINE= <  491.310>

****************************************************************************
 FLOW PROCESS FROM NODE   990.00 TO NODE   952.20 IS CODE =  1
 UPSTREAM NODE   952.20     ELEVATION =   491.40  (FLOW IS SUPERCRITICAL)
---------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      40.23 CFS     PIPE DIAMETER =  36.00 INCHES
 PIPE LENGTH =       8.75 FEET          MANNING'S N  =  0.01300
---------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      1.67          CRITICAL DEPTH(FT) =      2.07
===========================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     2.07
===========================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
---------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC       PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)   ENERGY(FT)   MOMENTUM(POUNDS)
        0.000          2.065      7.751        2.999           899.03
        0.051          2.049      7.818        2.999           899.11
        0.211          2.033      7.887        3.000           899.35
        0.489          2.017      7.957        3.001           899.75
        0.897          2.001      8.028        3.003           900.32
        1.448          1.985      8.102        3.005           901.06
        2.156          1.969      8.177        3.008           901.97
        3.040          1.953      8.253        3.012           903.06
        4.119          1.937      8.331        3.016           904.32
        5.418          1.921      8.411        3.021           905.78
        6.965          1.905      8.493        3.026           907.41
        8.750          1.890      8.575        3.032           909.20
---------------------------------------------------------------------------
 NODE   952.20 : HGL = <  493.465>;EGL= <  494.399>;FLOWLINE= <  491.400>

****************************************************************************
 FLOW PROCESS FROM NODE   952.20 TO NODE   952.20 IS CODE =  5
 UPSTREAM NODE   952.20     ELEVATION =   491.50  (FLOW IS AT CRITICAL DEPTH)
---------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
     PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                 (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)   (FT/SEC)
   UPSTREAM      40.23      36.00      90.00     491.50       2.07        5.691
  DOWNSTREAM     40.23      36.00          -     491.40       2.07        7.754
  LATERAL #1      0.00       0.00       0.00       0.00       0.00        0.000
  LATERAL #2      0.00       0.00       0.00       0.00       0.00        0.000
     Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
    Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00364
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00543
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00453
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.018 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 1.168)+( 0.000) =   1.168
---------------------------------------------------------------------------
 NODE   952.20 : HGL = <  495.064>;EGL= <  495.567>;FLOWLINE= <  491.500>
```

```
**************************************************************************
 FLOW PROCESS FROM NODE   952.20 TO NODE   921.00 IS CODE =  1
 UPSTREAM NODE   921.00     ELEVATION =   493.04  (FLOW SEALS IN REACH)
--------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      40.23 CFS     PIPE DIAMETER =  36.00 INCHES
 PIPE LENGTH =     187.55 FEET          MANNING'S N  =  0.01300
==========================================================================
 DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     3.56
==========================================================================
 PRESSURE FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------
 DISTANCE FROM      PRESSURE   VELOCITY     SPECIFIC       PRESSURE+
  CONTROL(FT)       HEAD(FT)   (FT/SEC)    ENERGY(FT)   MOMENTUM(POUNDS)
       0.000          3.564      5.691         4.067          1354.04
     123.300          3.000      5.691         3.503          1105.33
--------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      1.79          CRITICAL DEPTH(FT) =      2.07
==========================================================================
 ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =     3.00
==========================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC       PRESSURE+
  CONTROL(FT)         (FT)     (FT/SEC)    ENERGY(FT)   MOMENTUM(POUNDS)
     123.300          3.000      5.690         3.503          1105.33
     130.655          2.963      5.703         3.468          1089.89
     137.341          2.925      5.728         3.435          1075.39
     143.667          2.888      5.760         3.403          1061.53
     149.721          2.850      5.798         3.373          1048.26
     155.553          2.813      5.841         3.343          1035.52
     161.193          2.776      5.889         3.315          1023.29
     166.658          2.738      5.943         3.287          1011.58
     171.961          2.701      6.001         3.260          1000.38
     177.109          2.663      6.063         3.235           989.69
     182.106          2.626      6.130         3.210           979.52
     186.953          2.589      6.202         3.186           969.88
     187.550          2.584      6.211         3.183           968.69
--------------------------------------------------------------------------
 NODE   921.00 : HGL = <  495.624>;EGL= <  496.223>;FLOWLINE= <  493.040>

**************************************************************************
 FLOW PROCESS FROM NODE   921.00 TO NODE   921.00 IS CODE =  5
 UPSTREAM NODE   921.00     ELEVATION =   493.14  (FLOW UNSEALS IN REACH)
--------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
     PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                 (CFS)    (INCHES)  (DEGREES)  ELEVATION  DEPTH(FT.)   (FT/SEC)
   UPSTREAM       40.23      36.00      90.00      493.14       2.07       5.691
  DOWNSTREAM      40.23      36.00          -      493.04       2.07       6.213
  LATERAL #1       0.00       0.00       0.00        0.00       0.00       0.000
  LATERAL #2       0.00       0.00       0.00        0.00       0.00       0.000
     Q5            0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00364
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00336
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00350
 JUNCTION LENGTH =   4.00 FEET
```

```
 FRICTION LOSSES =  0.014 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 1.064)+( 0.000) =   1.064
------------------------------------------------------------------------------
 NODE   921.00 : HGL = <  496.784>;EGL= <  497.287>;FLOWLINE= <  493.140>

******************************************************************************
 FLOW PROCESS FROM NODE   921.00 TO NODE   920.00 IS CODE =  1
 UPSTREAM NODE   920.00     ELEVATION =   493.60  (FLOW IS UNDER PRESSURE)
------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      40.23 CFS     PIPE DIAMETER =  36.00 INCHES
 PIPE LENGTH =       56.30 FEET          MANNING'S N  =  0.01300
 SF=(Q/K)**2 = ((     40.23)/(   667.015))**2 = 0.00364
 HF=L*SF = (     56.30)*(0.00364) =      0.205
------------------------------------------------------------------------------
 NODE   920.00 : HGL = <  496.989>;EGL= <  497.492>;FLOWLINE= <  493.600>

******************************************************************************
 FLOW PROCESS FROM NODE   920.00 TO NODE   920.00 IS CODE =  5
 UPSTREAM NODE   920.00     ELEVATION =   493.70  (FLOW IS UNDER PRESSURE)
------------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                  (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM      40.23     36.00     45.00    493.70      2.07       5.691
   DOWNSTREAM     40.23     36.00       -      493.60      2.07       5.691
   LATERAL #1      0.00      0.00      0.00      0.00      0.00       0.000
   LATERAL #2      0.00      0.00      0.00      0.00      0.00       0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
    Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00364
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00364
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00364
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.015 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.309)+( 0.000) =   0.309
------------------------------------------------------------------------------
 NODE   920.00 : HGL = <  497.298>;EGL= <  497.801>;FLOWLINE= <  493.700>

******************************************************************************
 FLOW PROCESS FROM NODE   920.00 TO NODE   919.00 IS CODE =  1
 UPSTREAM NODE   919.00     ELEVATION =   494.50  (FLOW IS UNDER PRESSURE)
------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      40.23 CFS     PIPE DIAMETER =  36.00 INCHES
 PIPE LENGTH =       97.17 FEET          MANNING'S N  =  0.01300
 SF=(Q/K)**2 = ((     40.23)/(   666.978))**2 = 0.00364
 HF=L*SF = (     97.17)*(0.00364) =      0.354
------------------------------------------------------------------------------
 NODE   919.00 : HGL = <  497.652>;EGL= <  498.155>;FLOWLINE= <  494.500>

******************************************************************************
 FLOW PROCESS FROM NODE   919.00 TO NODE   919.00 IS CODE =  5
 UPSTREAM NODE   919.00     ELEVATION =   494.83  (FLOW IS UNDER PRESSURE)
  (NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)
------------------------------------------------------------------------------
```

```
 CALCULATE JUNCTION LOSSES:
      PIPE          FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                    (CFS)    (INCHES)  (DEGREES)  ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM        40.23      36.00      45.00      494.83       2.07       13.728
   DOWNSTREAM       40.23      36.00        -        494.50       2.07        5.691
   LATERAL #1        0.00       0.00       0.00        0.00       0.00        0.000
   LATERAL #2        0.00       0.00       0.00        0.00       0.00        0.000
      Q5             0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02411
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00364
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01387
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.055 FEET          ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.900)+( 0.000) =   0.900
------------------------------------------------------------------------------
 NODE   919.00 : HGL = <  496.128>;EGL= <  499.055>;FLOWLINE= <  494.830>

******************************************************************************
 FLOW PROCESS FROM NODE   919.00 TO NODE   919.20 IS CODE =  1
 UPSTREAM NODE   919.20     ELEVATION =   496.24  (FLOW IS SUPERCRITICAL)
------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =      40.23 CFS     PIPE DIAMETER =  36.00 INCHES
 PIPE LENGTH =       11.12 FEET          MANNING'S N  =  0.01300
------------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      0.84          CRITICAL DEPTH(FT) =      2.07
==============================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     2.07
==============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
------------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          2.065      7.751          2.999          899.03
         0.020          2.016      7.962          3.001          899.79
         0.082          1.967      8.189          3.009          902.13
         0.193          1.918      8.431          3.022          906.15
         0.358          1.868      8.690          3.042          911.95
         0.586          1.819      8.968          3.069          919.67
         0.885          1.770      9.267          3.104          929.45
         1.267          1.721      9.589          3.149          941.44
         1.745          1.672      9.935          3.205          955.81
         2.335          1.622     10.310          3.274          972.78
         3.056          1.573     10.714          3.357          992.57
         3.932          1.524     11.152          3.456         1015.45
         4.995          1.475     11.628          3.576         1041.71
         6.282          1.426     12.146          3.718         1071.71
         7.843          1.376     12.711          3.887         1105.85
         9.743          1.327     13.330          4.088         1144.60
        11.120          1.298     13.724          4.225         1169.96
------------------------------------------------------------------------------
 NODE   919.20 : HGL = <  498.305>;EGL= <  499.239>;FLOWLINE= <  496.240>

******************************************************************************
 FLOW PROCESS FROM NODE   919.20 TO NODE   919.20 IS CODE =  8
 UPSTREAM NODE   919.20     ELEVATION =   494.56  (FLOW IS AT CRITICAL DEPTH)
```

```
------------------------------------------------------------------------------
  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =      40.23 CFS          PIPE DIAMETER =  36.00 INCHES
  FLOW VELOCITY =   7.75 FEET/SEC.    VELOCITY HEAD =  0.934 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.934) =  0.187
------------------------------------------------------------------------------
  NODE   919.20 : HGL = <  499.425>;EGL= <  499.425>;FLOWLINE= <  494.560>

******************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   919.20            FLOWLINE ELEVATION =   494.56
  ASSUMED UPSTREAM CONTROL HGL =    496.63 FOR DOWNSTREAM RUN ANALYSIS

==============================================================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* J-16630 Construction Change "F" *
* BMRNV East Town Center and Paseo Del Sur Phase 5 Improvements *
* Western inlet storm drain at northern end of Paseo Del Sur (Node 956.2) *
****

FILE NAME: 956W.LAT
TIME/DATE OF STUDY: 09:20 09/23/2014

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
993.50-		1.93*	152.33	0.81 Dc	61.34
	} FRICTION				
956.00-		1.47*	101.28	0.81 Dc	61.34
	} JUNCTION				
956.00-		1.35*	74.09	0.55	29.02
	} FRICTION				
956.20-		1.33*	72.10	0.60 Dc	28.68
	} CATCH BASIN				
956.20-		1.38*	67.70	0.60 Dc	10.28

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 993.50 FLOWLINE ELEVATION = 492.02
PIPE FLOW = 4.50 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 493.950 FEET

NODE 993.50 : HGL = < 493.950>;EGL= < 494.051>;FLOWLINE= < 492.020>

FLOW PROCESS FROM NODE 993.50 TO NODE 956.00 IS CODE = 1
UPSTREAM NODE 956.00 ELEVATION = 492.70 (FLOW SEALS IN REACH)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW = 4.50 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 118.86 FEET MANNING'S N = 0.01300

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 1.93

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.930	2.546	2.031	152.33
110.660	1.500	2.546	1.601	104.91

NORMAL DEPTH(FT) = 0.81 CRITICAL DEPTH(FT) = 0.81

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
110.660	1.500	2.546	1.601	104.91
117.303	1.473	2.556	1.574	101.98

```
      118.860          1.466       2.561          1.568          101.28
------------------------------------------------------------------------------
 NODE   956.00 : HGL = <  494.166>;EGL= <  494.268>;FLOWLINE= <  492.700>

******************************************************************************
 FLOW PROCESS FROM NODE   956.00 TO NODE   956.00 IS CODE =  5
 UPSTREAM NODE   956.00     ELEVATION =   493.03  (FLOW IS SUBCRITICAL)
------------------------------------------------------------------------------
 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                  (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM       2.50     18.00     90.00    493.03       0.60       1.490
   DOWNSTREAM      4.50     18.00         -    492.70       0.81       2.561
   LATERAL #1      2.00     18.00     90.00    493.03       0.53       1.276
   LATERAL #2      0.00      0.00      0.00      0.00       0.00       0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00050
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00163
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00107
 JUNCTION LENGTH =   4.00 FEET
 FRICTION LOSSES =  0.004 FEET         ENTRANCE LOSSES =  0.000 FEET
 JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES = ( 0.150)+( 0.000) =   0.150
------------------------------------------------------------------------------
 NODE   956.00 : HGL = <  494.383>;EGL= <  494.418>;FLOWLINE= <  493.030>

******************************************************************************
 FLOW PROCESS FROM NODE   956.00 TO NODE   956.20 IS CODE =  1
 UPSTREAM NODE   956.20     ELEVATION =   493.05  (FLOW IS SUBCRITICAL)
------------------------------------------------------------------------------
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW    =       2.50 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =        1.75 FEET          MANNING'S N  =  0.01300
------------------------------------------------------------------------------
 NORMAL DEPTH(FT) =      0.48          CRITICAL DEPTH(FT) =      0.60
==============================================================================
 DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.35
==============================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
------------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000         1.353      1.489          1.388            74.09
         1.750         1.334      1.506          1.369            72.10
------------------------------------------------------------------------------
 NODE   956.20 : HGL = <  494.384>;EGL= <  494.419>;FLOWLINE= <  493.050>

******************************************************************************
 FLOW PROCESS FROM NODE   956.20 TO NODE   956.20 IS CODE =  8
 UPSTREAM NODE   956.20     ELEVATION =   493.05  (FLOW IS SUBCRITICAL)
------------------------------------------------------------------------------
 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       2.50 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =   1.51 FEET/SEC.    VELOCITY HEAD =  0.035 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.035) =  0.007
------------------------------------------------------------------------------
 NODE   956.20 : HGL = <  494.426>;EGL= <  494.426>;FLOWLINE= <  493.050>

******************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   956.20          FLOWLINE ELEVATION =   493.05
 ASSUMED UPSTREAM CONTROL HGL =    493.65 FOR DOWNSTREAM RUN ANALYSIS

==============================================================================
 END OF GRADUALLY VARIED FLOW ANALYSIS
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**************************************************************************
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                    Analysis prepared by:

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                       5620 Friars Rd
                    San Diego CA  92110
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 ************************* DESCRIPTION OF STUDY *************************
* J-16630  Construction Change "F"                                      *
* BMRNV East Town Center and Paseo Del Sur Phase 5 Improvements         *
* Eastern inlet storm drain at northern end of Paseo Del Sur (Node 955) *
 ************************************************************************

  FILE NAME: 956E.LAT
  TIME/DATE OF STUDY: 09:31 09/23/2014

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                       NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+          FLOW          PRESSURE+
  NUMBER  PROCESS  HEAD(FT)    MOMENTUM(POUNDS)   DEPTH(FT)    MOMENTUM(POUNDS)
  956.00-                1.35*              71.14        0.45               22.65
       } FRICTION
  955.00-                1.05*              43.97        0.53 Dc            21.55
       } CATCH BASIN
  955.00-                1.08*              39.50        0.53 Dc             7.78
--------------------------------------------------------------------------
  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25
--------------------------------------------------------------------------
  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   956.00          FLOWLINE ELEVATION =   493.03
  PIPE FLOW =       2.00 CFS      PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   494.380 FEET
--------------------------------------------------------------------------
  NODE   956.00 : HGL = <  494.380>;EGL= <  494.402>;FLOWLINE= <  493.030>

**************************************************************************
  FLOW PROCESS FROM NODE   956.00 TO NODE   955.00 IS CODE =  1
  UPSTREAM NODE   955.00     ELEVATION =   493.33  (FLOW IS SUBCRITICAL)
--------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW    =      2.00 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =      29.75 FEET          MANNING'S N  =  0.01300
--------------------------------------------------------------------------
  NORMAL DEPTH(FT) =      0.44          CRITICAL DEPTH(FT) =      0.53
==========================================================================
  DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      1.35
==========================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC      PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)   ENERGY(FT)   MOMENTUM(POUNDS)
          0.000         1.350       1.194        1.372             71.14
          3.262         1.317       1.216        1.340             67.84
          6.514         1.285       1.241        1.309             64.62
          9.757         1.252       1.269        1.277             61.48
         12.991         1.219       1.300        1.246             58.42
         16.215         1.187       1.333        1.214             55.46
         19.427         1.154       1.371        1.183             52.58
         22.629         1.121       1.411        1.152             49.81
         25.817         1.089       1.455        1.122             47.14
         28.991         1.056       1.504        1.091             44.57
         29.750         1.048       1.516        1.084             43.97
--------------------------------------------------------------------------
  NODE   955.00 : HGL = <  494.378>;EGL= <  494.414>;FLOWLINE= <  493.330>

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

```
 FLOW PROCESS FROM NODE   955.00 TO NODE   955.00 IS CODE =  8
 UPSTREAM NODE   955.00     ELEVATION =   493.34  (FLOW IS SUBCRITICAL)
----------------------------------------------------------------------------
 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       2.00 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =   1.52 FEET/SEC.    VELOCITY HEAD =  0.036 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.036) =  0.007
----------------------------------------------------------------------------
 NODE   955.00 : HGL = <  494.421>;EGL= <  494.421>;FLOWLINE= <  493.340>

****************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   955.00           FLOWLINE ELEVATION =   493.34
 ASSUMED UPSTREAM CONTROL HGL =   493.87 FOR DOWNSTREAM RUN ANALYSIS

============================================================================
 END OF GRADUALLY VARIED FLOW ANALYSIS
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Appendix H

Inlet Design Calculations

BMR BASIN 9A INLET SIZING

****
CAPACITY OF TYPE B INLETS ON A GRADE
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****

NODE 910.3

DISCHARGE = 1.1 CFS
STREET CROSS SLOPE = .02 FT/FT
STREET SLOPE = .03 FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB = .2 FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)^3/2 = 4.1 FT
LENGTH OF INLET OPENING = 4.0 FT
LENGTH OF INLET TO BE USED = 5.0 FT

****
CAPACITY OF TYPE B INLETS ON A GRADE
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NODE 914

DISCHARGE = .75 CFS
STREET CROSS SLOPE = .02 FT/FT
STREET SLOPE = .03 FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB = .17 FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)^3/2 = 3 FT
LENGTH OF INLET OPENING = 4 FT
LENGTH OF INLET TO BE USED = 5 FT

****
CAPACITY OF TYPE B INLETS IN A SUMP
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****

NODE 956.2

DISCHARGE = 2.5 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART 1-103.6C (Q/L=1.5) = 1.7 FT
LENGTH OF INLET OPENING USED = 4 FT
LENGTH OF INLET TO BE USED = 5 FT

```
**********************************************************************
                    CAPACITY OF TYPE B INLETS ON A GRADE
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**********************************************************************
 NODE 956.2 (Check for depth of flow)

      DISCHARGE =  2.5  CFS
      STREET CROSS SLOPE =  .02  FT/FT
      STREET SLOPE =  .03  FT/FT
      COMPUTED DEPTH OF FLOW AT THE CURB =  .25  FT
      LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
      USING THE FOLLOWING EQUATION Q=0.7L(A+Y)^3/2 =  8  FT
      LENGTH OF INLET OPENING =  8  FT
      LENGTH OF INLET TO BE USED =  9  FT

   **********************************************************************
            CAPACITY OF TYPE B INLETS IN A SUMP
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   **********************************************************************

   NODE 955

   DISCHARGE = 2 CFS
   LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
   USING CHART 1-103.6C (Q/L=1.5) = 1.3 FT
   LENGTH OF INLET OPENING USED = 4 FT
   LENGTH OF INLET TO BE USED = 5 FT

   **********************************************************************
            CAPACITY OF TYPE B INLETS ON A GRADE
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   **********************************************************************

   NODE 955 (Check for depth of flow)

   DISCHARGE = 2 CFS
   STREET CROSS SLOPE = .02 FT/FT
   STREET SLOPE = .03 FT/FT
   COMPUTED DEPTH OF FLOW AT THE CURB = .24 FT
   LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
   USING THE FOLLOWING EQUATION Q=0.7L(A+Y)^3/2 = 6.7 FT
   LENGTH OF INLET OPENING = 7.7 FT
   LENGTH OF INLET TO BE USED = 8.7 FT

   **********************************************************************
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   **********************************************************************
   NODE 990

   DISCHARGE = 1.75 CFS
   LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
   USING CHART 1-103.6C (Q/L=1.5) = 1.2 FT
   LENGTH OF INLET OPENING USED = 4 FT
   LENGTH OF INLET TO BE USED = 5 FT
```

```
**************************************************************************
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**************************************************************************
NODE 990  (check for depth of flow)

DISCHARGE =  1.75  CFS
STREET CROSS SLOPE =  .02  FT/FT
STREET SLOPE =  .03  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB =  .23  FT
~~LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW~~
~~USING THE FOLLOWING EQUATION Q=0.7L(A+Y)^3/2 =  6  FT~~
~~LENGTH OF INLET OPENING =  6  FT~~
~~LENGTH OF INLET TO BE USED =  7  FT~~


**************************************************************************
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**************************************************************************
NODE 904.3


DISCHARGE =  3.4  CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART 1-103.6C (Q/L=1.5) =  2.3  FT
LENGTH OF INLET OPENING USED =  4  FT
LENGTH OF INLET TO BE USED =  5  FT

**************************************************************************
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**************************************************************************
NODE 904.3 (Check for depth of flow)


DISCHARGE =  3.4  CFS
STREET CROSS SLOPE =  .02  FT/FT
STREET SLOPE =  .02  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB =  .3  FT
~~LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW~~
~~USING THE FOLLOWING EQUATION Q=0.7L(A+Y)^3/2 =  9.8  FT~~
~~LENGTH OF INLET OPENING =  4  FT~~
~~LENGTH OF INLET TO BE USED =  5  FT~~
~~DISCHARGE INTERCEPTED BY INLET =  1.6  CFS~~
~~BYPASS =  1.8  CFS~~
```

****

CAPACITY OF TYPE B INLETS IN A SUMP
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****

NODE 904.5

DISCHARGE = 1.1 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART 1-103.6C (Q/L=1.5) = .7 FT
LENGTH OF INLET OPENING USED = 4 FT
LENGTH OF INLET TO BE USED = 5 FT

****

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****

NODE 904.5 (Check for depth of flow)

DISCHARGE = 1.1 CFS
STREET CROSS SLOPE = .02 FT/FT
STREET SLOPE = .02 FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB = .21 FT
~~LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW~~
~~USING THE FOLLOWING EQUATION Q=0.7L(A+Y)^3/2 = 4 FT~~
~~LENGTH OF INLET OPENING = 4 FT~~
~~LENGTH OF INLET TO BE USED = 5 FT~~

BMR BASIN 700

****

CAPACITY OF TYPE B INLETS ON A GRADE
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****

NODE 730.3

DISCHARGE = 1.43 CFS
STREET CROSS SLOPE = .02 FT/FT
STREET SLOPE = .0524 FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB = .2 FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)^3/2 = 5.3 FT
LENGTH OF INLET OPENING = 5.5 FT
LENGTH OF INLET TO BE USED = 6.5 FT

Appendix L

Detention Basin Calculations

BASIN 900 (BASINS 9A, 9B) - FINAL ENGINEERED BASINS

6-HOUR STORM EVENT			
2-YR PRECIP	10-YR PRECIP	25-YR PRECIP	100-YR PRECIP
1.4	2.0	2.3	2.8

Drainage Area	Area (Ac)
Existing Conditon Area[1]	47.6
Proposed Conditon Area[2]	47.7

Drainage Basin 900 A		
Drainage Area	Area (Ac)	Percentage of Proposed
On-Site Area - Node 919	11.9	N/A
Paseo Del Sur (PDS) Area - Node 956	1.3	N/A
Perimeter Area - Node 919	0.1	N/A
Total	13.3	0.28

Drainage Basin 900		
9B Area (Node 904.7)	14.2	0.30
Middle School	20.2	0.42

Existing Condition	
Storm Event	Entire Basin 900 $Q_{Existing}$ (CFS)
2	32.0
10	46.6
25	55.6
100	65.1

Basin 9A (Designed as part of J-15009H - Construction Change 'E')								
Storm Event	$Q_{Existing}$ (9A Portion Pro-Rated) (CFS)	$Q_{ultimate}$ On-site Area (at Node 919) (CFS)	$Q_{ultimate}$ PDS Area (at Node 956) (CFS)	$Q_{ultimate}$ Perimeter Area (at Node 991) (CFS)	$Q_{ultimate}$ On-Site & PDS & Perimeter (at Node 991) (CFS)	Basin 9A Detention Volume (Ac-Ft)[3]	$Q_{Detained}$ On-site Area (at Node 919) (CFS)[4]	$Q_{Detained}$ On-Site & PDS & Perimeter (at Node 991) (CFS)[4]
2	8.9	21.2	2.3	0.2	23.8	0.492	6.4	8.6
10	13.0	29.9	3.3	0.2	33.2	0.692	9.3	12.0
25	15.5	34.9	3.8	0.3	38.8	0.793	11.1	14.4
100	18.2	40.2	4.4	0.3	45.0	N/A	N/A	N/A

Notes:
1. Measured from Node 920 on Basin 900 Existing Condition Map.
2. The proposed area is determined by summing the total area within Drainage Basin 900.
3. A HEC-1 computer program was used to determine the detention volume requirements for each basin.
4. $Q_{Detained}$ is the flow leaving the drainage basin following detention. Refer to the detained Modified Rational Method within Appendix A of this report.

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DETENTION BASIN 9A

EMERGENCY OVERFLOW

Q_{100} = 40.2 cfs (OUTLET FLOW FROM 9A NODE 919)

H_{avail} ≈ 1'4" - Top of outlet structure will be 1'4" taller than Storm Treep BASIN 9A VAULT TOP

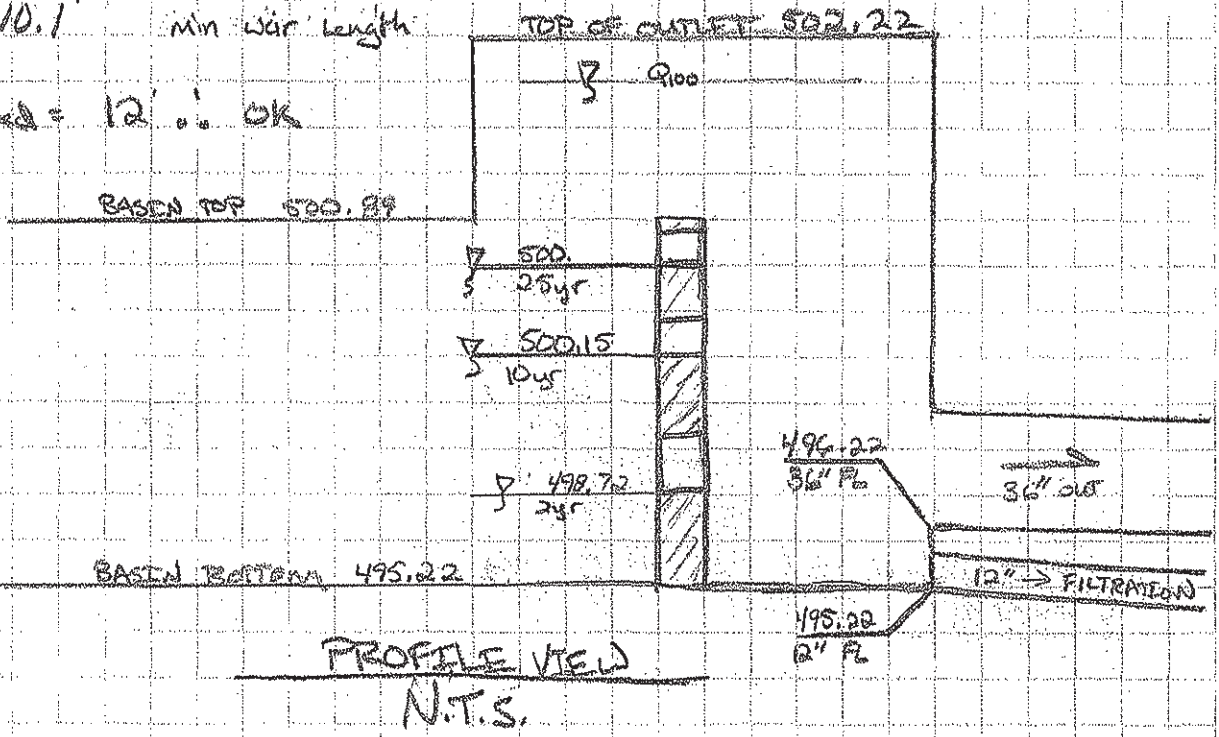
$C = 2.6$

$Q = CLH^{3/2}$

$L = \frac{Q}{CH^{3/2}} \Rightarrow \frac{40.2}{(2.6)(1.33)^{3/2}} = 10.1'$

$L_{required}$ = 10.1' min weir length

$L_{provided}$ = 12' ∴ OK



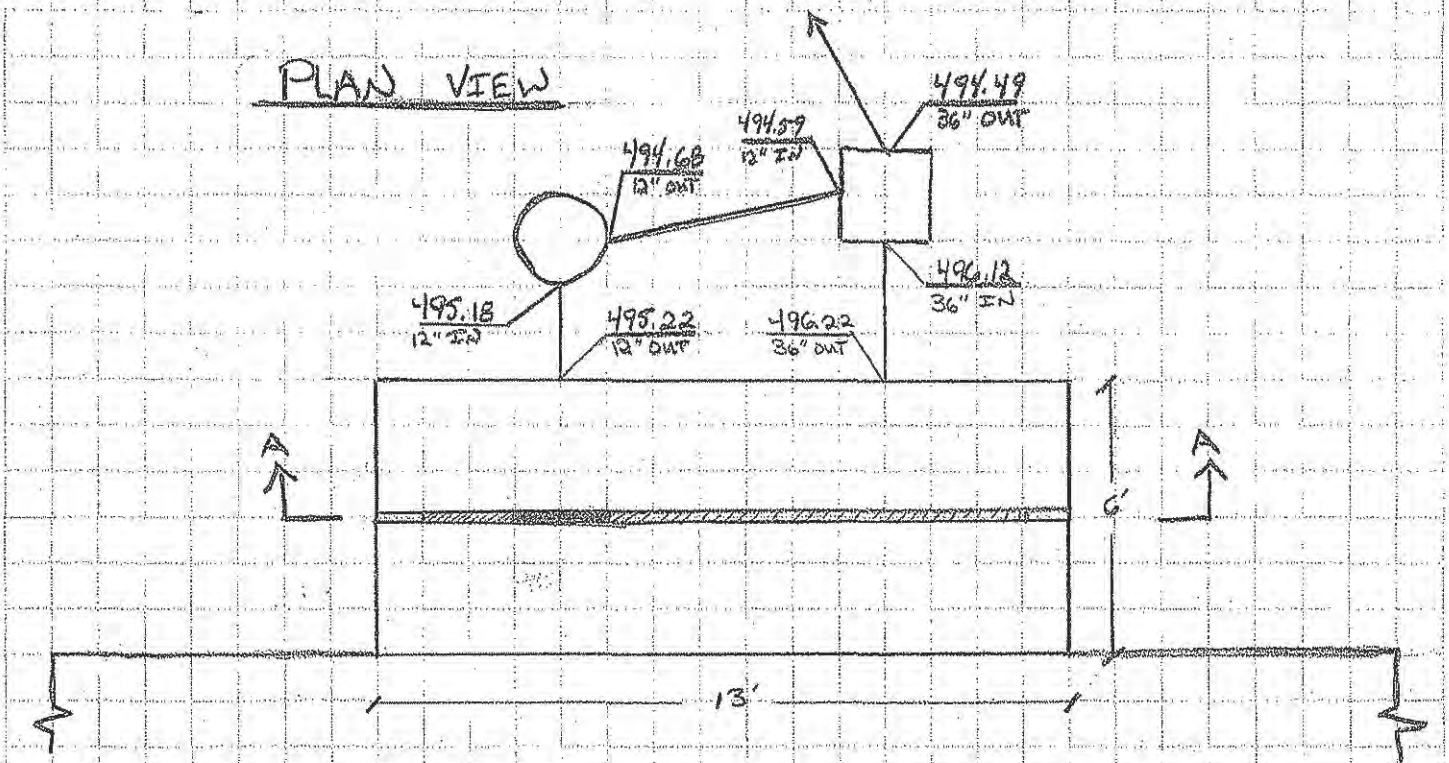
PROFILE VIEW
N.T.S.

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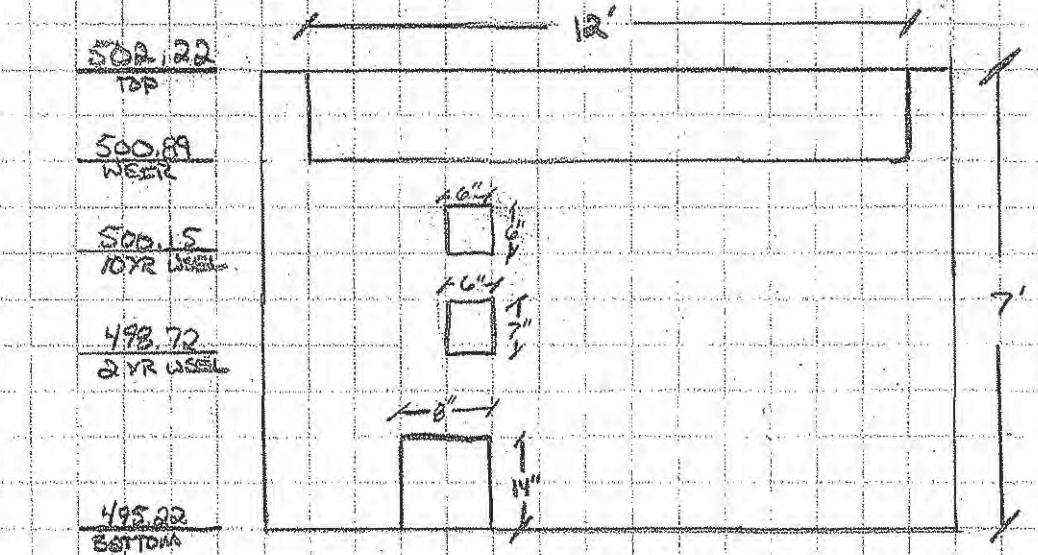
Date 7-2-14
Job No. 16630
Page
Done By JVR
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BMR DETENTION 9A OUTLET WORKS

PLAN VIEW



SECTION VIEW

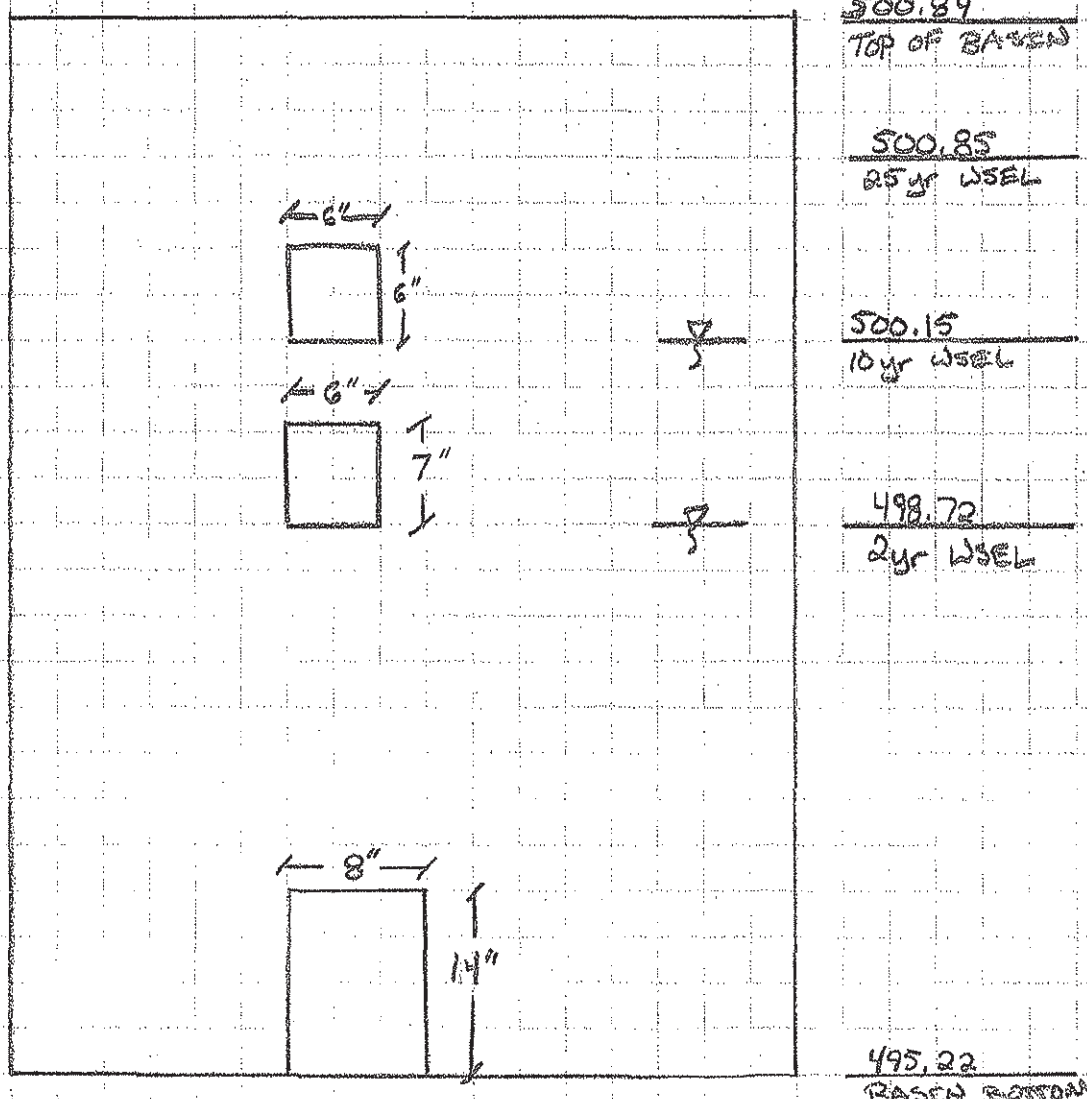


SECTION A-A
N.T.S.

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DETENTION 9A OUTLETS



N.T.S.

2- Year Outlet

Enter information in yellow boxes. All other information is self-generated.

	feet	
Height of Height of Opening, Hd (ft.):	1.17	14"
Width of Opening, L (ft.):	0.67	8"
Invert of Opening	495.22	
Basin Floor Elevation, Z (ft):	495.22	
Step Increments for Elevation (ft):	0.2	

		Weir			Q_{weir} =	Orifice			$Q_{orifice}$ =	Controlling	Flow Type
Water Surface Elevation, E	Elevations of Interest	C	L	h	$CL(H)^{1.5}$	C	A	H	$CA(2gH)^{0.5}$	Discharge, Qout	
495.22	WQ Flowline	2.6	0.667	0.0	0.00	0.6	0.00	0.0	0.00	0.00	weir flow
495.42		2.6	0.667	0.2	0.16	0.6	0.13	0.1	0.20	0.16	weir flow
495.62		2.6	0.667	0.4	0.44	0.6	0.27	0.2	0.57	0.44	weir flow
495.82		2.6	0.667	0.6	0.81	0.6	0.40	0.3	1.05	0.81	weir flow
496.02		2.6	0.667	0.8	1.24	0.6	0.53	0.4	1.62	1.24	weir flow
496.22		2.6	0.667	1.0	1.73	0.6	0.67	0.5	2.27	1.73	weir flow
496.42		2.6	0.667	1.2	2.28	0.6	0.78	0.6	2.94	2.28	weir flow
496.62		2.6	0.667	1.4	2.87	0.6	0.78	0.8	3.38	2.87	weir flow
496.82		2.6	0.667	1.6	3.51	0.6	0.78	1.0	3.78	3.51	weir flow
497.02		2.6	0.667	1.8	4.19	0.6	0.78	1.2	4.13	4.13	orifice flow
497.22		2.6	0.667	2.0	4.90	0.6	0.78	1.4	4.46	4.46	orifice flow
497.42		2.6	0.667	2.2	5.66	0.6	0.78	1.6	4.76	4.76	orifice flow
497.62		2.6	0.667	2.4	6.44	0.6	0.78	1.8	5.05	5.05	orifice flow
497.82		2.6	0.667	2.6	7.27	0.6	0.78	2.0	5.32	5.32	orifice flow
498.02		2.6	0.667	2.8	8.12	0.6	0.78	2.2	5.58	5.58	orifice flow
498.22		2.6	0.667	3.0	9.01	0.6	0.78	2.4	5.82	5.82	orifice flow
498.42		2.6	0.667	3.2	9.92	0.6	0.78	2.6	6.06	6.06	orifice flow
498.72		2.6	0.667	3.5	11.35	0.6	0.78	2.9	6.40	6.40	orifice flow
498.82		2.6	0.667	3.6	11.84	0.6	0.78	3.0	6.50	6.50	orifice flow
499.02		2.6	0.667	3.8	12.84	0.6	0.78	3.2	6.72	6.72	orifice flow
499.22		2.6	0.667	4.0	13.87	0.6	0.78	3.4	6.92	6.92	orifice flow
499.42		2.6	0.667	4.2	14.92	0.6	0.78	3.6	7.12	7.12	orifice flow
499.62		2.6	0.667	4.4	16.00	0.6	0.78	3.8	7.32	7.32	orifice flow
499.82		2.6	0.667	4.6	17.10	0.6	0.78	4.0	7.51	7.51	orifice flow
500.02		2.6	0.667	4.8	18.23	0.6	0.78	4.2	7.69	7.69	orifice flow
500.15		2.6	0.667	4.9	18.97	0.6	0.78	4.3	7.81	7.81	orifice flow
500.42		2.6	0.667	5.2	20.55	0.6	0.78	4.6	8.05	8.05	orifice flow
500.62		2.6	0.667	5.4	21.75	0.6	0.78	4.8	8.22	8.22	orifice flow
500.85		2.6	0.667	5.6	23.15	0.6	0.78	5.0	8.41	8.41	orifice flow
500.89		2.6	0.667	5.7	23.40	0.6	0.78	5.1	8.45	8.45	orifice flow

10 -Yr Outlet

Enter information in yellow boxes. All other information is self-generated.

	feet	
Height of Height of Opening, Hd (ft.):	0.58	7"
Width of Opening, L (ft.):	0.50	6"
Invert of Opening	498.72	
Basin Floor Elevation, Z (ft):	495.22	
Step Increments for Elevation (ft):	0.2	

		Weir			Q_{weir} =	Orifice			$Q_{orifice}$ =	Controlling	Flow Type
Water Surface Elevation, E	Elevations of Interest	C	L	h	$CL(H)^{1.5}$	C	A	H	$CA(2gH)^{0.5}$	Discharge, Qout	
495.22											
495.42											
495.62											
495.82											
496.02											
496.22											
496.42											
496.62											
496.82											
497.02											
497.22											
497.42											
497.62											
497.82											
498.02											
498.22											
498.42											
498.72		1.6	0.500	0.0	0.00	0.6	0.00	0.0	0.00	0.00	weir flow
498.82		2.6	0.500	0.1	0.04	0.6	0.05	0.1	0.05	0.04	weir flow
499.02		2.6	0.500	0.3	0.21	0.6	0.15	0.1	0.28	0.21	weir flow
499.22		2.6	0.500	0.5	0.46	0.6	0.25	0.2	0.60	0.46	weir flow
499.42		2.6	0.500	0.7	0.76	0.6	0.29	0.4	0.90	0.76	weir flow
499.62		2.6	0.500	0.9	1.11	0.6	0.29	0.6	1.10	1.10	orifice flow
499.82		2.6	0.500	1.1	1.50	0.6	0.29	0.8	1.26	1.26	orifice flow
500.02		2.6	0.500	1.3	1.93	0.6	0.29	1.0	1.41	1.41	orifice flow
500.15		2.6	0.500	1.4	2.22	0.6	0.29	1.1	1.50	1.50	orifice flow
500.42		2.6	0.500	1.7	2.88	0.6	0.29	1.4	1.67	1.67	orifice flow
500.62		2.6	0.500	1.9	3.40	0.6	0.29	1.6	1.78	1.78	orifice flow
500.85		2.6	0.500	2.1	4.04	0.6	0.29	1.8	1.90	1.90	orifice flow
500.89		2.6	0.500	2.2	4.16	0.6	0.29	1.9	1.92	1.92	orifice flow

25-Yr Outlet

Enter information in yellow boxes. All other information is self-generated.

	feet	
Height of Height of Opening, Hd (ft.):	0.5	6"
Width of Opening, L (ft.):	0.5	6"
Invert of Opening	500.15	
Basin Floor Elevation, Z (ft):	495.22	
Step Increments for Elevation (ft):	0.2	

		Weir			Q_{weir} =	Orifice			$Q_{orifice}$ =	Controlling	Flow Type
Water Surface Elevation, E	Elevations of Interest	C	L	h	$CL(H)^{1.5}$	C	A	H	$CA(2gH)^{0.5}$	Discharge, Qout	
495.22											
495.42											
495.62											
495.82											
496.02											
496.22											
496.42											
496.62											
496.82											
497.02											
497.22											
497.42											
497.62											
497.82											
498.02											
498.22											
498.42											
498.72											
498.82											
499.02											
499.22											
499.42											
499.62											
499.82											
500.02											
500.15		2.6	0.500	0.0	0.00	0.6	0.00	0.0	0.00	0.00	weir flow
500.42		2.6	0.500	0.3	0.18	0.6	0.14	0.1	0.24	0.18	weir flow
500.62		2.6	0.500	0.5	0.42	0.6	0.24	0.2	0.55	0.42	weir flow
500.85		2.6	0.500	0.7	0.76	0.6	0.25	0.5	0.81	0.76	weir flow
500.89		2.6	0.500	0.7	0.83	0.6	0.25	0.5	0.84	0.83	weir flow

TOTAL COMBINED:

This Combines the flows from the Water Quality Outlet, the 2- and 10-yr Outlet, and the 25-Yr Outlet. This is the total, detained Qout at each WSEL.

WATER SURFACE ELEVATION (WSEL, ft)	Point of Interest	TOTAL DISCHARGE (Qout, cfs)
495.22		0.00
495.42		0.16
495.62		0.44
495.82		0.81
496.02		1.24
496.22		1.73
496.42		2.28
496.62		2.87
496.82		3.51
497.02		4.13
497.22		4.46
497.42		4.76
497.62		5.05
497.82		5.32
498.02		5.58
498.22		5.82
498.42		6.06
498.72		6.40
498.82		6.55
499.02		6.93
499.22		7.38
499.42		7.88
499.62		8.41
499.82		8.77
500.02		9.10
500.15		9.31
500.42		9.90
500.62		10.42
500.85		11.08
500.89		11.20

2-YEAR


```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998              *
*          VERSION 4.1               *
*                                    *
*  RUN DATE   02JUL14  TIME  12:24:43  *
*                                    *
**************************************
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**************************************
*                                    *
*   U.S. ARMY CORPS OF ENGINEERS     *
*   HYDROLOGIC ENGINEERING CENTER    *
*        609 SECOND STREET           *
*     DAVIS, CALIFORNIA 95616        *
*          (916) 756-1104            *
*                                    *
**************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE;GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                        *DIAGRAM
*** FREE ***
               1        ID   BMR NVE UNIT 14
               2        ID   UNDERGROUND DETENTION BASIN 9A
               3        ID   15009_H
               4        IT       1 01JAN90    1200     800
               5        IO       5        0

               6        KK   9A_02
               7        KM   RATIONAL METHOD HYDROGRAPH PROGRAM
               8        KM   COPYRIGHT 1992, RICK ENGINEERING COMPANY
               9        KM   6HR RAINFALL IS  1.4  INCHES
              10        KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  .9
              11        KM   RATIONAL METHOD TIME OF CONCENTRATION IS  10  MIN.
              12        KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
              13        KM   IT 2 01JAN90 1200 200
              14        BA   .0186
              15        IN      10 01JAN90    1155
              16        QI       0        0       .9       .9        1        1      1.1      1.1      1.2      1.3
              17        QI     1.4      1.5      1.6      1.8        2      2.3      2.7      3.4        5    21.22
              18        QI    11.1        4        3      2.4      2.1      1.9      1.7      1.5      1.4      1.3
              19        QI     1.2      1.2      1.1      1.1        1        1       .9       .9        0        0
              20        QI       0        0        0        0        0        0        0        0

              21        KK   DETAIN
              22        KO       2        2        0        0       21
              23        RS       1     STOR       -1
              24        SV       0    0.068    0.135    0.203    0.271    0.338    0.406    0.474    0.541    0.609
              25        SE  495.22   495.72   496.22   496.72   497.22   497.72   498.22   498.72   499.22   499.72
              26        SQ       0     0.16     0.81     1.73     2.87     4.13     4.76     5.32     5.82     6.29
              27        SQ    6.72     7.12     7.51
              28        SE  495.22   495.42   495.82   496.22   496.62   497.02   497.42   497.82   498.22   498.62
              29        SE  499.02   499.42   499.82
              30        ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

   6       9A_02
             V
             V
  21       DETAIN

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998              *
*          VERSION 4.1               *
*                                    *
*  RUN DATE   02JUL14  TIME  12:24:43  *
*                                    *
**************************************
```

```
**************************************
*                                    *
*   U.S. ARMY CORPS OF ENGINEERS     *
*   HYDROLOGIC ENGINEERING CENTER    *
*        609 SECOND STREET           *
*     DAVIS, CALIFORNIA 95616        *
*          (916) 756-1104            *
*                                    *
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BMR NVE UNIT 14
UNDERGROUND DETENTION BASIN 9A
15009_H

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 5 IO          OUTPUT CONTROL VARIABLES
                    IPRNT         5  PRINT CONTROL
                    IPLOT         0  PLOT CONTROL
                    QSCAL        0.  HYDROGRAPH PLOT SCALE

   IT           HYDROGRAPH TIME DATA
                    NMIN          1  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1JAN90  STARTING DATE
                   ITIME        1200  STARTING TIME
                      NQ         800  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE      2JAN90  ENDING DATE
                  NDTIME        0119  ENDING TIME
                   ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL      .02 HOURS
                   TOTAL TIME BASE    13.32 HOURS

         ENGLISH UNITS
              DRAINAGE AREA        SQUARE MILES
              PRECIPITATION DEPTH  INCHES
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LENGTH, ELEVATION	FEET	
FLOW	CUBIC FEET PER SECOND	
STORAGE VOLUME	ACRE-FEET	
SURFACE AREA	ACRES	
TEMPERATURE	DEGREES FAHRENHEIT	

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21 KK      ***************
           *             *
           *    DETAIN   *
           *             *
           ***************

22 KO          OUTPUT CONTROL VARIABLES
                     IPRNT         2  PRINT CONTROL
                     IPLOT         2  PLOT CONTROL
                     QSCAL        0.  HYDROGRAPH PLOT SCALE
                     IPNCH         0  PUNCH COMPUTED HYDROGRAPH
                      IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2       800  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT      .017  TIME INTERVAL IN HOURS

               HYDROGRAPH ROUTING DATA

23 RS          STORAGE ROUTING
                     NSTPS         1  NUMBER OF SUBREACHES
                      ITYP      STOR  TYPE OF INITIAL CONDITION
                    RSVRIC     -1.00  INITIAL CONDITION
                         X       .00  WORKING R AND D COEFFICIENT

24 SV            STORAGE          .0        .1        .1        .2        .3        .3        .4        .5        .7        .8

25 SE            ELEVATION     495.22    495.72    496.22    496.72    497.22    497.72    498.22    498.72    499.22    499.72

26 SQ            DISCHARGE         0.        0.        1.        2.        3.        4.        5.        5.        6.        6.
                                  7.        7.        8.

28 SE            ELEVATION     495.22    495.42    495.82    496.22    496.62    497.02    497.42    497.82    498.22    498.62
                               499.02    499.42    499.82
                                                                 ***

                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                 STORAGE          .00       .03       .07       .08       .14       .19       .20       .24       .27       .30
                 OUTFLOW          .00       .16       .65       .81      1.73      2.87      3.19      4.13      4.45      4.76
               ELEVATION       495.22    495.42    495.72    495.82    496.22    496.62    496.72    497.02    497.22    497.42

                 STORAGE          .34       .35       .41       .46       .47       .51       .54       .57       .61       .62
                 OUTFLOW         5.18      5.32      5.82      6.29      6.40      6.72      6.92      7.12      7.41      7.51
               ELEVATION       497.72    497.82    498.22    498.62    498.72    499.02    499.22    499.42    499.72    499.82
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HYDROGRAPH AT STATION DETAIN

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	JAN	1200	1	0.	.0	495.2	1	JAN	1627	268	4.	.2	496.9	1	JAN	2054	535	0.	.0	495.4
1	JAN	1201	2	0.	.0	495.2	1	JAN	1628	269	4.	.2	496.8	1	JAN	2055	536	0.	.0	495.4
1	JAN	1202	3	0.	.0	495.2	1	JAN	1629	270	4.	.2	496.8	1	JAN	2056	537	0.	.0	495.4
1	JAN	1203	4	0.	.0	495.2	1	JAN	1630	271	3.	.2	496.8	1	JAN	2057	538	0.	.0	495.4
1	JAN	1204	5	0.	.0	495.2	1	JAN	1631	272	3.	.2	496.8	1	JAN	2058	539	0.	.0	495.3
1	JAN	1205	6	0.	.0	495.2	1	JAN	1632	273	3.	.2	496.8	1	JAN	2059	540	0.	.0	495.3
1	JAN	1206	7	0.	.0	495.2	1	JAN	1633	274	3.	.2	496.7	1	JAN	2100	541	0.	.0	495.3
1	JAN	1207	8	0.	.0	495.2	1	JAN	1634	275	3.	.2	496.7	1	JAN	2101	542	0.	.0	495.3
1	JAN	1208	9	0.	.0	495.2	1	JAN	1635	276	3.	.2	496.7	1	JAN	2102	543	0.	.0	495.3
1	JAN	1209	10	0.	.0	495.2	1	JAN	1636	277	3.	.2	496.7	1	JAN	2103	544	0.	.0	495.3
1	JAN	1210	11	0.	.0	495.2	1	JAN	1637	278	3.	.2	496.7	1	JAN	2104	545	0.	.0	495.3
1	JAN	1211	12	0.	.0	495.2	1	JAN	1638	279	3.	.2	496.7	1	JAN	2105	546	0.	.0	495.3
1	JAN	1212	13	0.	.0	495.2	1	JAN	1639	280	3.	.2	496.6	1	JAN	2106	547	0.	.0	495.3
1	JAN	1213	14	0.	.0	495.2	1	JAN	1640	281	3.	.2	496.6	1	JAN	2107	548	0.	.0	495.3
1	JAN	1214	15	0.	.0	495.3	1	JAN	1641	282	3.	.2	496.6	1	JAN	2108	549	0.	.0	495.3
1	JAN	1215	16	0.	.0	495.3	1	JAN	1642	283	3.	.2	496.6	1	JAN	2109	550	0.	.0	495.3
1	JAN	1216	17	0.	.0	495.3	1	JAN	1643	284	3.	.2	496.6	1	JAN	2110	551	0.	.0	495.3
1	JAN	1217	18	0.	.0	495.3	1	JAN	1644	285	3.	.2	496.6	1	JAN	2111	552	0.	.0	495.3
1	JAN	1218	19	0.	.0	495.3	1	JAN	1645	286	3.	.2	496.6	1	JAN	2112	553	0.	.0	495.3
1	JAN	1219	20	0.	.0	495.3	1	JAN	1646	287	3.	.2	496.5	1	JAN	2113	554	0.	.0	495.3
1	JAN	1220	21	0.	.0	495.3	1	JAN	1647	288	3.	.2	496.5	1	JAN	2114	555	0.	.0	495.3
1	JAN	1221	22	0.	.0	495.3	1	JAN	1648	289	3.	.2	496.5	1	JAN	2115	556	0.	.0	495.3
1	JAN	1222	23	0.	.0	495.3	1	JAN	1649	290	3.	.2	496.5	1	JAN	2116	557	0.	.0	495.3
1	JAN	1223	24	0.	.0	495.3	1	JAN	1650	291	2.	.2	496.5	1	JAN	2117	558	0.	.0	495.3
1	JAN	1224	25	0.	.0	495.3	1	JAN	1651	292	2.	.2	496.5	1	JAN	2118	559	0.	.0	495.3
1	JAN	1225	26	0.	.0	495.3	1	JAN	1652	293	2.	.2	496.5	1	JAN	2119	560	0.	.0	495.3
1	JAN	1226	27	0.	.0	495.4	1	JAN	1653	294	2.	.2	496.4	1	JAN	2120	561	0.	.0	495.3
1	JAN	1227	28	0.	.0	495.4	1	JAN	1654	295	2.	.2	496.4	1	JAN	2121	562	0.	.0	495.3
1	JAN	1228	29	0.	.0	495.4	1	JAN	1655	296	2.	.2	496.4	1	JAN	2122	563	0.	.0	495.3
1	JAN	1229	30	0.	.0	495.4	1	JAN	1656	297	2.	.2	496.4	1	JAN	2123	564	0.	.0	495.3
1	JAN	1230	31	0.	.0	495.4	1	JAN	1657	298	2.	.2	496.4	1	JAN	2124	565	0.	.0	495.3
1	JAN	1231	32	0.	.0	495.4	1	JAN	1658	299	2.	.2	496.4	1	JAN	2125	566	0.	.0	495.3
1	JAN	1232	33	0.	.0	495.4	1	JAN	1659	300	2.	.2	496.4	1	JAN	2126	567	0.	.0	495.3
1	JAN	1233	34	0.	.0	495.4	1	JAN	1700	301	2.	.2	496.4	1	JAN	2127	568	0.	.0	495.3
1	JAN	1234	35	0.	.0	495.4	1	JAN	1701	302	2.	.2	496.4	1	JAN	2128	569	0.	.0	495.3
1	JAN	1235	36	0.	.0	495.4	1	JAN	1702	303	2.	.2	496.4	1	JAN	2129	570	0.	.0	495.3
1	JAN	1236	37	0.	.0	495.4	1	JAN	1703	304	2.	.2	496.3	1	JAN	2130	571	0.	.0	495.3
1	JAN	1237	38	0.	.0	495.4	1	JAN	1704	305	2.	.2	496.3	1	JAN	2131	572	0.	.0	495.3
1	JAN	1238	39	0.	.0	495.5	1	JAN	1705	306	2.	.1	496.3	1	JAN	2132	573	0.	.0	495.3
1	JAN	1239	40	0.	.0	495.5	1	JAN	1706	307	2.	.1	496.3	1	JAN	2133	574	0.	.0	495.3
1	JAN	1240	41	0.	.0	495.5	1	JAN	1707	308	2.	.1	496.3	1	JAN	2134	575	0.	.0	495.3
1	JAN	1241	42	0.	.0	495.5	1	JAN	1708	309	2.	.1	496.3	1	JAN	2135	576	0.	.0	495.3
1	JAN	1242	43	0.	.0	495.5	1	JAN	1709	310	2.	.1	496.3	1	JAN	2136	577	0.	.0	495.3
1	JAN	1243	44	0.	.0	495.5	1	JAN	1710	311	2.	.1	496.3	1	JAN	2137	578	0.	.0	495.3
1	JAN	1244	45	0.	.0	495.5	1	JAN	1711	312	2.	.1	496.3	1	JAN	2138	579	0.	.0	495.3
1	JAN	1245	46	0.	.0	495.5	1	JAN	1712	313	2.	.1	496.3	1	JAN	2139	580	0.	.0	495.3
1	JAN	1246	47	0.	.0	495.5	1	JAN	1713	314	2.	.1	496.3	1	JAN	2140	581	0.	.0	495.3
1	JAN	1247	48	0.	.0	495.5	1	JAN	1714	315	2.	.1	496.3	1	JAN	2141	582	0.	.0	495.3
1	JAN	1248	49	0.	.0	495.5	1	JAN	1715	316	2.	.1	496.2	1	JAN	2142	583	0.	.0	495.3
1	JAN	1249	50	0.	.0	495.5	1	JAN	1716	317	2.	.1	496.2	1	JAN	2143	584	0.	.0	495.3
1	JAN	1250	51	0.	.0	495.5	1	JAN	1717	318	2.	.1	496.2	1	JAN	2144	585	0.	.0	495.3
1	JAN	1251	52	0.	.0	495.5	1	JAN	1718	319	2.	.1	496.2	1	JAN	2145	586	0.	.0	495.3
1	JAN	1252	53	0.	.0	495.6	1	JAN	1719	320	2.	.1	496.2	1	JAN	2146	587	0.	.0	495.3
1	JAN	1253	54	0.	.0	495.6	1	JAN	1720	321	2.	.1	496.2	1	JAN	2147	588	0.	.0	495.3

1	JAN	1254	55	0.	.0	495.6	*	1	JAN	1721	322	2.	.1	496.2	*	1	JAN	2148	589	0.	.0	495.3
1	JAN	1255	56	0.	.0	495.6	*	1	JAN	1722	323	2.	.1	496.2	*	1	JAN	2149	590	0.	.0	495.3
1	JAN	1256	57	0.	.0	495.6	*	1	JAN	1723	324	2.	.1	496.2	*	1	JAN	2150	591	0.	.0	495.3
1	JAN	1257	58	0.	.1	495.6	*	1	JAN	1724	325	2.	.1	496.2	*	1	JAN	2151	592	0.	.0	495.3
1	JAN	1258	59	0.	.1	495.6	*	1	JAN	1725	326	2.	.1	496.2	*	1	JAN	2152	593	0.	.0	495.3
1	JAN	1259	60	0.	.1	495.6	*	1	JAN	1726	327	2.	.1	496.2	*	1	JAN	2153	594	0.	.0	495.3
1	JAN	1300	61	0.	.1	495.6	*	1	JAN	1727	328	2.	.1	496.2	*	1	JAN	2154	595	0.	.0	495.3
1	JAN	1301	62	0.	.1	495.6	*	1	JAN	1728	329	2.	.1	496.2	*	1	JAN	2155	596	0.	.0	495.3
1	JAN	1302	63	0.	.1	495.6	*	1	JAN	1729	330	2.	.1	496.2	*	1	JAN	2156	597	0.	.0	495.3
1	JAN	1303	64	1.	.1	495.6	*	1	JAN	1730	331	2.	.1	496.2	*	1	JAN	2157	598	0.	.0	495.3
1	JAN	1304	65	1.	.1	495.6	*	1	JAN	1731	332	2.	.1	496.2	*	1	JAN	2158	599	0.	.0	495.3
1	JAN	1305	66	1.	.1	495.6	*	1	JAN	1732	333	2.	.1	496.1	*	1	JAN	2159	600	0.	.0	495.3
1	JAN	1306	67	1.	.1	495.6	*	1	JAN	1733	334	2.	.1	496.1	*	1	JAN	2200	601	0.	.0	495.3
1	JAN	1307	68	1.	.1	495.7	*	1	JAN	1734	335	2.	.1	496.1	*	1	JAN	2201	602	0.	.0	495.3
1	JAN	1308	69	1.	.1	495.7	*	1	JAN	1735	336	2.	.1	496.1	*	1	JAN	2202	603	0.	.0	495.3
1	JAN	1309	70	1.	.1	495.7	*	1	JAN	1736	337	2.	.1	496.1	*	1	JAN	2203	604	0.	.0	495.3
1	JAN	1310	71	1.	.1	495.7	*	1	JAN	1737	338	2.	.1	496.1	*	1	JAN	2204	605	0.	.0	495.3
1	JAN	1311	72	1.	.1	495.7	*	1	JAN	1738	339	1.	.1	496.1	*	1	JAN	2205	606	0.	.0	495.3
1	JAN	1312	73	1.	.1	495.7	*	1	JAN	1739	340	1.	.1	496.1	*	1	JAN	2206	607	0.	.0	495.3
1	JAN	1313	74	1.	.1	495.7	*	1	JAN	1740	341	1.	.1	496.1	*	1	JAN	2207	608	0.	.0	495.3
1	JAN	1314	75	1.	.1	495.7	*	1	JAN	1741	342	1.	.1	496.1	*	1	JAN	2208	609	0.	.0	495.3
1	JAN	1315	76	1.	.1	495.7	*	1	JAN	1742	343	1.	.1	496.1	*	1	JAN	2209	610	0.	.0	495.3
1	JAN	1316	77	1.	.1	495.7	*	1	JAN	1743	344	1.	.1	496.1	*	1	JAN	2210	611	0.	.0	495.3
1	JAN	1317	78	1.	.1	495.7	*	1	JAN	1744	345	1.	.1	496.1	*	1	JAN	2211	612	0.	.0	495.3
1	JAN	1318	79	1.	.1	495.7	*	1	JAN	1745	346	1.	.1	496.1	*	1	JAN	2212	613	0.	.0	495.3
1	JAN	1319	80	1.	.1	495.7	*	1	JAN	1746	347	1.	.1	496.1	*	1	JAN	2213	614	0.	.0	495.3
1	JAN	1320	81	1.	.1	495.7	*	1	JAN	1747	348	1.	.1	496.1	*	1	JAN	2214	615	0.	.0	495.3
1	JAN	1321	82	1.	.1	495.7	*	1	JAN	1748	349	1.	.1	496.1	*	1	JAN	2215	616	0.	.0	495.3
1	JAN	1322	83	1.	.1	495.7	*	1	JAN	1749	350	1.	.1	496.1	*	1	JAN	2216	617	0.	.0	495.3
1	JAN	1323	84	1.	.1	495.7	*	1	JAN	1750	351	1.	.1	496.1	*	1	JAN	2217	618	0.	.0	495.3
1	JAN	1324	85	1.	.1	495.8	*	1	JAN	1751	352	1.	.1	496.1	*	1	JAN	2218	619	0.	.0	495.3
1	JAN	1325	86	1.	.1	495.8	*	1	JAN	1752	353	1.	.1	496.1	*	1	JAN	2219	620	0.	.0	495.3
1	JAN	1326	87	1.	.1	495.8	*	1	JAN	1753	354	1.	.1	496.0	*	1	JAN	2220	621	0.	.0	495.3
1	JAN	1327	88	1.	.1	495.8	*	1	JAN	1754	355	1.	.1	496.0	*	1	JAN	2221	622	0.	.0	495.3
1	JAN	1328	89	1.	.1	495.8	*	1	JAN	1755	356	1.	.1	496.0	*	1	JAN	2222	623	0.	.0	495.3
1	JAN	1329	90	1.	.1	495.8	*	1	JAN	1756	357	1.	.1	496.0	*	1	JAN	2223	624	0.	.0	495.3
1	JAN	1330	91	1.	.1	495.8	*	1	JAN	1757	358	1.	.1	496.0	*	1	JAN	2224	625	0.	.0	495.3
1	JAN	1331	92	1.	.1	495.8	*	1	JAN	1758	359	1.	.1	496.0	*	1	JAN	2225	626	0.	.0	495.3
1	JAN	1332	93	1.	.1	495.8	*	1	JAN	1759	360	1.	.1	496.0	*	1	JAN	2226	627	0.	.0	495.3
1	JAN	1333	94	1.	.1	495.8	*	1	JAN	1800	361	1.	.1	496.0	*	1	JAN	2227	628	0.	.0	495.3
1	JAN	1334	95	1.	.1	495.8	*	1	JAN	1801	362	1.	.1	496.0	*	1	JAN	2228	629	0.	.0	495.3
1	JAN	1335	96	1.	.1	495.8	*	1	JAN	1802	363	1.	.1	496.0	*	1	JAN	2229	630	0.	.0	495.3
1	JAN	1336	97	1.	.1	495.8	*	1	JAN	1803	364	1.	.1	496.0	*	1	JAN	2230	631	0.	.0	495.3
1	JAN	1337	98	1.	.1	495.8	*	1	JAN	1804	365	1.	.1	496.0	*	1	JAN	2231	632	0.	.0	495.3
1	JAN	1338	99	1.	.1	495.8	*	1	JAN	1805	366	1.	.1	496.0	*	1	JAN	2232	633	0.	.0	495.3
1	JAN	1339	100	1.	.1	495.8	*	1	JAN	1806	367	1.	.1	496.0	*	1	JAN	2233	634	0.	.0	495.3
1	JAN	1340	101	1.	.1	495.9	*	1	JAN	1807	368	1.	.1	496.0	*	1	JAN	2234	635	0.	.0	495.3
1	JAN	1341	102	1.	.1	495.9	*	1	JAN	1808	369	1.	.1	496.0	*	1	JAN	2235	636	0.	.0	495.3
1	JAN	1342	103	1.	.1	495.9	*	1	JAN	1809	370	1.	.1	496.0	*	1	JAN	2236	637	0.	.0	495.3
1	JAN	1343	104	1.	.1	495.9	*	1	JAN	1810	371	1.	.1	496.0	*	1	JAN	2237	638	0.	.0	495.3
1	JAN	1344	105	1.	.1	495.9	*	1	JAN	1811	372	1.	.1	496.0	*	1	JAN	2238	639	0.	.0	495.3
1	JAN	1345	106	1.	.1	495.9	*	1	JAN	1812	373	1.	.1	496.0	*	1	JAN	2239	640	0.	.0	495.3
1	JAN	1346	107	1.	.1	495.9	*	1	JAN	1813	374	1.	.1	495.9	*	1	JAN	2240	641	0.	.0	495.3
1	JAN	1347	108	1.	.1	495.9	*	1	JAN	1814	375	1.	.1	495.9	*	1	JAN	2241	642	0.	.0	495.3
1	JAN	1348	109	1.	.1	495.9	*	1	JAN	1815	376	1.	.1	495.9	*	1	JAN	2242	643	0.	.0	495.3
1	JAN	1349	110	1.	.1	495.9	*	1	JAN	1816	377	1.	.1	495.9	*	1	JAN	2243	644	0.	.0	495.3
1	JAN	1350	111	1.	.1	495.9	*	1	JAN	1817	378	1.	.1	495.9	*	1	JAN	2244	645	0.	.0	495.3
1	JAN	1351	112	1.	.1	495.9	*	1	JAN	1818	379	1.	.1	495.9	*	1	JAN	2245	646	0.	.0	495.3
1	JAN	1352	113	1.	.2	495.9	*	1	JAN	1819	380	1.	.1	495.9	*	1	JAN	2246	647	0.	.0	495.3
1	JAN	1353	114	1.	.1	495.9	*	1	JAN	1820	381	1.	.1	495.9	*	1	JAN	2247	648	0.	.0	495.3
1	JAN	1354	115	1.	.1	495.9	*	1	JAN	1821	382	1.	.1	495.9	*	1	JAN	2248	649	0.	.0	495.3
1	JAN	1355	116	1.	.1	495.9	*	1	JAN	1822	383	1.	.1	495.9	*	1	JAN	2249	650	0.	.0	495.3
1	JAN	1356	117	1.	.1	495.9	*	1	JAN	1823	384	1.	.1	495.8	*	1	JAN	2250	651	0.	.0	495.3
1	JAN	1357	118	1.	.1	495.9	*	1	JAN	1824	385	1.	.1	495.8	*	1	JAN	2251	652	0.	.0	495.3
1	JAN	1358	119	1.	.1	496.0	*	1	JAN	1825	386	1.	.1	495.8	*	1	JAN	2252	653	0.	.0	495.3
1	JAN	1359	120	1.	.1	496.0	*	1	JAN	1826	387	1.	.1	495.8	*	1	JAN	2253	654	0.	.0	495.3
1	JAN	1400	121	1.	.1	496.0	*	1	JAN	1827	388	1.	.1	495.8	*	1	JAN	2254	655	0.	.0	495.3
1	JAN	1401	122	1.	.1	496.0	*	1	JAN	1828	389	1.	.1	495.8	*	1	JAN	2255	656	0.	.0	495.3
1	JAN	1402	123	1.	.1	496.0	*	1	JAN	1829	390	1.	.1	495.8	*	1	JAN	2256	657	0.	.0	495.3
1	JAN	1403	124	1.	.1	496.0	*	1	JAN	1830	391	1.	.1	495.8	*	1	JAN	2257	658	0.	.0	495.3
1	JAN	1404	125	1.	.1	496.0	*	1	JAN	1831	392	1.	.1	495.8	*	1	JAN	2258	659	0.	.0	495.3
1	JAN	1405	126	1.	.1	496.0	*	1	JAN	1832	393	1.	.1	495.8	*	1	JAN	2259	660	0.	.0	495.3
1	JAN	1406	127	1.	.1	496.0	*	1	JAN	1833	394	1.	.1	495.8	*	1	JAN	2300	661	0.	.0	495.3
1	JAN	1407	128	1.	.1	496.0	*	1	JAN	1834	395	1.	.1	495.8	*	1	JAN	2301	662	0.	.0	495.3
1	JAN	1408	129	1.	.1	496.0	*	1	JAN	1835	396	1.	.1	495.8	*	1	JAN	2302	663	0.	.0	495.3
1	JAN	1409	130	1.	.1	496.0	*	1	JAN	1836	397	1.	.1	495.7	*	1	JAN	2303	664	0.	.0	495.3
1	JAN	1410	131	1.	.1	496.0	*	1	JAN	1837	398	1.	.1	495.7	*	1	JAN	2304	665	0.	.0	495.3
1	JAN	1411	132	1.	.1	496.0	*	1	JAN	1838	399	1.	.1	495.7	*	1	JAN	2305	666	0.	.0	495.3
1	JAN	1412	133	1.	.1	496.0	*	1	JAN	1839	400	1.	.1	495.7	*	1	JAN	2306	667	0.	.0	495.3
1	JAN	1413	134	1.	.1	496.0	*	1	JAN	1840	401	1.	.1	495.7	*	1	JAN	2307	668	0.	.0	495.3
1	JAN	1414	135	1.	.1	496.0	*	1	JAN	1841	402	1.	.1	495.7	*	1	JAN	2308	669	0.	.0	495.3
1	JAN	1415	136	1.	.1	496.1	*	1	JAN	1842	403	1.	.1	495.7	*	1	JAN	2309	670	0.	.0	495.3
1	JAN	1416	137	1.	.1	496.1	*	1	JAN	1843	404	1.	.1	495.7	*	1	JAN	2310	671	0.	.0	495.3
1	JAN	1417	138	1.	.1	496.1	*	1	JAN	1844	405	1.	.1	495.7	*	1	JAN	2311	672	0.	.0	495.3
1	JAN	1418	139	1.	.1	496.1	*	1	JAN	1845	406	1.	.1	495.7	*	1	JAN	2312	673	0.	.0	495.3
1	JAN	1419	140	1.	.1	496.1	*	1	JAN	1846	407	1.	.1	495.7	*	1	JAN	2313	674	0.	.0	495.3
1	JAN	1420	141	1.	.1	496.1	*	1	JAN	1847	408	1.	.1	495.7	*	1	JAN	2314	675	0.	.0	495.3
1	JAN	1421	142	1.	.1	496.1	*	1	JAN	1848	409	1.	.1	495.7	*	1	JAN	2315	676	0.	.0	495.3
1	JAN	1422	143	1.	.1	496.1	*	1	JAN	1849	410	1.	.1	495.7	*	1	JAN	2316	677	0.	.0	495.3
1	JAN	1423	144	1.	.1	496.1	*	1	JAN	1850	411	1.	.1	495.7	*	1	JAN	2317	678	0.	.0	495.3
1	JAN	1424	145	2.	.1	496.1	*	1	JAN	1851	412	1.	.1	495.7	*	1	JAN	2318	679	0.	.0	495.3
1	JAN	1425	146	2.	.1	496.1	*	1	JAN	1852	413	1.	.1	495.6	*	1	JAN	2319	680	0.	.0	495.3
1	JAN	1426	147	2.	.1	496.1	*	1	JAN	1853	414	1.	.1	495.6	*	1	JAN	2320	681	0.	.0	495.3
1	JAN	1427	148	2.	.1	496.1	*	1	JAN	1854	415	1.	.1	495.6	*	1	JAN	2321	682	0.	.0	495.3
1	JAN	1428	149	2.	.1	496.2	*	1	JAN	1855	416	1.	.1	495.6	*	1	JAN	2322	683	0.	.0	495.3
1	JAN	1429	150	2.	.1	496.2	*	1	JAN	1856	417	0.	.1	495.6	*	1	JAN	2323	684	0.	.0	495.3
1	JAN	1430	151	2.	.1	496.2	*	1	JAN	1857	418	0.	.1	495.6	*	1	JAN	2324	685	0.	.0	495.3
1	JAN	1431	152	2.	.1	496.2	*	1	JAN	1858	419	0.	.1	495.6	*	1	JAN	2325	686	0.	.0	495.3
1	JAN	1432	153	2.	.1	496.2	*	1	JAN	1859	420	0.	.1	495.6	*	1	JAN	2326	687	0.	.0	495.3
1	JAN	1433	154	2.	.1	496.2	*	1	JAN	1900	421	0.	.1	495.6	*	1	JAN	2327	688	0.	.0	495.3
1	JAN	1434	155	2.	.1	496.2	*	1	JAN	1901	422	0.	.1	495.6	*	1	JAN	2328	689	0.	.0	495.3
1	JAN	1435	156	2.	.1	496.2	*	1	JAN	1902	423	0.	.1	495.6	*	1	JAN	2329	690	0.	.0	495.3
1	JAN	1436	157	2.	.1	496.2	*	1	JAN	1903	424	0.	.1	495.6	*	1	JAN	2330	691	0.	.0	495.3
1	JAN	1437	158	2.	.1	496.2	*	1	JAN	1904	425	0.	.1	495.6	*	1	JAN	2331	692	0.	.0	495.3
1	JAN	1438	159	2.	.1	496.3	*	1	JAN	1905	426	0.	.0	495.6	*	1	JAN	2332	693	0.	.0	495.3
1	JAN	1439	160	2.	.1	496.3	*	1	JAN	1906	427	0.	.0	495.6	*	1	JAN	2333	694	0.	.0	495.3
1	JAN	1440	161	2.	.1	496.3	*	1	JAN	1907	428	0.	.0	495.6	*	1	JAN	2334	695	0.	.0	495.3
1	JAN	1441	162	2.	.1	496.3	*	1	JAN	1908	429	0.	.0	495.6	*	1	JAN	2335	696	0.	.0	495.3
1	JAN	1442	163	2.	.1	496.3	*	1	JAN	1909	430	0.	.0	495.6	*	1	JAN	2336	697	0.	.0	495.3
1	JAN	1443	164	2.	.1	496.3	*	1	JAN	1910	431	0.	.0	495.6	*	1	JAN	2337	698	0.	.0	495.3
1	JAN	1444	165	2.	.1	496.3	*	1	JAN	1911	432	0.	.0	495.6	*	1	JAN	2338	699	0.	.0	495.3
1	JAN	1445	166	2.	.2	496.3	*	1	JAN	1912	433	0.	.0	495.6	*	1	JAN	2339	700	0.	.0	495.3
1	JAN	1446	167	2.	.2	496.4	*	1	JAN	1913	434	0.	.0	495.6	*	1	JAN	2340	701	0.	.0	495.3
1	JAN	1447	168	2.	.2	496.4	*	1	JAN	1914	435	0.	.0	495.5	*	1	JAN	2341	702	0.	.0	495.3
1	JAN	1448	169	2.	.2	496.4	*	1	JAN	1915	436	0.	.0	495.5	*	1	JAN	2342	703	0.	.0	495.3
1	JAN	1449	170	2.	.2	496.4	*	1	JAN	1916	437	0.	.0	495.5	*	1	JAN	2343	704	0.	.0	495.3
1	JAN	1450	171	2.	.2	496.4	*	1	JAN	1917	438	0.	.0	495.5	*	1	JAN	2344	705	0.	.0	495.3
1	JAN	1451	172	2.	.2	496.4	*	1	JAN	1918	439	0.	.0	495.5	*	1	JAN	2345	706	0.	.0	495.3
1	JAN	1452	173	2.	.2	496.5	*	1	JAN	1919	440	0.	.0	495.5	*	1	JAN	2346	707	0.	.0	495.3
1	JAN	1453	174	2.	.2	496.5	*	1	JAN	1920	441	0.	.0	495.5	*	1	JAN	2347	708	0.	.0	495.3
1	JAN	1454	175	3.	.2	496.5	*	1	JAN	1921	442	0.	.0	495.5	*	1	JAN	2348	709	0.	.0	495.3
1	JAN	1455	176	3.	.2	496.5	*	1	JAN	1922	443	0.	.0	495.5	*	1	JAN	2349	710	0.	.0	495.3
1	JAN	1456	177	3.	.2	496.6	*	1	JAN	1923	444	0.	.0	495.5	*	1	JAN	2350	711	0.	.0	495.3

1	JAN	1457	178	3.	.2	496.6	*	1	JAN	1924	445	0.	.0	495.5	*	1	JAN	2351	712	0.	.0	495.3
1	JAN	1458	179	3.	.2	496.7	*	1	JAN	1925	446	0.	.0	495.5	*	1	JAN	2352	713	0.	.0	495.3
1	JAN	1459	180	3.	.2	496.7	*	1	JAN	1926	447	0.	.0	495.5	*	1	JAN	2353	714	0.	.0	495.3
1	JAN	1500	181	4.	.2	496.8	*	1	JAN	1927	448	0.	.0	495.5	*	1	JAN	2354	715	0.	.0	495.3
1	JAN	1501	182	4.	.2	496.9	*	1	JAN	1928	449	0.	.0	495.5	*	1	JAN	2355	716	0.	.0	495.3
1	JAN	1502	183	4.	.2	497.1	*	1	JAN	1929	450	0.	.0	495.5	*	1	JAN	2356	717	0.	.0	495.3
1	JAN	1503	184	4.	.3	497.2	*	1	JAN	1930	451	0.	.0	495.5	*	1	JAN	2357	718	0.	.0	495.3
1	JAN	1504	185	5.	.3	497.3	*	1	JAN	1931	452	0.	.0	495.5	*	1	JAN	2358	719	0.	.0	495.3
1	JAN	1505	186	5.	.3	497.5	*	1	JAN	1932	453	0.	.0	495.5	*	1	JAN	2359	720	0.	.0	495.2
1	JAN	1506	187	5.	.3	497.7	*	1	JAN	1933	454	0.	.0	495.5	*	2	JAN	0000	721	0.	.0	495.2
1	JAN	1507	188	5.	.3	497.8	*	1	JAN	1934	455	0.	.0	495.5	*	2	JAN	0001	722	0.	.0	495.2
1	JAN	1508	189	5.	.4	497.9	*	1	JAN	1935	456	0.	.0	495.5	*	2	JAN	0002	723	0.	.0	495.2
1	JAN	1509	190	6.	.4	498.1	*	1	JAN	1936	457	0.	.0	495.5	*	2	JAN	0003	724	0.	.0	495.2
1	JAN	1510	191	6.	.4	498.2	*	1	JAN	1937	458	0.	.0	495.5	*	2	JAN	0004	725	0.	.0	495.2
1	JAN	1511	192	6.	.4	498.3	*	1	JAN	1938	459	0.	.0	495.5	*	2	JAN	0005	726	0.	.0	495.2
1	JAN	1512	193	6.	.4	498.4	*	1	JAN	1939	460	0.	.0	495.5	*	2	JAN	0006	727	0.	.0	495.2
1	JAN	1513	194	6.	.4	498.4	*	1	JAN	1940	461	0.	.0	495.5	*	2	JAN	0007	728	0.	.0	495.2
1	JAN	1514	195	6.	.4	498.5	*	1	JAN	1941	462	0.	.0	495.5	*	2	JAN	0008	729	0.	.0	495.2
1	JAN	1515	196	6.	.5	498.6	*	1	JAN	1942	463	0.	.0	495.5	*	2	JAN	0009	730	0.	.0	495.2
1	JAN	1516	197	6.	.5	498.6	*	1	JAN	1943	464	0.	.0	495.5	*	2	JAN	0010	731	0.	.0	495.2
1	JAN	1517	198	6.	.5	498.6	*	1	JAN	1944	465	0.	.0	495.5	*	2	JAN	0011	732	0.	.0	495.2
1	JAN	1518	199	6.	.5	498.7	*	1	JAN	1945	466	0.	.0	495.5	*	2	JAN	0012	733	0.	.0	495.2
1	JAN	1519	200	6.	.5	498.7	*	1	JAN	1946	467	0.	.0	495.5	*	2	JAN	0013	734	0.	.0	495.2
1	JAN	1520	201	6.	.5	498.7	*	1	JAN	1947	468	0.	.0	495.5	*	2	JAN	0014	735	0.	.0	495.2
1	JAN	1521	202	6.	.5	498.7	*	1	JAN	1948	469	0.	.0	495.5	*	2	JAN	0015	736	0.	.0	495.2
1	JAN	1522	203	6.	.5	498.7	*	1	JAN	1949	470	0.	.0	495.4	*	2	JAN	0016	737	0.	.0	495.2
1	JAN	1523	204	6.	.5	498.7	*	1	JAN	1950	471	0.	.0	495.4	*	2	JAN	0017	738	0.	.0	495.2
1	JAN	1524	205	6.	.5	498.7	*	1	JAN	1951	472	0.	.0	495.4	*	2	JAN	0018	739	0.	.0	495.2
1	JAN	1525	206	6.	.5	498.7	*	1	JAN	1952	473	0.	.0	495.4	*	2	JAN	0019	740	0.	.0	495.2
1	JAN	1526	207	6.	.5	498.7	*	1	JAN	1953	474	0.	.0	495.4	*	2	JAN	0020	741	0.	.0	495.2
1	JAN	1527	208	6.	.5	498.6	*	1	JAN	1954	475	0.	.0	495.4	*	2	JAN	0021	742	0.	.0	495.2
1	JAN	1528	209	6.	.5	498.6	*	1	JAN	1955	476	0.	.0	495.4	*	2	JAN	0022	743	0.	.0	495.2
1	JAN	1529	210	6.	.5	498.6	*	1	JAN	1956	477	0.	.0	495.4	*	2	JAN	0023	744	0.	.0	495.2
1	JAN	1530	211	6.	.5	498.6	*	1	JAN	1957	478	0.	.0	495.4	*	2	JAN	0024	745	0.	.0	495.2
1	JAN	1531	212	6.	.4	498.5	*	1	JAN	1958	479	0.	.0	495.4	*	2	JAN	0025	746	0.	.0	495.2
1	JAN	1532	213	6.	.4	498.5	*	1	JAN	1959	480	0.	.0	495.4	*	2	JAN	0026	747	0.	.0	495.2
1	JAN	1533	214	6.	.4	498.5	*	1	JAN	2000	481	0.	.0	495.4	*	2	JAN	0027	748	0.	.0	495.2
1	JAN	1534	215	6.	.4	498.4	*	1	JAN	2001	482	0.	.0	495.4	*	2	JAN	0028	749	0.	.0	495.2
1	JAN	1535	216	6.	.4	498.4	*	1	JAN	2002	483	0.	.0	495.4	*	2	JAN	0029	750	0.	.0	495.2
1	JAN	1536	217	6.	.4	498.4	*	1	JAN	2003	484	0.	.0	495.4	*	2	JAN	0030	751	0.	.0	495.2
1	JAN	1537	218	6.	.4	498.3	*	1	JAN	2004	485	0.	.0	495.4	*	2	JAN	0031	752	0.	.0	495.2
1	JAN	1538	219	6.	.4	498.3	*	1	JAN	2005	486	0.	.0	495.4	*	2	JAN	0032	753	0.	.0	495.2
1	JAN	1539	220	6.	.4	498.3	*	1	JAN	2006	487	0.	.0	495.4	*	2	JAN	0033	754	0.	.0	495.2
1	JAN	1540	221	6.	.4	498.2	*	1	JAN	2007	488	0.	.0	495.4	*	2	JAN	0034	755	0.	.0	495.2
1	JAN	1541	222	6.	.4	498.2	*	1	JAN	2008	489	0.	.0	495.4	*	2	JAN	0035	756	0.	.0	495.2
1	JAN	1542	223	6.	.4	498.2	*	1	JAN	2009	490	0.	.0	495.4	*	2	JAN	0036	757	0.	.0	495.2
1	JAN	1543	224	6.	.4	498.2	*	1	JAN	2010	491	0.	.0	495.4	*	2	JAN	0037	758	0.	.0	495.2
1	JAN	1544	225	6.	.4	498.1	*	1	JAN	2011	492	0.	.0	495.4	*	2	JAN	0038	759	0.	.0	495.2
1	JAN	1545	226	6.	.4	498.1	*	1	JAN	2012	493	0.	.0	495.4	*	2	JAN	0039	760	0.	.0	495.2
1	JAN	1546	227	6.	.4	498.1	*	1	JAN	2013	494	0.	.0	495.4	*	2	JAN	0040	761	0.	.0	495.2
1	JAN	1547	228	6.	.4	498.0	*	1	JAN	2014	495	0.	.0	495.4	*	2	JAN	0041	762	0.	.0	495.2
1	JAN	1548	229	6.	.4	498.0	*	1	JAN	2015	496	0.	.0	495.4	*	2	JAN	0042	763	0.	.0	495.2
1	JAN	1549	230	5.	.4	498.0	*	1	JAN	2016	497	0.	.0	495.4	*	2	JAN	0043	764	0.	.0	495.2
1	JAN	1550	231	5.	.4	497.9	*	1	JAN	2017	498	0.	.0	495.4	*	2	JAN	0044	765	0.	.0	495.2
1	JAN	1551	232	5.	.4	497.9	*	1	JAN	2018	499	0.	.0	495.4	*	2	JAN	0045	766	0.	.0	495.2
1	JAN	1552	233	5.	.4	497.9	*	1	JAN	2019	500	0.	.0	495.4	*	2	JAN	0046	767	0.	.0	495.2
1	JAN	1553	234	5.	.4	497.8	*	1	JAN	2020	501	0.	.0	495.4	*	2	JAN	0047	768	0.	.0	495.2
1	JAN	1554	235	5.	.3	497.8	*	1	JAN	2021	502	0.	.0	495.4	*	2	JAN	0048	769	0.	.0	495.2
1	JAN	1555	236	5.	.3	497.8	*	1	JAN	2022	503	0.	.0	495.4	*	2	JAN	0049	770	0.	.0	495.2
1	JAN	1556	237	5.	.3	497.7	*	1	JAN	2023	504	0.	.0	495.4	*	2	JAN	0050	771	0.	.0	495.2
1	JAN	1557	238	5.	.3	497.7	*	1	JAN	2024	505	0.	.0	495.4	*	2	JAN	0051	772	0.	.0	495.2
1	JAN	1558	239	5.	.3	497.7	*	1	JAN	2025	506	0.	.0	495.4	*	2	JAN	0052	773	0.	.0	495.2
1	JAN	1559	240	5.	.3	497.6	*	1	JAN	2026	507	0.	.0	495.4	*	2	JAN	0053	774	0.	.0	495.2
1	JAN	1600	241	5.	.3	497.6	*	1	JAN	2027	508	0.	.0	495.4	*	2	JAN	0054	775	0.	.0	495.2
1	JAN	1601	242	5.	.3	497.6	*	1	JAN	2028	509	0.	.0	495.4	*	2	JAN	0055	776	0.	.0	495.2
1	JAN	1602	243	5.	.3	497.5	*	1	JAN	2029	510	0.	.0	495.4	*	2	JAN	0056	777	0.	.0	495.2
1	JAN	1603	244	5.	.3	497.5	*	1	JAN	2030	511	0.	.0	495.4	*	2	JAN	0057	778	0.	.0	495.2
1	JAN	1604	245	5.	.3	497.5	*	1	JAN	2031	512	0.	.0	495.4	*	2	JAN	0058	779	0.	.0	495.2
1	JAN	1605	246	5.	.3	497.5	*	1	JAN	2032	513	0.	.0	495.4	*	2	JAN	0059	780	0.	.0	495.2
1	JAN	1606	247	5.	.3	497.4	*	1	JAN	2033	514	0.	.0	495.4	*	2	JAN	0100	781	0.	.0	495.2
1	JAN	1607	248	5.	.3	497.4	*	1	JAN	2034	515	0.	.0	495.4	*	2	JAN	0101	782	0.	.0	495.2
1	JAN	1608	249	5.	.3	497.4	*	1	JAN	2035	516	0.	.0	495.4	*	2	JAN	0102	783	0.	.0	495.2
1	JAN	1609	250	5.	.3	497.3	*	1	JAN	2036	517	0.	.0	495.4	*	2	JAN	0103	784	0.	.0	495.2
1	JAN	1610	251	5.	.3	497.3	*	1	JAN	2037	518	0.	.0	495.4	*	2	JAN	0104	785	0.	.0	495.2
1	JAN	1611	252	5.	.3	497.3	*	1	JAN	2038	519	0.	.0	495.4	*	2	JAN	0105	786	0.	.0	495.2
1	JAN	1612	253	4.	.3	497.2	*	1	JAN	2039	520	0.	.0	495.4	*	2	JAN	0106	787	0.	.0	495.2
1	JAN	1613	254	4.	.3	497.2	*	1	JAN	2040	521	0.	.0	495.4	*	2	JAN	0107	788	0.	.0	495.2
1	JAN	1614	255	4.	.3	497.2	*	1	JAN	2041	522	0.	.0	495.4	*	2	JAN	0108	789	0.	.0	495.2
1	JAN	1615	256	4.	.3	497.2	*	1	JAN	2042	523	0.	.0	495.4	*	2	JAN	0109	790	0.	.0	495.2
1	JAN	1616	257	4.	.3	497.1	*	1	JAN	2043	524	0.	.0	495.4	*	2	JAN	0110	791	0.	.0	495.2
1	JAN	1617	258	4.	.3	497.1	*	1	JAN	2044	525	0.	.0	495.4	*	2	JAN	0111	792	0.	.0	495.2
1	JAN	1618	259	4.	.3	497.1	*	1	JAN	2045	526	0.	.0	495.4	*	2	JAN	0112	793	0.	.0	495.2
1	JAN	1619	260	4.	.2	497.1	*	1	JAN	2046	527	0.	.0	495.4	*	2	JAN	0113	794	0.	.0	495.2
1	JAN	1620	261	4.	.2	497.0	*	1	JAN	2047	528	0.	.0	495.4	*	2	JAN	0114	795	0.	.0	495.2
1	JAN	1621	262	4.	.2	497.0	*	1	JAN	2048	529	0.	.0	495.4	*	2	JAN	0115	796	0.	.0	495.2
1	JAN	1622	263	4.	.2	497.0	*	1	JAN	2049	530	0.	.0	495.4	*	2	JAN	0116	797	0.	.0	495.2
1	JAN	1623	264	4.	.2	497.0	*	1	JAN	2050	531	0.	.0	495.4	*	2	JAN	0117	798	0.	.0	495.2
1	JAN	1624	265	4.	.2	496.9	*	1	JAN	2051	532	0.	.0	495.4	*	2	JAN	0118	799	0.	.0	495.2
1	JAN	1625	266	4.	.2	496.9	*	1	JAN	2052	533	0.	.0	495.4	*	2	JAN	0119	800	0.	.0	495.2
1	JAN	1626	267	4.	.2	496.9	*	1	JAN	2053	534	0.	.0	495.4	*							

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	13.32-HR	
(CFS)	(HR)					
6.	3.35	(CFS) 2.	1.	1.	1.	
		(INCHES) 1.185	1.251	1.251	1.251	
		(AC-FT) 1.	1.	1.	1.	

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	13.32-HR
(AC-FT)	(HR)				
0.	3.35	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	13.32-HR
(FEET)	(HR)				
498.72	3.37	496.50	495.86	495.86	495.86

CUMULATIVE AREA = .02 SQ MI

STATION DETAIN

(I) INFLOW, (O) OUTFLOW

0. 4. 8. 12. 16. 20. 24. 0. 0. 0. 0. 0. 0.

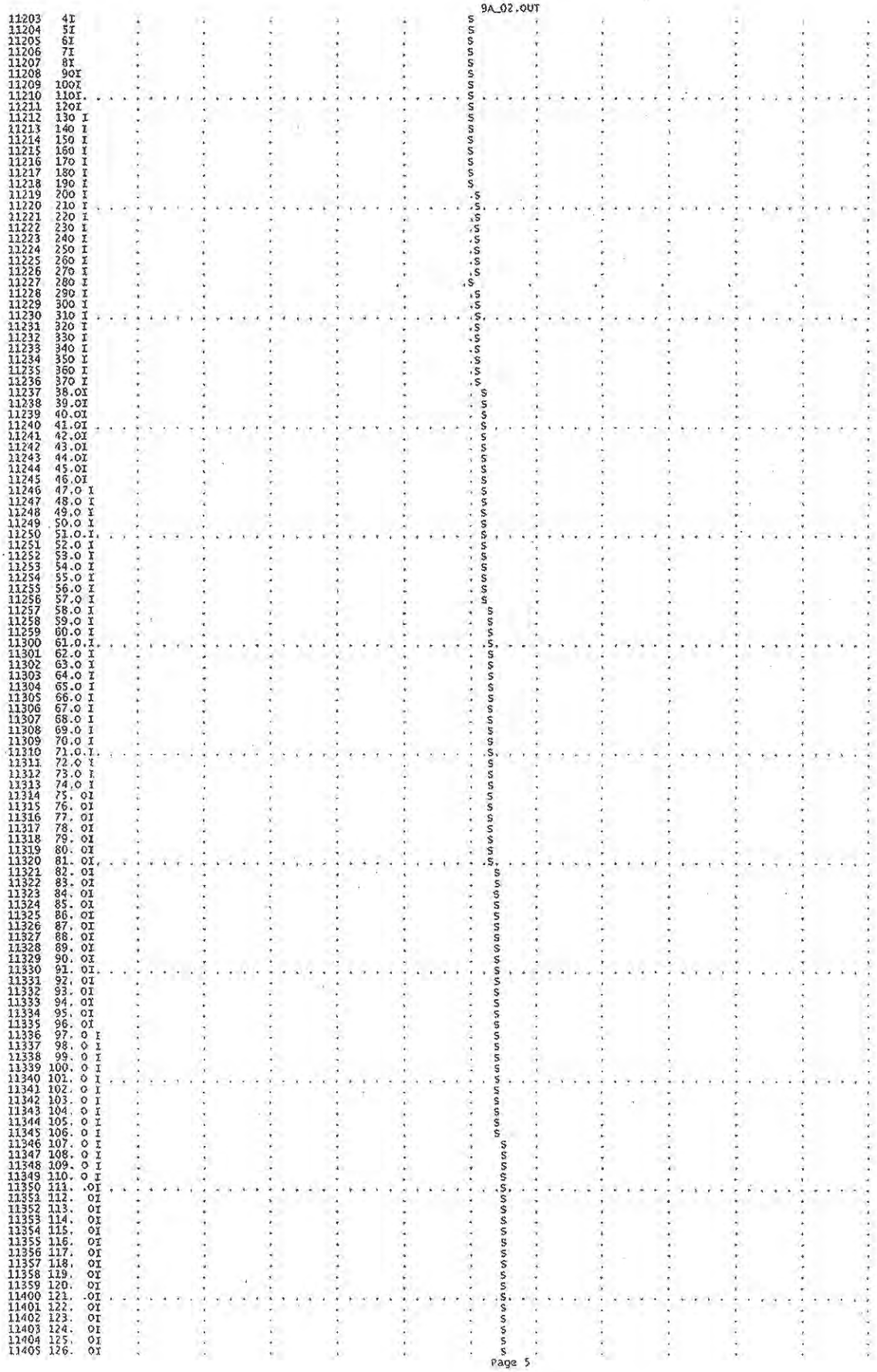
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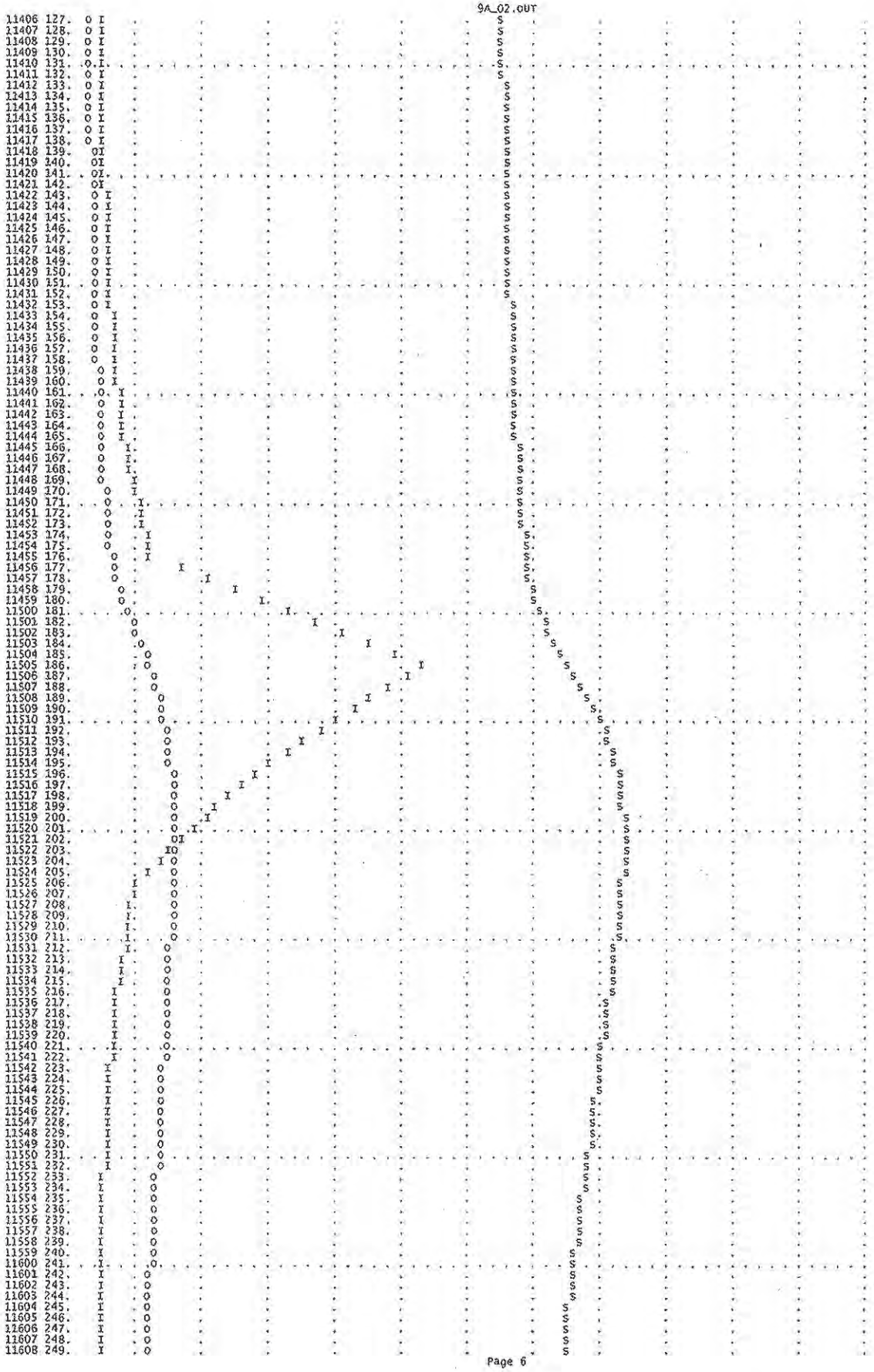
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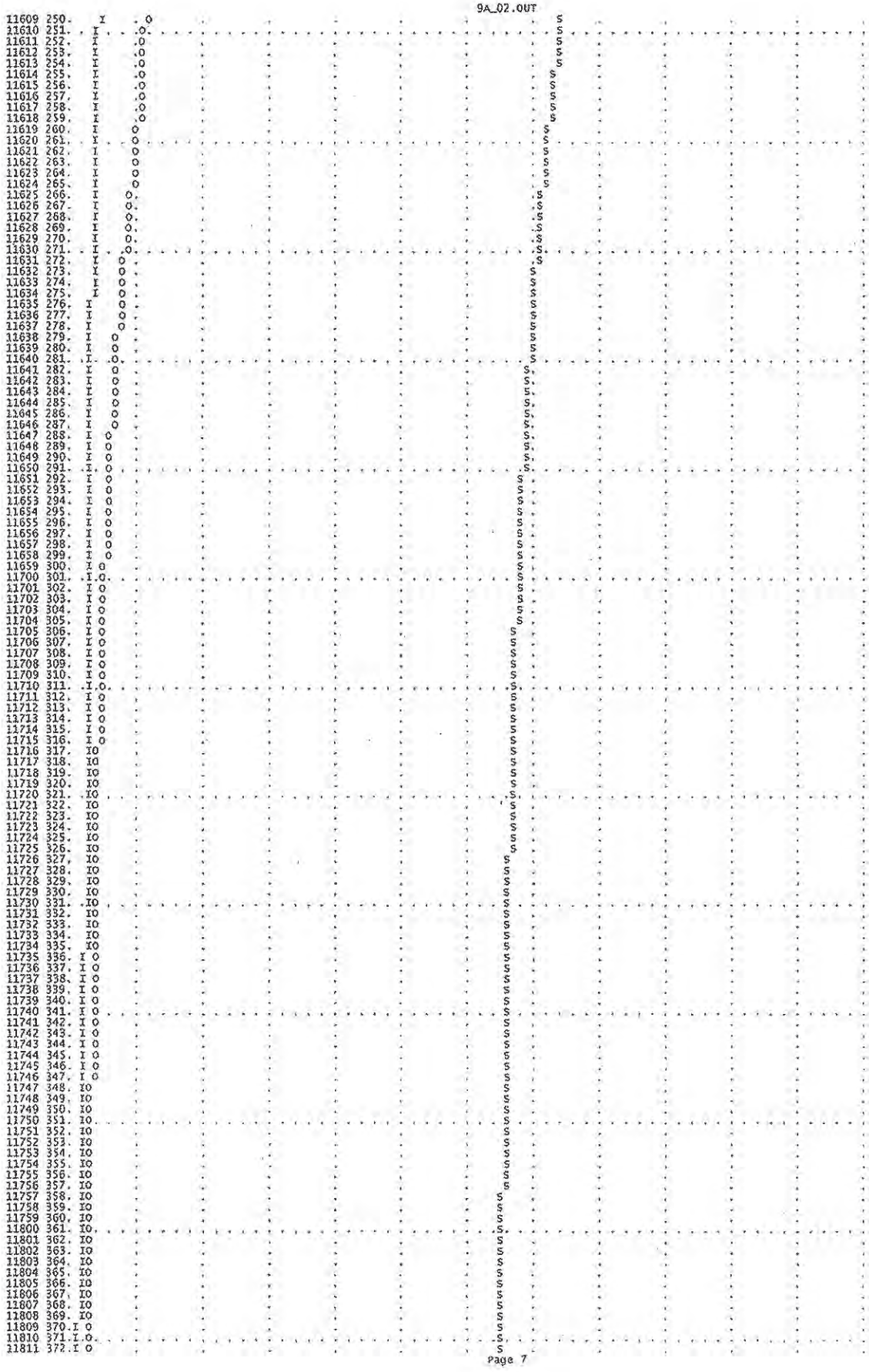
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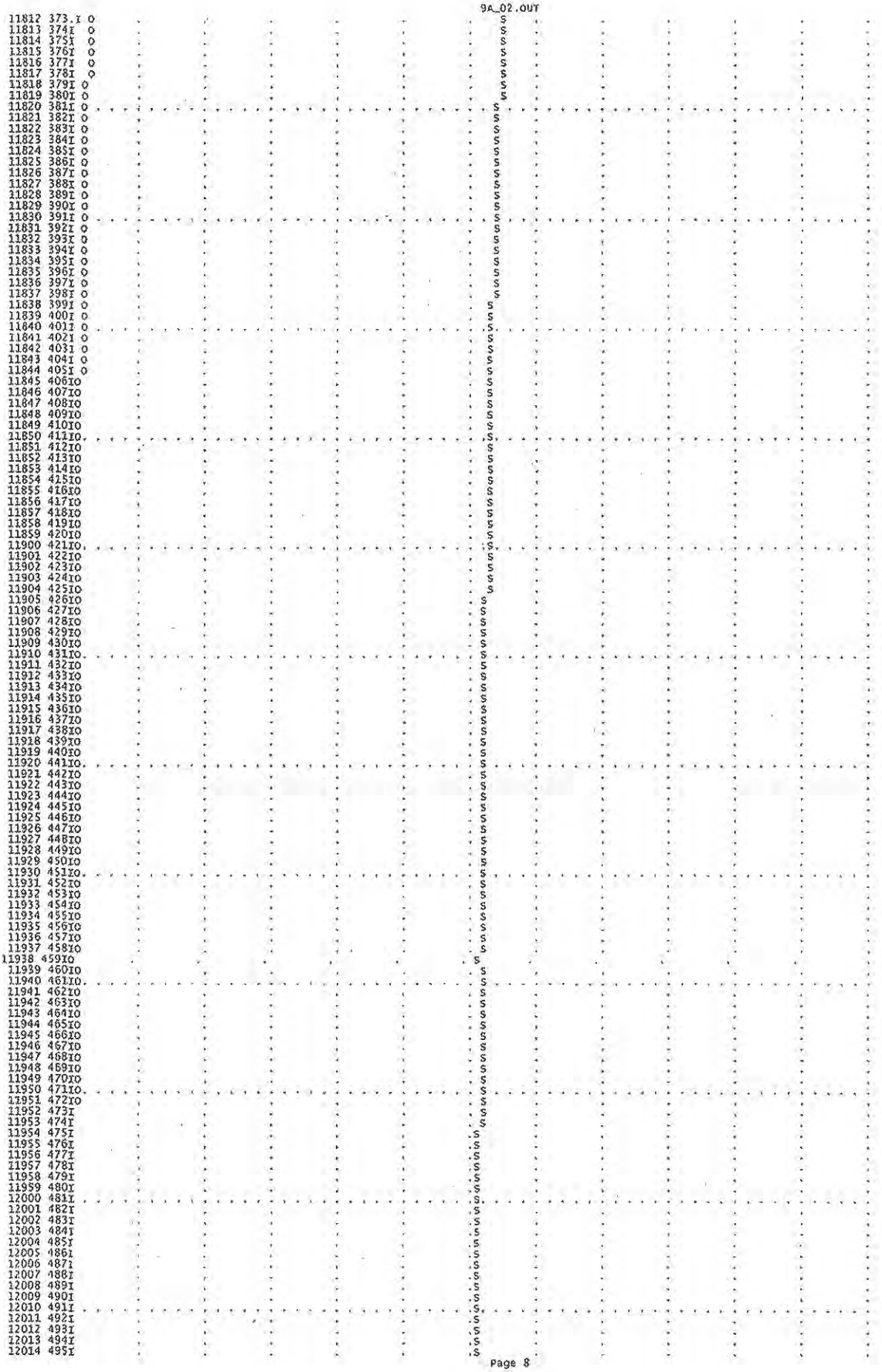
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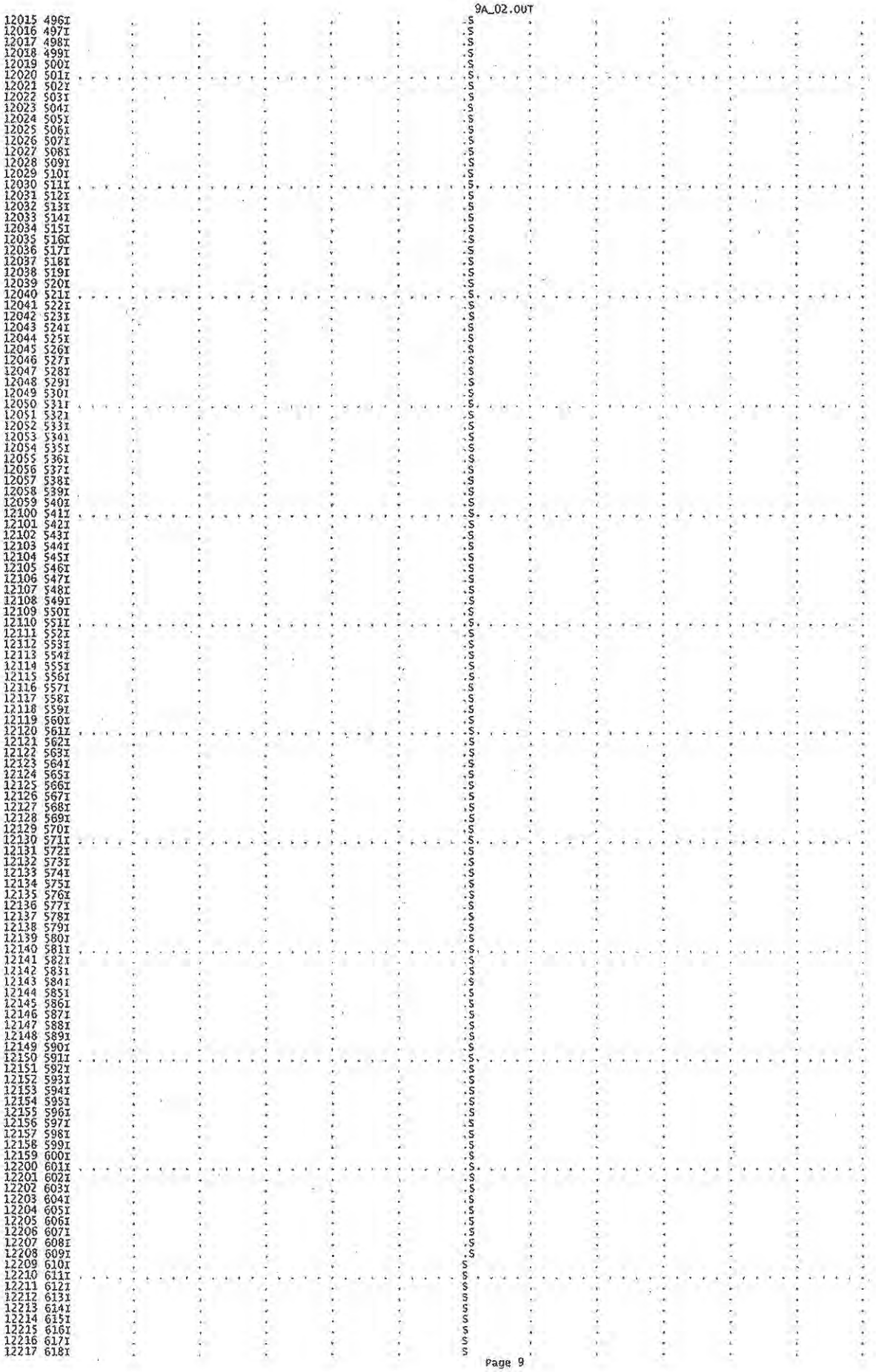
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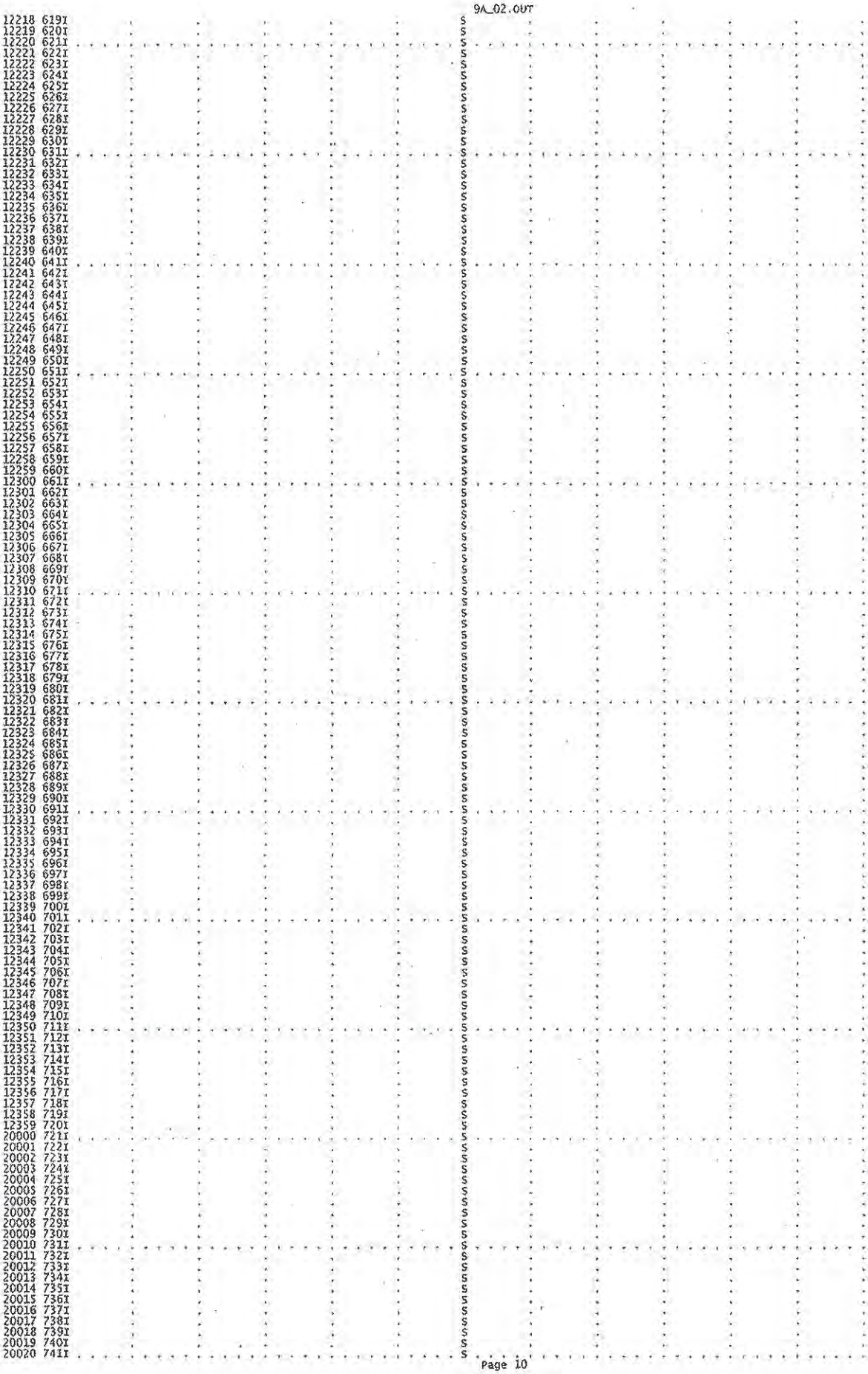


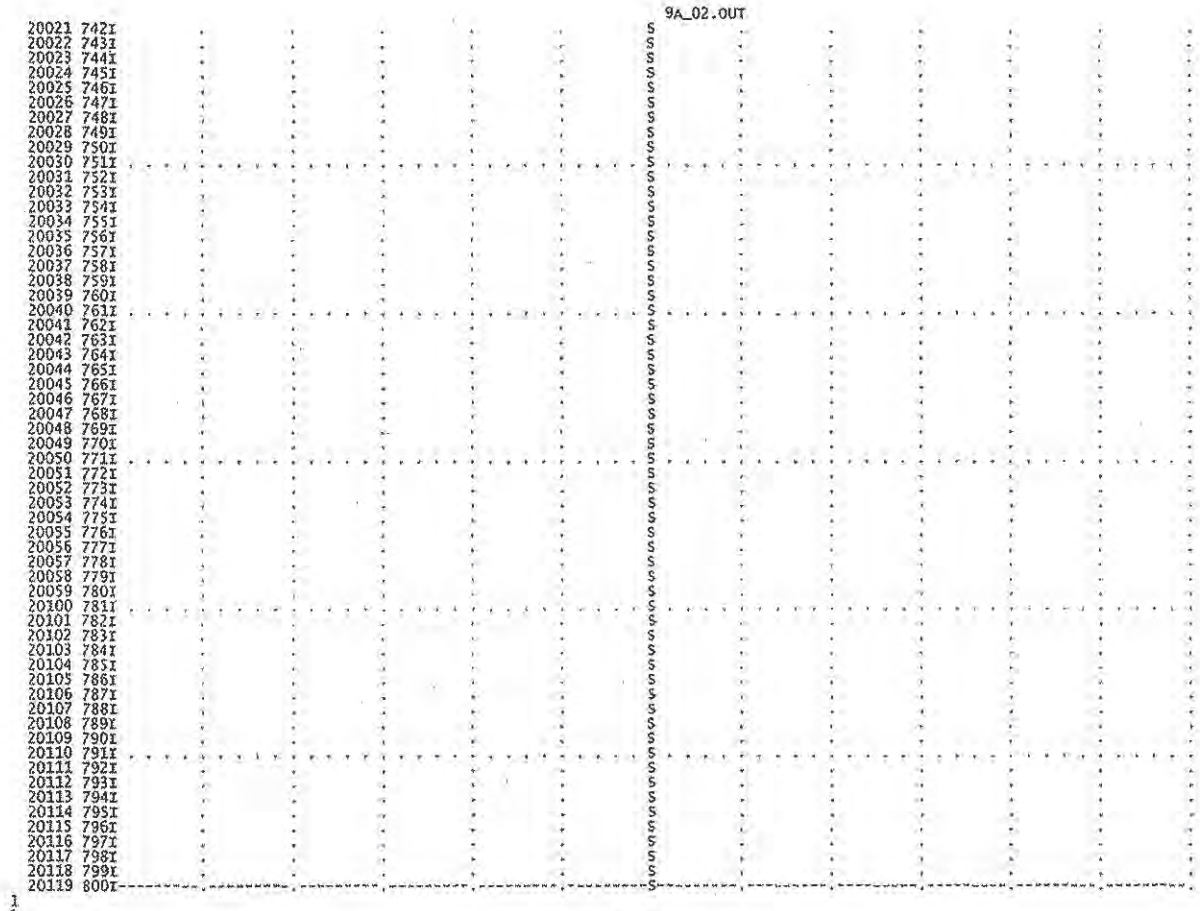












RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	9A_02	21.	3.08	2.	1.	1.	.02		
+	ROUTED TO	DETAIN	6.	3.35	2.	1.	1.	.02	498.72	3.37

*** NORMAL END OF HEC-1 ***

10- YEAR


```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   02JUL14  TIME  12:42:01   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*     DAVIS, CALIFORNIA 95616           *
*         (916) 756-1104                *
*                                       *
*****************************************
```

```
X    X  XXXXXXX   XXXXX          X
X    X  X        X     X        XX
X    X  X        X              X
XXXXXXX  XXXX    X        XXXXX  X
X    X  X        X              X
X    X  X        X     X        X
X    X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                        *DIAGRAM
*** FREE ***
               1        ID   BMR NVE UNIT 14
               2        ID   UNDERGROUND DETENTION BASIN 9A
               3        ID   15009_H
               4        IT       1 01JAN90    1200     800
               5        IO       5         0

               6        KK   9A_10
               7        KM   RATIONAL METHOD HYDROGRAPH PROGRAM
               8        KM   COPYRIGHT 1992, RICK ENGINEERING COMPANY
               9        KM   6HR RAINFALL IS  2  INCHES
              10        KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  .9
              11        KM   RATIONAL METHOD TIME OF CONCENTRATION IS  10  MIN.
              12        KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
              13        KM   IT 2 01JAN90 1200 200
              14        BA   .0186
              15        IN      10 01JAN90    1155
              16        QI       0         0      1.3      1.4      1.4      1.5      1.5      1.6      1.7      1.8
              17        QI       2       2.1      2.3      2.5      2.8      3.2      3.8      4.9      7.1     29.9
              18        QI    16.3       5.7      4.3      3.5        3      2.7      2.4      2.2        2      1.9
              19        QI     1.8       1.7      1.6      1.5      1.4      1.4      1.3      1.3        0        0
              20        QI       0         0        0        0        0        0        0        0

              21        KK   DETAIN
              22        KO       2         2        0        0       21
              23        RS       1      STOR       -1
              24        SV       0     0.135    0.271    0.406    0.541    0.677    0.767
              25        SE  495.22    496.22   497.22   498.22   499.22   500.22   500.89
              26        SQ       0      0.16     0.81     1.73     2.87     4.13     4.76     5.32     5.82     6.40
              27        SQ    6.93      7.88     8.77     9.41    10.00    10.37
              28        SE  495.22    495.42   495.82   496.22   496.62   497.02   497.42   497.82   498.22   498.72
              29        SE  499.02    499.42   499.82   500.22   500.62   500.89
              30        ZZ
```

I SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    6       9A_10
             V
             V
   21      DETAIN
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION


```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   02JUL14  TIME  12:42:01   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*     DAVIS, CALIFORNIA 95616           *
*         (916) 756-1104                *
*                                       *
*****************************************
```


BMR NVE UNIT 14
UNDERGROUND DETENTION BASIN 9A
15009_H

```
 5 IO          OUTPUT CONTROL VARIABLES
                   IPRNT         5  PRINT CONTROL
                   IPLOT         0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                   NMIN          1  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1JAN90  STARTING DATE
                   ITIME        1200  STARTING TIME
                   NQ            800  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     2JAN90  ENDING DATE
                   NDTIME        0119  ENDING TIME
                   ICENT           19  CENTURY MARK

                 COMPUTATION INTERVAL      .02 HOURS
                   TOTAL TIME BASE   13.32 HOURS

       ENGLISH UNITS
            DRAINAGE AREA        SQUARE MILES
            PRECIPITATION DEPTH  INCHES
```

LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

```
21 KK      DETAIN
```

```
22 KO      OUTPUT CONTROL VARIABLES
             IPRNT        2  PRINT CONTROL
             IPLOT        2  PLOT CONTROL
             QSCAL       0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      800  LAST ORDINATE PUNCHED OR SAVED
            TIMINT     .017  TIME INTERVAL IN HOURS

           HYDROGRAPH ROUTING DATA

23 RS      STORAGE ROUTING
             NSTPS        1  NUMBER OF SUBREACHES
              ITYP     STOR  TYPE OF INITIAL CONDITION
            RSVRIC    -1.00  INITIAL CONDITION
                 X      .00 WORKING R AND D COEFFICIENT

24 SV        STORAGE      .0      .1      .3      .4      .5      .7      .8
25 SE        ELEVATION  495.22  496.22  497.22  498.22  499.22  500.22  500.89
26 SQ        DISCHARGE      0.      0.      1.      2.      3.      4.      5.      5.      6.      6.
                            7.      8.      9.      9.     10.     10.
28 SE        ELEVATION  495.22  495.42  495.82  496.22  496.62  497.02  497.42  497.82  498.22  498.72
                        499.02  499.42  499.82  500.22  500.62  500.89
```

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.03	.08	.14	.19	.24	.27	.30	.35	.41
OUTFLOW	.00	.16	.81	1.73	2.87	4.13	4.45	4.76	5.32	5.82
ELEVATION	495.22	495.42	495.82	496.22	496.62	497.02	497.22	497.42	497.82	498.22
STORAGE	.47	.51	.54	.57	.62	.68	.73	.77		
OUTFLOW	6.40	6.93	7.40	7.88	8.77	9.41	10.00	10.37		
ELEVATION	498.72	499.02	499.22	499.42	499.82	500.22	500.62	500.89		

HYDROGRAPH AT STATION DETAIN

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	JAN	1200	1	0.	.0	495.2	1	JAN	1627	268	5.	.3	497.8	1	JAN	2054	535	0.	.0	495.4
1	JAN	1201	2	0.	.0	495.2	1	JAN	1628	269	5.	.3	497.8	1	JAN	2055	536	0.	.0	495.4
1	JAN	1202	3	0.	.0	495.2	1	JAN	1629	270	5.	.3	497.7	1	JAN	2056	537	0.	.0	495.4
1	JAN	1203	4	0.	.0	495.2	1	JAN	1630	271	5.	.3	497.7	1	JAN	2057	538	0.	.0	495.4
1	JAN	1204	5	0.	.0	495.2	1	JAN	1631	272	5.	.3	497.7	1	JAN	2058	539	0.	.0	495.4
1	JAN	1205	6	0.	.0	495.2	1	JAN	1632	273	5.	.3	497.6	1	JAN	2059	540	0.	.0	495.4
1	JAN	1206	7	0.	.0	495.2	1	JAN	1633	274	5.	.3	497.6	1	JAN	2100	541	0.	.0	495.4
1	JAN	1207	8	0.	.0	495.2	1	JAN	1634	275	5.	.3	497.6	1	JAN	2101	542	0.	.0	495.4
1	JAN	1208	9	0.	.0	495.2	1	JAN	1635	276	5.	.3	497.5	1	JAN	2102	543	0.	.0	495.4
1	JAN	1209	10	0.	.0	495.2	1	JAN	1636	277	5.	.3	497.5	1	JAN	2103	544	0.	.0	495.4
1	JAN	1210	11	0.	.0	495.2	1	JAN	1637	278	5.	.3	497.5	1	JAN	2104	545	0.	.0	495.4
1	JAN	1211	12	0.	.0	495.2	1	JAN	1638	279	5.	.3	497.4	1	JAN	2105	546	0.	.0	495.4
1	JAN	1212	13	0.	.0	495.3	1	JAN	1639	280	5.	.3	497.4	1	JAN	2106	547	0.	.0	495.4
1	JAN	1213	14	0.	.0	495.3	1	JAN	1640	281	5.	.3	497.4	1	JAN	2107	548	0.	.0	495.4
1	JAN	1214	15	0.	.0	495.3	1	JAN	1641	282	5.	.3	497.4	1	JAN	2108	549	0.	.0	495.4
1	JAN	1215	16	0.	.0	495.3	1	JAN	1642	283	5.	.3	497.3	1	JAN	2109	550	0.	.0	495.4
1	JAN	1216	17	0.	.0	495.3	1	JAN	1643	284	5.	.3	497.3	1	JAN	2110	551	0.	.0	495.4
1	JAN	1217	18	0.	.0	495.3	1	JAN	1644	285	5.	.3	497.3	1	JAN	2111	552	0.	.0	495.4
1	JAN	1218	19	0.	.0	495.3	1	JAN	1645	286	4.	.3	497.3	1	JAN	2112	553	0.	.0	495.4
1	JAN	1219	20	0.	.0	495.3	1	JAN	1646	287	4.	.3	497.2	1	JAN	2113	554	0.	.0	495.3
1	JAN	1220	21	0.	.0	495.3	1	JAN	1647	288	4.	.3	497.2	1	JAN	2114	555	0.	.0	495.3
1	JAN	1221	22	0.	.0	495.4	1	JAN	1648	289	4.	.3	497.2	1	JAN	2115	556	0.	.0	495.3
1	JAN	1222	23	0.	.0	495.4	1	JAN	1649	290	4.	.3	497.2	1	JAN	2116	557	0.	.0	495.3
1	JAN	1223	24	0.	.0	495.4	1	JAN	1650	291	4.	.3	497.1	1	JAN	2117	558	0.	.0	495.3
1	JAN	1224	25	0.	.0	495.4	1	JAN	1651	292	4.	.3	497.1	1	JAN	2118	559	0.	.0	495.3
1	JAN	1225	26	0.	.0	495.4	1	JAN	1652	293	4.	.3	497.1	1	JAN	2119	560	0.	.0	495.3
1	JAN	1226	27	0.	.0	495.4	1	JAN	1653	294	4.	.2	497.1	1	JAN	2120	561	0.	.0	495.3
1	JAN	1227	28	0.	.0	495.4	1	JAN	1654	295	4.	.2	497.0	1	JAN	2121	562	0.	.0	495.3
1	JAN	1228	29	0.	.0	495.4	1	JAN	1655	296	4.	.2	497.0	1	JAN	2122	563	0.	.0	495.3
1	JAN	1229	30	0.	.0	495.5	1	JAN	1656	297	4.	.2	497.0	1	JAN	2123	564	0.	.0	495.3
1	JAN	1230	31	0.	.0	495.5	1	JAN	1657	298	4.	.2	497.0	1	JAN	2124	565	0.	.0	495.3
1	JAN	1231	32	0.	.0	495.5	1	JAN	1658	299	4.	.2	496.9	1	JAN	2125	566	0.	.0	495.3
1	JAN	1232	33	0.	.0	495.5	1	JAN	1659	300	4.	.2	496.9	1	JAN	2126	567	0.	.0	495.3
1	JAN	1233	34	0.	.0	495.5	1	JAN	1700	301	4.	.2	496.9	1	JAN	2127	568	0.	.0	495.3
1	JAN	1234	35	0.	.0	495.5	1	JAN	1701	302	4.	.2	496.9	1	JAN	2128	569	0.	.0	495.3
1	JAN	1235	36	0.	.0	495.5	1	JAN	1702	303	4.	.2	496.9	1	JAN	2129	570	0.	.0	495.3
1	JAN	1236	37	0.	.0	495.5	1	JAN	1703	304	4.	.2	496.8	1	JAN	2130	571	0.	.0	495.3
1	JAN	1237	38	0.	.0	495.6	1	JAN	1704	305	4.	.2	496.8	1	JAN	2131	572	0.	.0	495.3
1	JAN	1238	39	0.	.0	495.6	1	JAN	1705	306	3.	.2	496.8	1	JAN	2132	573	0.	.0	495.3
1	JAN	1239	40	0.	.0	495.6	1	JAN	1706	307	3.	.2	496.8	1	JAN	2133	574	0.	.0	495.3
1	JAN	1240	41	0.	.0	495.6	1	JAN	1707	308	3.	.2	496.8	1	JAN	2134	575	0.	.0	495.3
1	JAN	1241	42	0.	.1	495.6	1	JAN	1708	309	3.	.2	496.8	1	JAN	2135	576	0.	.0	495.3
1	JAN	1242	43	0.	.1	495.6	1	JAN	1709	310	3.	.2	496.7	1	JAN	2136	577	0.	.0	495.3
1	JAN	1243	44	0.	.1	495.6	1	JAN	1710	311	3.	.2	496.7	1	JAN	2137	578	0.	.0	495.3
1	JAN	1244	45	0.	.1	495.6	1	JAN	1711	312	3.	.2	496.7	1	JAN	2138	579	0.	.0	495.3
1	JAN	1245	46	1.	.1	495.6	1	JAN	1712	313	3.	.2	496.7	1	JAN	2139	580	0.	.0	495.3
1	JAN	1246	47	1.	.1	495.6	1	JAN	1713	314	3.	.2	496.7	1	JAN	2140	581	0.	.0	495.3
1	JAN	1247	48	1.	.1	495.7	1	JAN	1714	315	3.	.2	496.7	1	JAN	2141	582	0.	.0	495.3
1	JAN	1248	49	1.	.1	495.7	1	JAN	1715	316	3.	.2	496.6	1	JAN	2142	583	0.	.0	495.3
1	JAN	1249	50	1.	.1	495.7	1	JAN	1716	317	3.	.2	496.6	1	JAN	2143	584	0.	.0	495.3
1	JAN	1250	51	1.	.1	495.7	1	JAN	1717	318	3.	.2	496.6	1	JAN	2144	585	0.	.0	495.3
1	JAN	1251	52	1.	.1	495.7	1	JAN	1718	319	3.	.2	496.6	1	JAN	2145	586	0.	.0	495.3
1	JAN	1252	53	1.	.1	495.7	1	JAN	1719	320	3.	.2	496.6	1	JAN	2146	587	0.	.0	495.3
1	JAN	1253	54	1.	.1	495.7	1	JAN	1720	321	3.	.2	496.6	1	JAN	2147	588	0.	.0	495.3
1	JAN	1254	55	1.	.1	495.7	1	JAN	1721	322	3.	.2	496.6	1	JAN	2148	589	0.	.0	495.3
1	JAN	1255	56	1.	.1	495.7	1	JAN	1722	323	3.	.2	496.6	1	JAN	2149	590	0.	.0	495.3
1	JAN	1256	57	1.	.1	495.7	1	JAN	1723	324	3.	.2	496.5	1	JAN	2150	591	0.	.0	495.3

1	JAN	1257	58	1.	.1	495.7	*	1	JAN	1724	325	3.	.2	496.5	*	1	JAN	2151	592	0.	.0	495.3
1	JAN	1258	59	1.	.1	495.8	*	1	JAN	1725	326	3.	.2	496.5	*	1	JAN	2152	593	0.	.0	495.3
1	JAN	1259	60	1.	.1	495.8	*	1	JAN	1726	327	3.	.2	496.5	*	1	JAN	2153	594	0.	.0	495.3
1	JAN	1300	61	1.	.1	495.8	*	1	JAN	1727	328	3.	.2	496.5	*	1	JAN	2154	595	0.	.0	495.3
1	JAN	1301	62	1.	.1	495.8	*	1	JAN	1728	329	3.	.2	496.5	*	1	JAN	2155	596	0.	.0	495.3
1	JAN	1302	63	1.	.1	495.8	*	1	JAN	1729	330	2.	.2	496.5	*	1	JAN	2156	597	0.	.0	495.3
1	JAN	1303	64	1.	.1	495.8	*	1	JAN	1730	331	2.	.2	496.5	*	1	JAN	2157	598	0.	.0	495.3
1	JAN	1304	65	1.	.1	495.8	*	1	JAN	1731	332	2.	.2	496.5	*	1	JAN	2158	599	0.	.0	495.3
1	JAN	1305	66	1.	.1	495.8	*	1	JAN	1732	333	2.	.2	496.5	*	1	JAN	2159	600	0.	.0	495.3
1	JAN	1306	67	1.	.1	495.8	*	1	JAN	1733	334	2.	.2	496.4	*	1	JAN	2200	601	0.	.0	495.3
1	JAN	1307	68	1.	.1	495.8	*	1	JAN	1734	335	2.	.2	496.4	*	1	JAN	2201	602	0.	.0	495.3
1	JAN	1308	69	1.	.1	495.8	*	1	JAN	1735	336	2.	.2	496.4	*	1	JAN	2202	603	0.	.0	495.3
1	JAN	1309	70	1.	.1	495.8	*	1	JAN	1736	337	2.	.2	496.4	*	1	JAN	2203	604	0.	.0	495.3
1	JAN	1310	71	1.	.1	495.9	*	1	JAN	1737	338	2.	.2	496.4	*	1	JAN	2204	605	0.	.0	495.3
1	JAN	1311	72	1.	.1	495.9	*	1	JAN	1738	339	2.	.2	496.4	*	1	JAN	2205	606	0.	.0	495.3
1	JAN	1312	73	1.	.1	495.9	*	1	JAN	1739	340	2.	.2	496.4	*	1	JAN	2206	607	0.	.0	495.3
1	JAN	1313	74	1.	.1	495.9	*	1	JAN	1740	341	2.	.2	496.4	*	1	JAN	2207	608	0.	.0	495.3
1	JAN	1314	75	1.	.1	495.9	*	1	JAN	1741	342	2.	.2	496.4	*	1	JAN	2208	609	0.	.0	495.3
1	JAN	1315	76	1.	.1	495.9	*	1	JAN	1742	343	2.	.2	496.4	*	1	JAN	2209	610	0.	.0	495.3
1	JAN	1316	77	1.	.1	495.9	*	1	JAN	1743	344	2.	.2	496.4	*	1	JAN	2210	611	0.	.0	495.3
1	JAN	1317	78	1.	.1	495.9	*	1	JAN	1744	345	2.	.2	496.3	*	1	JAN	2211	612	0.	.0	495.3
1	JAN	1318	79	1.	.1	495.9	*	1	JAN	1745	346	2.	.2	496.3	*	1	JAN	2212	613	0.	.0	495.3
1	JAN	1319	80	1.	.1	495.9	*	1	JAN	1746	347	2.	.2	496.3	*	1	JAN	2213	614	0.	.0	495.3
1	JAN	1320	81	1.	.1	495.9	*	1	JAN	1747	348	2.	.1	496.3	*	1	JAN	2214	615	0.	.0	495.3
1	JAN	1321	82	1.	.1	495.9	*	1	JAN	1748	349	2.	.1	496.3	*	1	JAN	2215	616	0.	.0	495.3
1	JAN	1322	83	1.	.1	495.9	*	1	JAN	1749	350	2.	.1	496.3	*	1	JAN	2216	617	0.	.0	495.3
1	JAN	1323	84	1.	.1	495.9	*	1	JAN	1750	351	2.	.1	496.3	*	1	JAN	2217	618	0.	.0	495.3
1	JAN	1324	85	1.	.1	496.0	*	1	JAN	1751	352	2.	.1	496.3	*	1	JAN	2218	619	0.	.0	495.3
1	JAN	1325	86	1.	.1	496.0	*	1	JAN	1752	353	2.	.1	496.3	*	1	JAN	2219	620	0.	.0	495.3
1	JAN	1326	87	1.	.1	496.0	*	1	JAN	1753	354	2.	.1	496.3	*	1	JAN	2220	621	0.	.0	495.3
1	JAN	1327	88	1.	.1	496.0	*	1	JAN	1754	355	2.	.1	496.3	*	1	JAN	2221	622	0.	.0	495.3
1	JAN	1328	89	1.	.1	496.0	*	1	JAN	1755	356	2.	.1	496.3	*	1	JAN	2222	623	0.	.0	495.3
1	JAN	1329	90	1.	.1	496.0	*	1	JAN	1756	357	2.	.1	496.3	*	1	JAN	2223	624	0.	.0	495.3
1	JAN	1330	91	1.	.1	496.0	*	1	JAN	1757	358	2.	.1	496.3	*	1	JAN	2224	625	0.	.0	495.3
1	JAN	1331	92	1.	.1	496.0	*	1	JAN	1758	359	2.	.1	496.3	*	1	JAN	2225	626	0.	.0	495.3
1	JAN	1332	93	1.	.1	496.0	*	1	JAN	1759	360	2.	.1	496.3	*	1	JAN	2226	627	0.	.0	495.3
1	JAN	1333	94	1.	.1	496.0	*	1	JAN	1800	361	2.	.1	496.3	*	1	JAN	2227	628	0.	.0	495.3
1	JAN	1334	95	1.	.1	496.0	*	1	JAN	1801	362	2.	.1	496.2	*	1	JAN	2228	629	0.	.0	495.3
1	JAN	1335	96	1.	.1	496.0	*	1	JAN	1802	363	2.	.1	496.2	*	1	JAN	2229	630	0.	.0	495.3
1	JAN	1336	97	1.	.1	496.0	*	1	JAN	1803	364	2.	.1	496.2	*	1	JAN	2230	631	0.	.0	495.3
1	JAN	1337	98	1.	.1	496.0	*	1	JAN	1804	365	2.	.1	496.2	*	1	JAN	2231	632	0.	.0	495.3
1	JAN	1338	99	1.	.1	496.1	*	1	JAN	1805	366	2.	.1	496.2	*	1	JAN	2232	633	0.	.0	495.3
1	JAN	1339	100	1.	.1	496.1	*	1	JAN	1806	367	2.	.1	496.2	*	1	JAN	2233	634	0.	.0	495.3
1	JAN	1340	101	1.	.1	496.1	*	1	JAN	1807	368	2.	.1	496.2	*	1	JAN	2234	635	0.	.0	495.3
1	JAN	1341	102	1.	.1	496.1	*	1	JAN	1808	369	2.	.1	496.2	*	1	JAN	2235	636	0.	.0	495.3
1	JAN	1342	103	1.	.1	496.1	*	1	JAN	1809	370	2.	.1	496.2	*	1	JAN	2236	637	0.	.0	495.3
1	JAN	1343	104	1.	.1	496.1	*	1	JAN	1810	371	2.	.1	496.2	*	1	JAN	2237	638	0.	.0	495.3
1	JAN	1344	105	1.	.1	496.1	*	1	JAN	1811	372	2.	.1	496.2	*	1	JAN	2238	639	0.	.0	495.3
1	JAN	1345	106	1.	.1	496.1	*	1	JAN	1812	373	2.	.1	496.2	*	1	JAN	2239	640	0.	.0	495.3
1	JAN	1346	107	1.	.1	496.1	*	1	JAN	1813	374	2.	.1	496.2	*	1	JAN	2240	641	0.	.0	495.3
1	JAN	1347	108	1.	.1	496.1	*	1	JAN	1814	375	2.	.1	496.1	*	1	JAN	2241	642	0.	.0	495.3
1	JAN	1348	109	1.	.1	496.1	*	1	JAN	1815	376	2.	.1	496.1	*	1	JAN	2242	643	0.	.0	495.3
1	JAN	1349	110	2.	.1	496.1	*	1	JAN	1816	377	1.	.1	496.1	*	1	JAN	2243	644	0.	.0	495.3
1	JAN	1350	111	2.	.1	496.1	*	1	JAN	1817	378	1.	.1	496.1	*	1	JAN	2244	645	0.	.0	495.3
1	JAN	1351	112	2.	.1	496.1	*	1	JAN	1818	379	1.	.1	496.1	*	1	JAN	2245	646	0.	.0	495.3
1	JAN	1352	113	2.	.1	496.1	*	1	JAN	1819	380	1.	.1	496.1	*	1	JAN	2246	647	0.	.0	495.3
1	JAN	1353	114	2.	.1	496.2	*	1	JAN	1820	381	1.	.1	496.1	*	1	JAN	2247	648	0.	.0	495.3
1	JAN	1354	115	2.	.1	496.2	*	1	JAN	1821	382	1.	.1	496.0	*	1	JAN	2248	649	0.	.0	495.3
1	JAN	1355	116	2.	.1	496.2	*	1	JAN	1822	383	1.	.1	496.0	*	1	JAN	2249	650	0.	.0	495.3
1	JAN	1356	117	2.	.1	496.2	*	1	JAN	1823	384	1.	.1	496.0	*	1	JAN	2250	651	0.	.0	495.3
1	JAN	1357	118	2.	.1	496.2	*	1	JAN	1824	385	1.	.1	496.0	*	1	JAN	2251	652	0.	.0	495.3
1	JAN	1358	119	2.	.1	496.2	*	1	JAN	1825	386	1.	.1	496.0	*	1	JAN	2252	653	0.	.0	495.3
1	JAN	1359	120	2.	.1	496.2	*	1	JAN	1826	387	1.	.1	496.0	*	1	JAN	2253	654	0.	.0	495.3
1	JAN	1400	121	2.	.1	496.2	*	1	JAN	1827	388	1.	.1	496.0	*	1	JAN	2254	655	0.	.0	495.3
1	JAN	1401	122	2.	.1	496.2	*	1	JAN	1828	389	1.	.1	496.0	*	1	JAN	2255	656	0.	.0	495.3
1	JAN	1402	123	2.	.1	496.2	*	1	JAN	1829	390	1.	.1	495.9	*	1	JAN	2256	657	0.	.0	495.3
1	JAN	1403	124	2.	.1	496.2	*	1	JAN	1830	391	1.	.1	495.9	*	1	JAN	2257	658	0.	.0	495.3
1	JAN	1404	125	2.	.1	496.2	*	1	JAN	1831	392	1.	.1	495.9	*	1	JAN	2258	659	0.	.0	495.3
1	JAN	1405	126	2.	.1	496.2	*	1	JAN	1832	393	1.	.1	495.9	*	1	JAN	2259	660	0.	.0	495.3
1	JAN	1406	127	2.	.1	496.2	*	1	JAN	1833	394	1.	.1	495.9	*	1	JAN	2300	661	0.	.0	495.3
1	JAN	1407	128	2.	.1	496.3	*	1	JAN	1834	395	1.	.1	495.9	*	1	JAN	2301	662	0.	.0	495.3
1	JAN	1408	129	2.	.1	496.3	*	1	JAN	1835	396	1.	.1	495.9	*	1	JAN	2302	663	0.	.0	495.3
1	JAN	1409	130	2.	.1	496.3	*	1	JAN	1836	397	1.	.1	495.9	*	1	JAN	2303	664	0.	.0	495.3
1	JAN	1410	131	2.	.1	496.3	*	1	JAN	1837	398	1.	.1	495.9	*	1	JAN	2304	665	0.	.0	495.3
1	JAN	1411	132	2.	.1	496.3	*	1	JAN	1838	399	1.	.1	495.9	*	1	JAN	2305	666	0.	.0	495.3
1	JAN	1412	133	2.	.1	496.3	*	1	JAN	1839	400	1.	.1	495.8	*	1	JAN	2306	667	0.	.0	495.3
1	JAN	1413	134	2.	.1	496.3	*	1	JAN	1840	401	1.	.1	495.8	*	1	JAN	2307	668	0.	.0	495.3
1	JAN	1414	135	2.	.1	496.3	*	1	JAN	1841	402	1.	.1	495.8	*	1	JAN	2308	669	0.	.0	495.3
1	JAN	1415	136	2.	.1	496.3	*	1	JAN	1842	403	1.	.1	495.8	*	1	JAN	2309	670	0.	.0	495.3
1	JAN	1416	137	2.	.1	496.3	*	1	JAN	1843	404	1.	.1	495.8	*	1	JAN	2310	671	0.	.0	495.3
1	JAN	1417	138	2.	.2	496.3	*	1	JAN	1844	405	1.	.1	495.8	*	1	JAN	2311	672	0.	.0	495.3
1	JAN	1418	139	2.	.2	496.3	*	1	JAN	1845	406	1.	.1	495.8	*	1	JAN	2312	673	0.	.0	495.3
1	JAN	1419	140	2.	.2	496.3	*	1	JAN	1846	407	1.	.1	495.8	*	1	JAN	2313	674	0.	.0	495.3
1	JAN	1420	141	2.	.2	496.4	*	1	JAN	1847	408	1.	.1	495.8	*	1	JAN	2314	675	0.	.0	495.3
1	JAN	1421	142	2.	.2	496.4	*	1	JAN	1848	409	1.	.1	495.8	*	1	JAN	2315	676	0.	.0	495.3
1	JAN	1422	143	2.	.2	496.4	*	1	JAN	1849	410	1.	.1	495.8	*	1	JAN	2316	677	0.	.0	495.3
1	JAN	1423	144	2.	.2	496.4	*	1	JAN	1850	411	1.	.1	495.8	*	1	JAN	2317	678	0.	.0	495.3
1	JAN	1424	145	2.	.2	496.4	*	1	JAN	1851	412	1.	.1	495.7	*	1	JAN	2318	679	0.	.0	495.3
1	JAN	1425	146	2.	.2	496.4	*	1	JAN	1852	413	1.	.1	495.7	*	1	JAN	2319	680	0.	.0	495.3
1	JAN	1426	147	2.	.2	496.4	*	1	JAN	1853	414	1.	.1	495.7	*	1	JAN	2320	681	0.	.0	495.3
1	JAN	1427	148	2.	.2	496.4	*	1	JAN	1854	415	1.	.1	495.7	*	1	JAN	2321	682	0.	.0	495.3
1	JAN	1428	149	2.	.2	496.4	*	1	JAN	1855	416	1.	.1	495.7	*	1	JAN	2322	683	0.	.0	495.3
1	JAN	1429	150	2.	.2	496.4	*	1	JAN	1856	417	1.	.1	495.7	*	1	JAN	2323	684	0.	.0	495.3
1	JAN	1430	151	2.	.2	496.5	*	1	JAN	1857	418	1.	.1	495.7	*	1	JAN	2324	685	0.	.0	495.3
1	JAN	1431	152	2.	.2	496.5	*	1	JAN	1858	419	1.	.1	495.7	*	1	JAN	2325	686	0.	.0	495.3
1	JAN	1432	153	2.	.2	496.5	*	1	JAN	1859	420	1.	.1	495.7	*	1	JAN	2326	687	0.	.0	495.3
1	JAN	1433	154	3.	.2	496.5	*	1	JAN	1900	421	1.	.1	495.7	*	1	JAN	2327	688	0.	.0	495.3
1	JAN	1434	155	3.	.2	496.5	*	1	JAN	1901	422	1.	.1	495.7	*	1	JAN	2328	689	0.	.0	495.3
1	JAN	1435	156	3.	.2	496.5	*	1	JAN	1902	423	1.	.1	495.7	*	1	JAN	2329	690	0.	.0	495.3
1	JAN	1436	157	3.	.2	496.5	*	1	JAN	1903	424	1.	.1	495.7	*	1	JAN	2330	691	0.	.0	495.3
1	JAN	1437	158	3.	.2	496.5	*	1	JAN	1904	425	1.	.1	495.7	*	1	JAN	2331	692	0.	.0	495.3
1	JAN	1438	159	3.	.2	496.6	*	1	JAN	1905	426	1.	.1	495.7	*	1	JAN	2332	693	0.	.0	495.3
1	JAN	1439	160	3.	.2	496.6	*	1	JAN	1906	427	1.	.1	495.7	*	1	JAN	2333	694	0.	.0	495.3
1	JAN	1440	161	3.	.2	496.6	*	1	JAN	1907	428	1.	.1	495.6	*	1	JAN	2334	695	0.	.0	495.3
1	JAN	1441	162	3.	.2	496.6	*	1	JAN	1908	429	1.	.1	495.6	*	1	JAN	2335	696	0.	.0	495.3
1	JAN	1442	163	3.	.2	496.6	*	1	JAN	1909	430	1.	.1	495.6	*	1	JAN	2336	697	0.	.0	495.3
1	JAN	1443	164	3.	.2	496.6	*	1	JAN	1910	431	1.	.1	495.6	*	1	JAN	2337	698	0.	.0	495.3
1	JAN	1444	165	3.	.2	496.7	*	1	JAN	1911	432	0.	.1	495.6	*	1	JAN	2338	699	0.	.0	495.3
1	JAN	1445	166	3.	.2	496.7	*	1	JAN	1912	433	0.	.1	495.6	*	1	JAN	2339	700	0.	.0	495.3
1	JAN	1446	167	3.	.2	496.7	*	1	JAN	1913	434	0.	.1	495.6	*	1	JAN	2340	701	0.	.0	495.3
1	JAN	1447	168	3.	.2	496.7	*	1	JAN	1914	435	0.	.1	495.6	*	1	JAN	2341	702	0.	.0	495.3
1	JAN	1448	169	3.	.2	496.7	*	1	JAN	1915	436	0.	.1	495.6	*	1	JAN	2342	703	0.	.0	495.3
1	JAN	1449	170	3.	.2	496.8	*	1	JAN	1916	437	0.	.1	495.6	*	1	JAN	2343	704	0.	.0	495.3
1	JAN	1450	171	3.	.2	496.8	*	1	JAN	1917	438	0.	.1	495.6	*	1	JAN	2344	705	0.	.0	495.3
1	JAN	1451	172	3.	.2	496.8	*	1	JAN	1918	439	0.	.1	495.6	*	1	JAN	2345	706	0.	.0	495.3
1	JAN	1452	173	4.	.2	496.8	*	1	JAN	1919	440	0.	.0	495.6	*	1	JAN	2346	707	0.	.0	495.3
1	JAN	1453	174	4.	.2	496.9	*	1	JAN	1920	441	0.	.0	495.6	*	1	JAN	2347	708	0.	.0	495.3
1	JAN	1454	175	4.	.2	496.9	*	1	JAN	1921	442	0.	.0	495.6	*	1	JAN	2348	709	0.	.0	495.3
1	JAN	1455	176	4.	.2	496.9	*	1	JAN	1922	443	0.	.0	495.6	*	1	JAN	2349	710	0.	.0	495.3
1	JAN	1456	177	4.	.2	497.0	*	1	JAN	1923	444	0.	.0	495.6	*	1	JAN	2350	711	0.	.0	495.3
1	JAN	1457	178	4.	.2	497.0	*	1	JAN	1924	445	0.	.0	495.6	*	1	JAN	2351	712	0.	.0	495.3
1	JAN	1458	179	4.	.3	497.1	*	1	JAN	1925	446	0.	.0	495.6	*	1	JAN	2352	713	0.	.0	495.3
1	JAN	1459	180	4.	.3	497.2	*	1	JAN	1926	447	0.	.0	495.6	*	1	JAN	2353	714	0.	.0	495.3

1	JAN	1500	181	5.	.3	497.4	*	1	JAN	1927	448	0.	.0	495.6	*	1	JAN	2354	715	0.	.0	495.3
1	JAN	1501	182	5.	.3	497.5	*	1	JAN	1928	449	0.	.0	495.6	*	1	JAN	2355	716	0.	.0	495.3
1	JAN	1502	183	5.	.3	497.7	*	1	JAN	1929	450	0.	.0	495.5	*	1	JAN	2356	717	0.	.0	495.3
1	JAN	1503	184	5.	.4	497.9	*	1	JAN	1930	451	0.	.0	495.5	*	1	JAN	2357	718	0.	.0	495.3
1	JAN	1504	185	6.	.4	498.1	*	1	JAN	1931	452	0.	.0	495.5	*	1	JAN	2358	719	0.	.0	495.3
1	JAN	1505	186	6.	.4	498.3	*	1	JAN	1932	453	0.	.0	495.5	*	1	JAN	2359	720	0.	.0	495.3
1	JAN	1506	187	6.	.5	498.6	*	1	JAN	1933	454	0.	.0	495.5	*	2	JAN	0000	721	0.	.0	495.3
1	JAN	1507	188	7.	.5	498.8	*	1	JAN	1934	455	0.	.0	495.5	*	2	JAN	0001	722	0.	.0	495.3
1	JAN	1508	189	7.	.5	499.0	*	1	JAN	1935	456	0.	.0	495.5	*	2	JAN	0002	723	0.	.0	495.3
1	JAN	1509	190	7.	.5	499.2	*	1	JAN	1936	457	0.	.0	495.5	*	2	JAN	0003	724	0.	.0	495.3
1	JAN	1510	191	8.	.6	499.3	*	1	JAN	1937	458	0.	.0	495.5	*	2	JAN	0004	725	0.	.0	495.3
1	JAN	1511	192	8.	.6	499.5	*	1	JAN	1938	459	0.	.0	495.5	*	2	JAN	0005	726	0.	.0	495.3
1	JAN	1512	193	8.	.6	499.6	*	1	JAN	1939	460	0.	.0	495.5	*	2	JAN	0006	727	0.	.0	495.3
1	JAN	1513	194	9.	.6	499.7	*	1	JAN	1940	461	0.	.0	495.5	*	2	JAN	0007	728	0.	.0	495.3
1	JAN	1514	195	9.	.6	499.8	*	1	JAN	1941	462	0.	.0	495.5	*	2	JAN	0008	729	0.	.0	495.3
1	JAN	1515	196	9.	.6	499.9	*	1	JAN	1942	463	0.	.0	495.5	*	2	JAN	0009	730	0.	.0	495.3
1	JAN	1516	197	9.	.6	500.0	*	1	JAN	1943	464	0.	.0	495.5	*	2	JAN	0010	731	0.	.0	495.3
1	JAN	1517	198	9.	.7	500.0	*	1	JAN	1944	465	0.	.0	495.5	*	2	JAN	0011	732	0.	.0	495.3
1	JAN	1518	199	9.	.7	500.1	*	1	JAN	1945	466	0.	.0	495.5	*	2	JAN	0012	733	0.	.0	495.2
1	JAN	1519	200	9.	.7	500.1	*	1	JAN	1946	467	0.	.0	495.5	*	2	JAN	0013	734	0.	.0	495.2
1	JAN	1520	201	9.	.7	500.1	*	1	JAN	1947	468	0.	.0	495.5	*	2	JAN	0014	735	0.	.0	495.2
1	JAN	1521	202	9.	.7	500.2	*	1	JAN	1948	469	0.	.0	495.5	*	2	JAN	0015	736	0.	.0	495.2
1	JAN	1522	203	9.	.7	500.2	*	1	JAN	1949	470	0.	.0	495.5	*	2	JAN	0016	737	0.	.0	495.2
1	JAN	1523	204	9.	.7	500.1	*	1	JAN	1950	471	0.	.0	495.5	*	2	JAN	0017	738	0.	.0	495.2
1	JAN	1524	205	9.	.7	500.1	*	1	JAN	1951	472	0.	.0	495.5	*	2	JAN	0018	739	0.	.0	495.2
1	JAN	1525	206	9.	.7	500.1	*	1	JAN	1952	473	0.	.0	495.5	*	2	JAN	0019	740	0.	.0	495.2
1	JAN	1526	207	9.	.7	500.1	*	1	JAN	1953	474	0.	.0	495.5	*	2	JAN	0020	741	0.	.0	495.2
1	JAN	1527	208	9.	.7	500.0	*	1	JAN	1954	475	0.	.0	495.5	*	2	JAN	0021	742	0.	.0	495.2
1	JAN	1528	209	9.	.6	500.0	*	1	JAN	1955	476	0.	.0	495.5	*	2	JAN	0022	743	0.	.0	495.2
1	JAN	1529	210	9.	.6	499.9	*	1	JAN	1956	477	0.	.0	495.5	*	2	JAN	0023	744	0.	.0	495.2
1	JAN	1530	211	9.	.6	499.9	*	1	JAN	1957	478	0.	.0	495.5	*	2	JAN	0024	745	0.	.0	495.2
1	JAN	1531	212	9.	.6	499.9	*	1	JAN	1958	479	0.	.0	495.5	*	2	JAN	0025	746	0.	.0	495.2
1	JAN	1532	213	9.	.6	499.8	*	1	JAN	1959	480	0.	.0	495.5	*	2	JAN	0026	747	0.	.0	495.2
1	JAN	1533	214	9.	.6	499.8	*	1	JAN	2000	481	0.	.0	495.5	*	2	JAN	0027	748	0.	.0	495.2
1	JAN	1534	215	9.	.6	499.7	*	1	JAN	2001	482	0.	.0	495.5	*	2	JAN	0028	749	0.	.0	495.2
1	JAN	1535	216	9.	.6	499.7	*	1	JAN	2002	483	0.	.0	495.5	*	2	JAN	0029	750	0.	.0	495.2
1	JAN	1536	217	8.	.6	499.7	*	1	JAN	2003	484	0.	.0	495.5	*	2	JAN	0030	751	0.	.0	495.2
1	JAN	1537	218	8.	.6	499.6	*	1	JAN	2004	485	0.	.0	495.4	*	2	JAN	0031	752	0.	.0	495.2
1	JAN	1538	219	8.	.6	499.6	*	1	JAN	2005	486	0.	.0	495.4	*	2	JAN	0032	753	0.	.0	495.2
1	JAN	1539	220	8.	.6	499.5	*	1	JAN	2006	487	0.	.0	495.4	*	2	JAN	0033	754	0.	.0	495.2
1	JAN	1540	221	8.	.6	499.5	*	1	JAN	2007	488	0.	.0	495.4	*	2	JAN	0034	755	0.	.0	495.2
1	JAN	1541	222	8.	.6	499.4	*	1	JAN	2008	489	0.	.0	495.4	*	2	JAN	0035	756	0.	.0	495.2
1	JAN	1542	223	8.	.6	499.4	*	1	JAN	2009	490	0.	.0	495.4	*	2	JAN	0036	757	0.	.0	495.2
1	JAN	1543	224	8.	.6	499.4	*	1	JAN	2010	491	0.	.0	495.4	*	2	JAN	0037	758	0.	.0	495.2
1	JAN	1544	225	8.	.6	499.3	*	1	JAN	2011	492	0.	.0	495.4	*	2	JAN	0038	759	0.	.0	495.2
1	JAN	1545	226	8.	.5	499.3	*	1	JAN	2012	493	0.	.0	495.4	*	2	JAN	0039	760	0.	.0	495.2
1	JAN	1546	227	7.	.5	499.2	*	1	JAN	2013	494	0.	.0	495.4	*	2	JAN	0040	761	0.	.0	495.2
1	JAN	1547	228	7.	.5	499.2	*	1	JAN	2014	495	0.	.0	495.4	*	2	JAN	0041	762	0.	.0	495.2
1	JAN	1548	229	7.	.5	499.2	*	1	JAN	2015	496	0.	.0	495.4	*	2	JAN	0042	763	0.	.0	495.2
1	JAN	1549	230	7.	.5	499.1	*	1	JAN	2016	497	0.	.0	495.4	*	2	JAN	0043	764	0.	.0	495.2
1	JAN	1550	231	7.	.5	499.1	*	1	JAN	2017	498	0.	.0	495.4	*	2	JAN	0044	765	0.	.0	495.2
1	JAN	1551	232	7.	.5	499.0	*	1	JAN	2018	499	0.	.0	495.4	*	2	JAN	0045	766	0.	.0	495.2
1	JAN	1552	233	7.	.5	499.0	*	1	JAN	2019	500	0.	.0	495.4	*	2	JAN	0046	767	0.	.0	495.2
1	JAN	1553	234	7.	.5	499.0	*	1	JAN	2020	501	0.	.0	495.4	*	2	JAN	0047	768	0.	.0	495.2
1	JAN	1554	235	7.	.5	498.9	*	1	JAN	2021	502	0.	.0	495.4	*	2	JAN	0048	769	0.	.0	495.2
1	JAN	1555	236	7.	.5	498.9	*	1	JAN	2022	503	0.	.0	495.4	*	2	JAN	0049	770	0.	.0	495.2
1	JAN	1556	237	7.	.5	498.9	*	1	JAN	2023	504	0.	.0	495.4	*	2	JAN	0050	771	0.	.0	495.2
1	JAN	1557	238	7.	.5	498.8	*	1	JAN	2024	505	0.	.0	495.4	*	2	JAN	0051	772	0.	.0	495.2
1	JAN	1558	239	7.	.5	498.8	*	1	JAN	2025	506	0.	.0	495.4	*	2	JAN	0052	773	0.	.0	495.2
1	JAN	1559	240	6.	.5	498.7	*	1	JAN	2026	507	0.	.0	495.4	*	2	JAN	0053	774	0.	.0	495.2
1	JAN	1600	241	6.	.5	498.7	*	1	JAN	2027	508	0.	.0	495.4	*	2	JAN	0054	775	0.	.0	495.2
1	JAN	1601	242	6.	.5	498.7	*	1	JAN	2028	509	0.	.0	495.4	*	2	JAN	0055	776	0.	.0	495.2
1	JAN	1602	243	6.	.5	498.6	*	1	JAN	2029	510	0.	.0	495.4	*	2	JAN	0056	777	0.	.0	495.2
1	JAN	1603	244	6.	.5	498.6	*	1	JAN	2030	511	0.	.0	495.4	*	2	JAN	0057	778	0.	.0	495.2
1	JAN	1604	245	6.	.5	498.6	*	1	JAN	2031	512	0.	.0	495.4	*	2	JAN	0058	779	0.	.0	495.2
1	JAN	1605	246	6.	.4	498.5	*	1	JAN	2032	513	0.	.0	495.4	*	2	JAN	0059	780	0.	.0	495.2
1	JAN	1606	247	6.	.4	498.5	*	1	JAN	2033	514	0.	.0	495.4	*	2	JAN	0100	781	0.	.0	495.2
1	JAN	1607	248	6.	.4	498.5	*	1	JAN	2034	515	0.	.0	495.4	*	2	JAN	0101	782	0.	.0	495.2
1	JAN	1608	249	6.	.4	498.4	*	1	JAN	2035	516	0.	.0	495.4	*	2	JAN	0102	783	0.	.0	495.2
1	JAN	1609	250	6.	.4	498.4	*	1	JAN	2036	517	0.	.0	495.4	*	2	JAN	0103	784	0.	.0	495.2
1	JAN	1610	251	6.	.4	498.4	*	1	JAN	2037	518	0.	.0	495.4	*	2	JAN	0104	785	0.	.0	495.2
1	JAN	1611	252	6.	.4	498.3	*	1	JAN	2038	519	0.	.0	495.4	*	2	JAN	0105	786	0.	.0	495.2
1	JAN	1612	253	6.	.4	498.3	*	1	JAN	2039	520	0.	.0	495.4	*	2	JAN	0106	787	0.	.0	495.2
1	JAN	1613	254	6.	.4	498.2	*	1	JAN	2040	521	0.	.0	495.4	*	2	JAN	0107	788	0.	.0	495.2
1	JAN	1614	255	6.	.4	498.2	*	1	JAN	2041	522	0.	.0	495.4	*	2	JAN	0108	789	0.	.0	495.2
1	JAN	1615	256	6.	.4	498.2	*	1	JAN	2042	523	0.	.0	495.4	*	2	JAN	0109	790	0.	.0	495.2
1	JAN	1616	257	6.	.4	498.1	*	1	JAN	2043	524	0.	.0	495.4	*	2	JAN	0110	791	0.	.0	495.2
1	JAN	1617	258	6.	.4	498.1	*	1	JAN	2044	525	0.	.0	495.4	*	2	JAN	0111	792	0.	.0	495.2
1	JAN	1618	259	6.	.4	498.1	*	1	JAN	2045	526	0.	.0	495.4	*	2	JAN	0112	793	0.	.0	495.2
1	JAN	1619	260	6.	.4	498.0	*	1	JAN	2046	527	0.	.0	495.4	*	2	JAN	0113	794	0.	.0	495.2
1	JAN	1620	261	6.	.4	498.0	*	1	JAN	2047	528	0.	.0	495.4	*	2	JAN	0114	795	0.	.0	495.2
1	JAN	1621	262	6.	.4	498.0	*	1	JAN	2048	529	0.	.0	495.4	*	2	JAN	0115	796	0.	.0	495.2
1	JAN	1622	263	5.	.4	497.9	*	1	JAN	2049	530	0.	.0	495.4	*	2	JAN	0116	797	0.	.0	495.2
1	JAN	1623	264	5.	.4	497.9	*	1	JAN	2050	531	0.	.0	495.4	*	2	JAN	0117	798	0.	.0	495.2
1	JAN	1624	265	5.	.4	497.9	*	1	JAN	2051	532	0.	.0	495.4	*	2	JAN	0118	799	0.	.0	495.2
1	JAN	1625	266	5.	.4	497.8	*	1	JAN	2052	533	0.	.0	495.4	*	2	JAN	0119	800	0.	.0	495.2
1	JAN	1626	267	5.	.4	497.8	*	1	JAN	2053	534	0.	.0	495.4	*							

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	13.32-HR
(CFS)	(HR)					
9.	3.37	(CFS)	3.	2.	2.	2.
		(INCHES)	1.701	1.786	1.786	1.786
		(AC-FT)	2.	2.	2.	2.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	13.32-HR
(AC-FT)	(HR)					
1.	3.35		0.	0.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	13.32-HR
(FEET)	(HR)					
500.15	3.37		497.01	496.10	496.10	496.10

CUMULATIVE AREA = .02 SQ MI

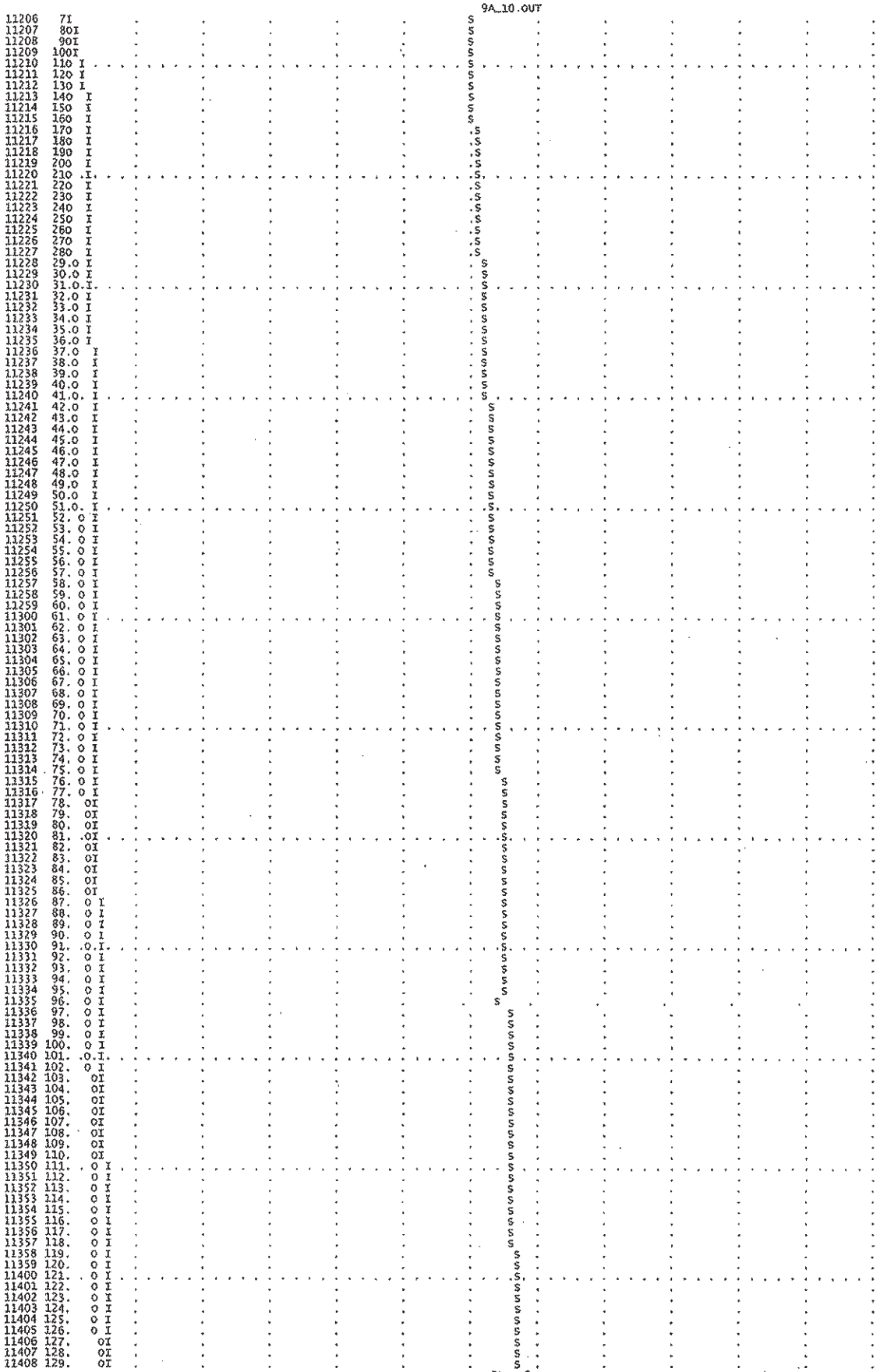
1 STATION OBTAIN

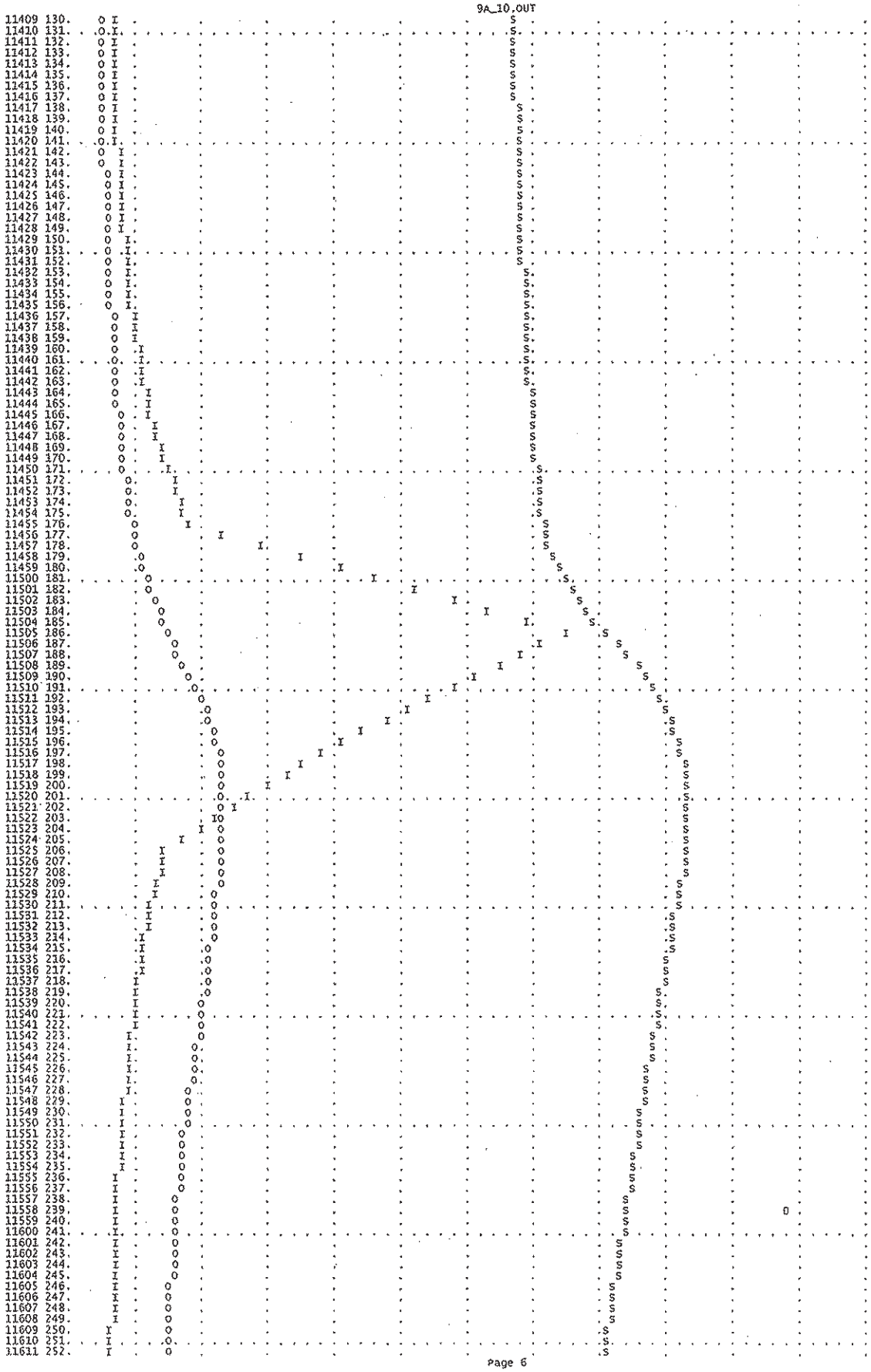
(I) INFLOW, (O) OUTFLOW

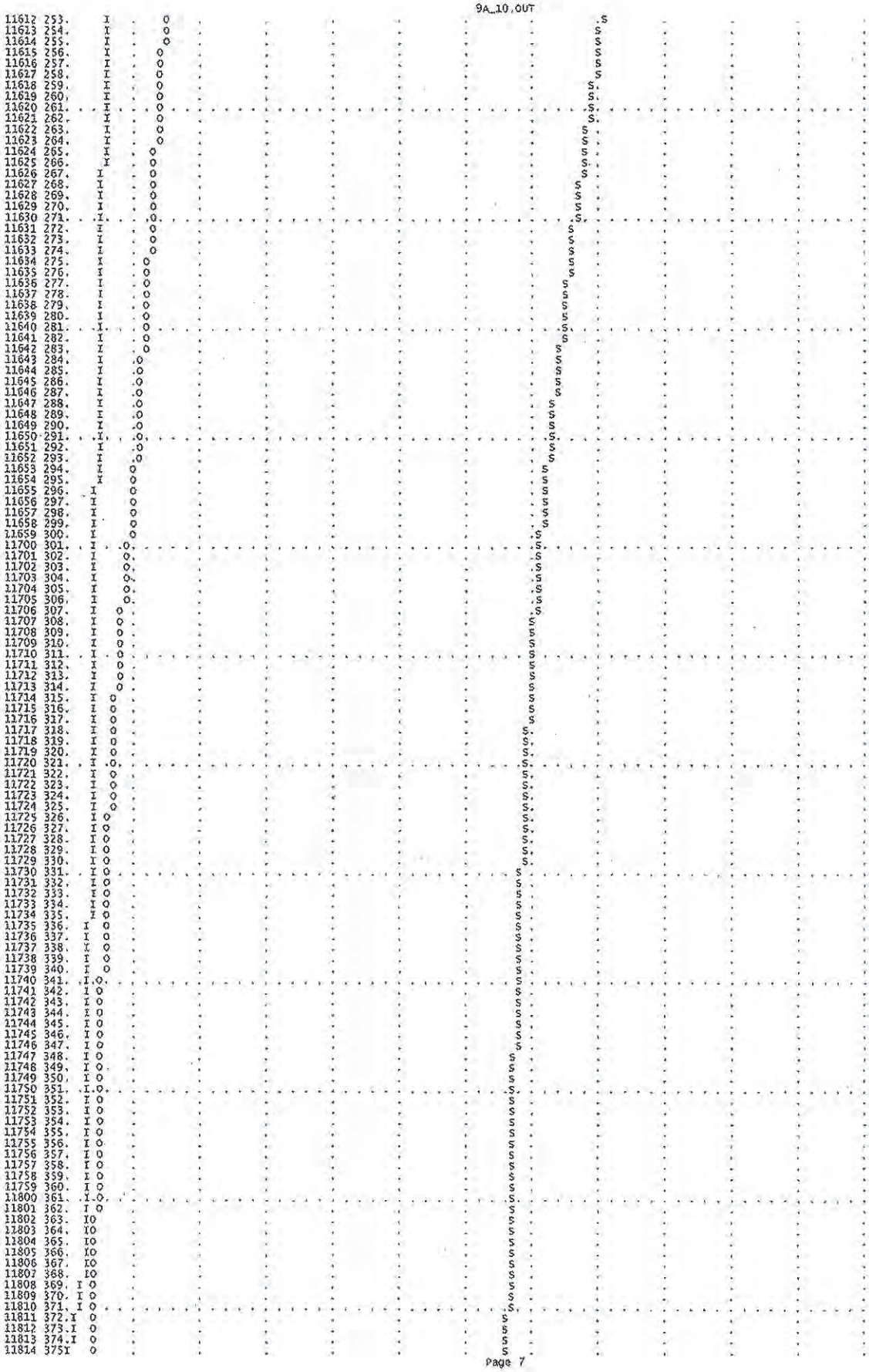
0.	4.	8.	12.	16.	20.	24.	28.	32.	0.	0.	0.	0.
.0	.0	.0	.0	.0	.0	.0	.2	.4	.6	.8	.0	.0

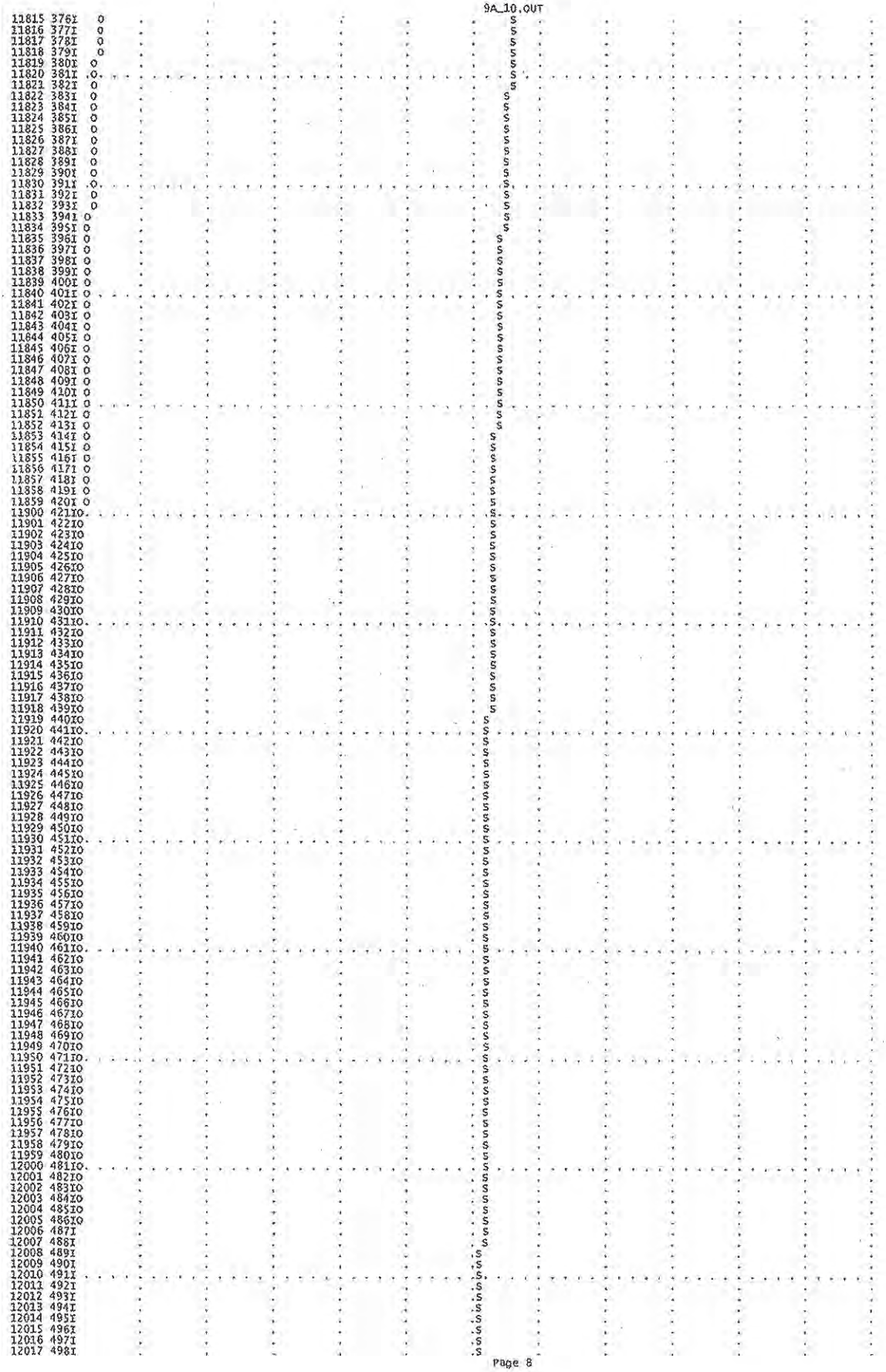
(S) STORAGE

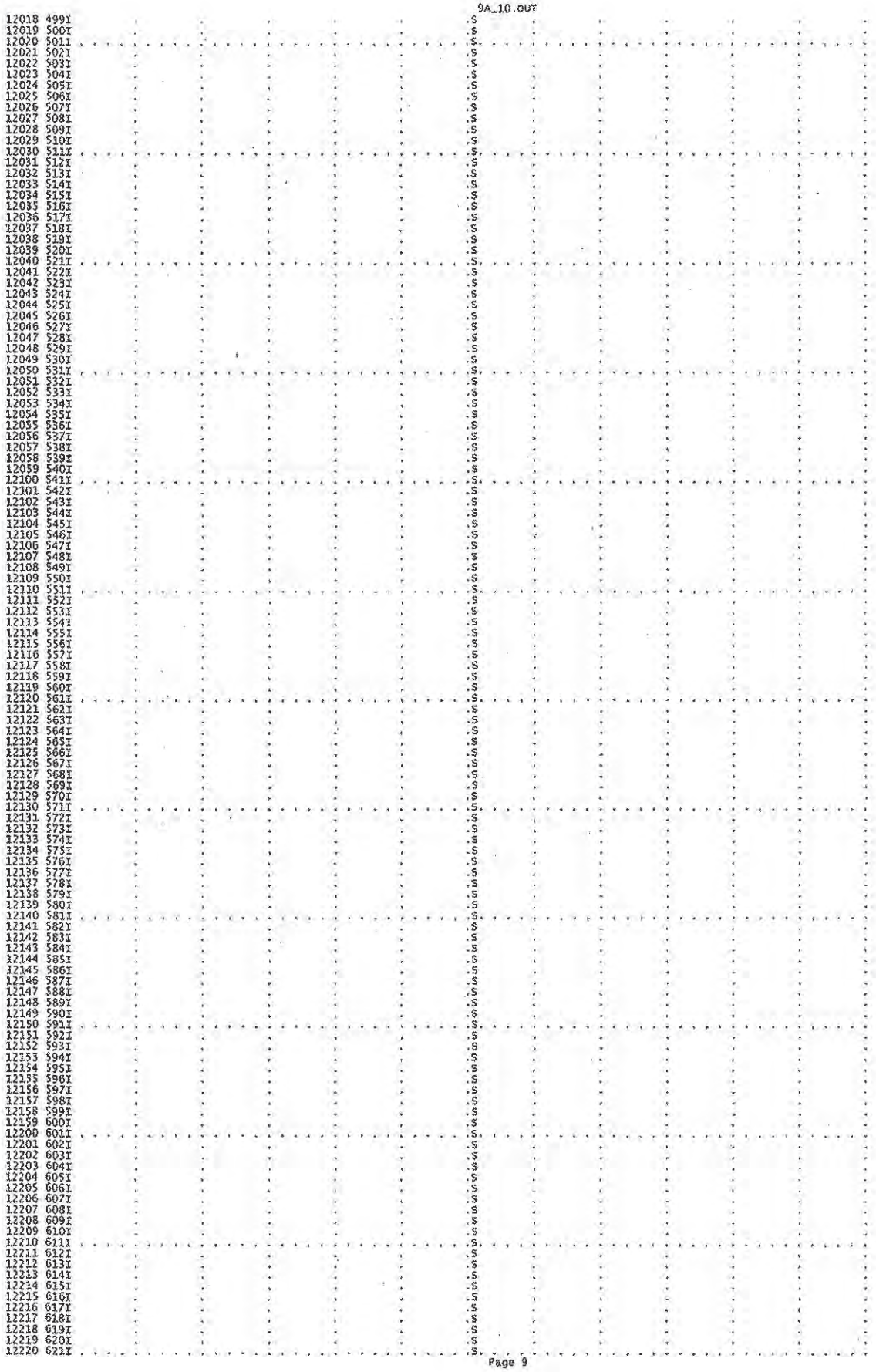
DAHRMN	PER												
11200	1I						S						
11201	2I	.	.	.	.	.	S	.	.	.	.	.	.
11202	3I	.	.	.	.	.	S	.	.	.	.	.	.
11203	4I	.	.	.	.	.	S	.	.	.	.	.	.
11204	5I	.	.	.	.	.	S	.	.	.	.	.	.
11205	6I	.	.	.	.	.	S	.	.	.	.	.	.

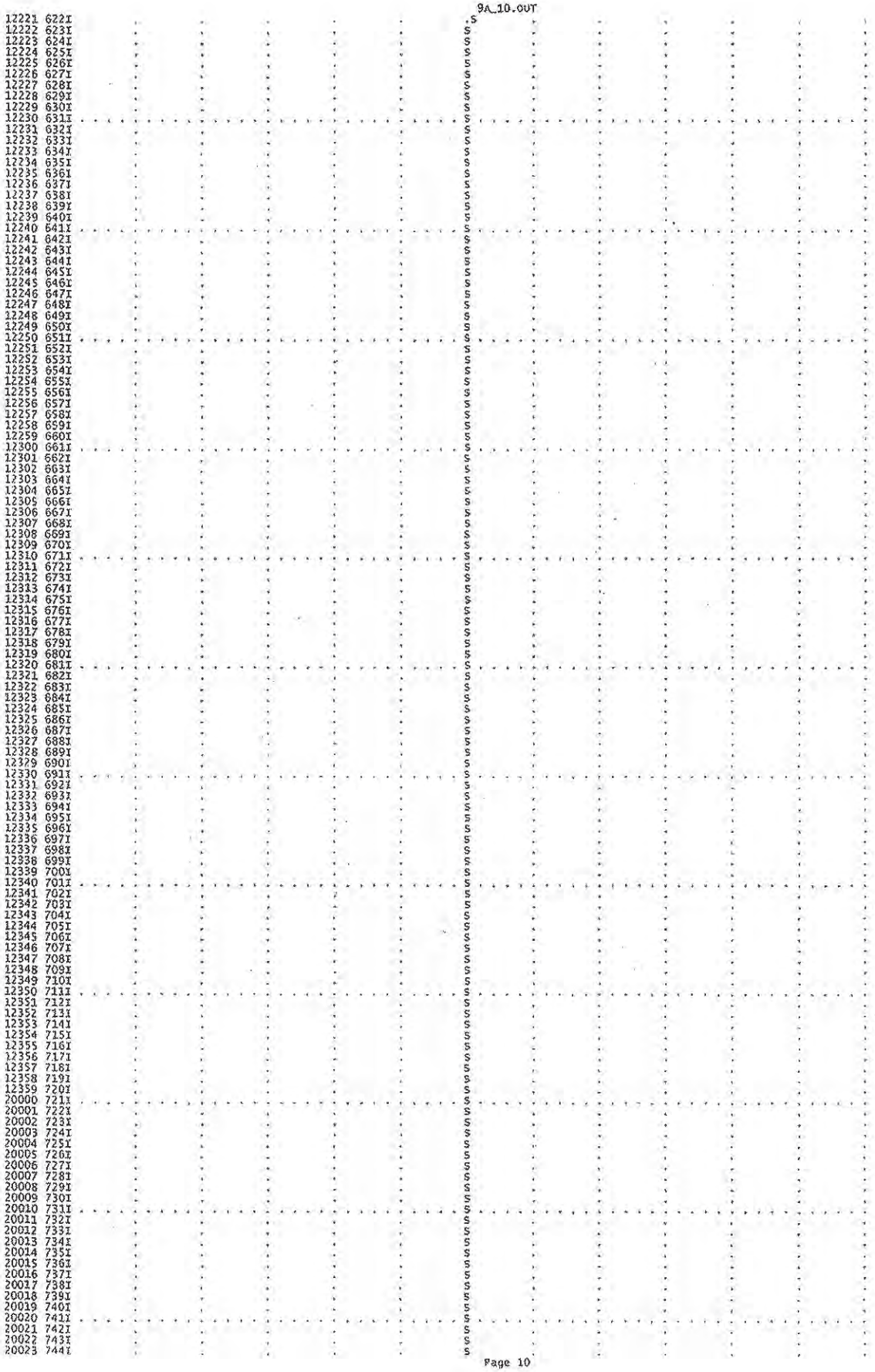


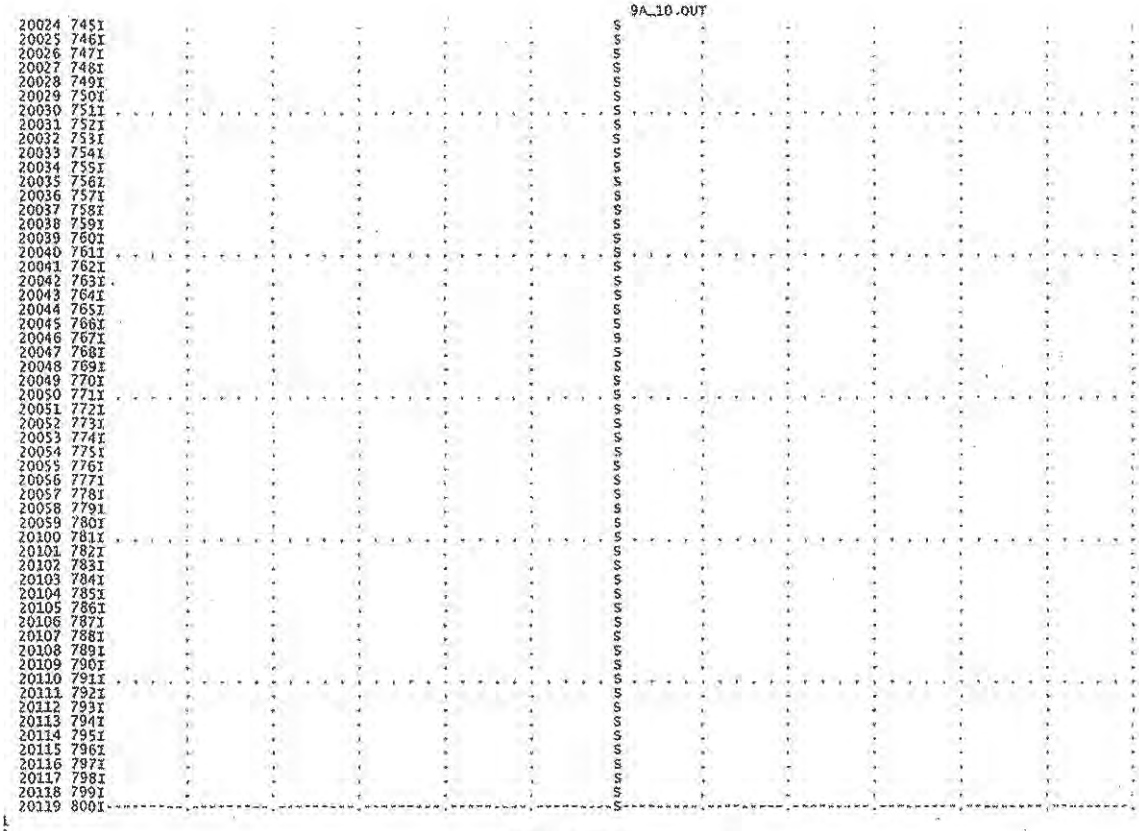












RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	9A_10	30.	3.08	4.	2.	2.	.02		
ROUTED TO	DETAIN	9.	3.37	3.	2.	2.	.02	500.15	3.37

*** NORMAL END OF HEC-1 ***

25-YEAR


```
**********************************************
*                                            *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *
*             JUN  1998                      *
*           VERSION 4.1                      *
*                                            *
*  RUN DATE   02JUL14  TIME  12:56:55        *
*                                            *
**********************************************
```

```
**********************************************
*                                            *
*   U.S. ARMY CORPS OF ENGINEERS             *
*   HYDROLOGIC ENGINEERING CENTER            *
*        609 SECOND STREET                   *
*     DAVIS, CALIFORNIA 95616                *
*          (916) 756-1104                    *
*                                            *
**********************************************
```

```
X    X XXXXXXX  XXXXX         X
X    X X      X     X       XX
X    X X      X             X
XXXXXX XXXX   X       XXXXX  X
X    X X      X             X
X    X X      X   X         X
X    X XXXXXXX  XXXXX       XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                        *DIAGRAM
*** FREE ***
               1        ID   BMR NVE UNIT 14
               2        ID   UNDERGROUND DETENTION BASIN 9A
               3        ID   15009_H
               4        IT       1 01JAN90    1200     800
               5        IO       5        0

               6        KK   9A_25
               7        KM   RATIONAL METHOD HYDROGRAPH PROGRAM
               8        KM   COPYRIGHT 1992, RICK ENGINEERING COMPANY
               9        KM   6HR RAINFALL IS  2.3  INCHES
              10        KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  .9
              11        KM   RATIONAL METHOD TIME OF CONCENTRATION IS  10  MIN.
              12        KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
              13        KM   IT 2 01JAN90 1200 200
              14        BA   .0186
              15        IN       10 01JAN90    1155
              16        QI        0        0      1.5      1.6      1.6      1.7      1.8      1.9        2      2.1
              17        QI      2.2      2.4      2.6      2.9      3.2      3.7      4.4      5.6      8.2    34.89
              18        QI     18.2      6.6      4.9        4      3.5      3.1      2.8      2.5      2.3      2.2
              19        QI        2      1.9      1.8      1.7      1.7      1.6      1.5      1.5        0        0
              20        QI        0        0        0        0        0        0        0        0

              21        KK   DETAIN
              22        KO        2        2        0        0       21
              23        RS        1     STOR       -1
              24        SV        0    0.135    0.271    0.406    0.541    0.677    0.767
              25        SE   495.22   496.22   497.22   498.22   499.22   500.22   500.89
              26        SQ        0     0.16     0.81     1.73     2.87     4.13     4.76     5.32     5.82     6.40
              27        SQ     6.93     7.88     8.77     9.31    10.42     11.2
              28        SE   495.22   495.42   495.82   496.22   496.62   497.02   497.42   497.82   498.22   498.72
              29        SE   499.02   499.42   499.82   500.15   500.62   500.89
              30        ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    6      9A_25
             V
             V
   21      DETAIN
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION


```
**********************************************
*                                            *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *
*             JUN  1998                      *
*           VERSION 4.1                      *
*                                            *
*  RUN DATE   02JUL14  TIME  12:56:55        *
*                                            *
**********************************************
```

```
**********************************************
*                                            *
*   U.S. ARMY CORPS OF ENGINEERS             *
*   HYDROLOGIC ENGINEERING CENTER            *
*        609 SECOND STREET                   *
*     DAVIS, CALIFORNIA 95616                *
*          (916) 756-1104                    *
*                                            *
**********************************************
```


BMR NVE UNIT 14
UNDERGROUND DETENTION BASIN 9A
15009_H

```
 5 IO          OUTPUT CONTROL VARIABLES
                    IPRNT         5  PRINT CONTROL
                    IPLOT         0  PLOT CONTROL
                    QSCAL        0.  HYDROGRAPH PLOT SCALE

   IT           HYDROGRAPH TIME DATA
                    NMIN          1  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1JAN90  STARTING DATE
                   ITIME        1200  STARTING TIME
                      NQ         800  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     2JAN90  ENDING DATE
                   NDTIME        0119  ENDING TIME
                   ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL      .02 HOURS
                   TOTAL TIME BASE   13.32 HOURS

        ENGLISH UNITS
            DRAINAGE AREA        SQUARE MILES
            PRECIPITATION DEPTH  INCHES
```

LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

```
21 KK      ***************
           *             *
           *   DETAIN    *
           *             *
           ***************

22 KO          OUTPUT CONTROL VARIABLES
                     IPRNT         2  PRINT CONTROL
                     IPLOT         2  PLOT CONTROL
                     QSCAL        0.  HYDROGRAPH PLOT SCALE
                     IPNCH         0  PUNCH COMPUTED HYDROGRAPH
                      IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2       800  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT      .017  TIME INTERVAL IN HOURS

               HYDROGRAPH ROUTING DATA

23 RS          STORAGE ROUTING
                     NSTPS         1  NUMBER OF SUBREACHES
                      ITYP      STOR  TYPE OF INITIAL CONDITION
                    RSVRIC     -1.00  INITIAL CONDITION
                         X       .00  WORKING R AND D COEFFICIENT

24 SV            STORAGE        .0       .1       .3       .4       .5       .7       .8

25 SE            ELEVATION   495.22   496.22   497.22   498.22   499.22   500.22   500.89

26 SQ            DISCHARGE       0.       0.       1.       2.       3.       4.       5.       5.       6.       6.
                                 7.       8.       9.       9.      10.      11.

28 SE            ELEVATION   495.22   495.42   495.82   496.22   496.62   497.02   497.42   497.82   498.22   498.72
                             499.02   499.42   499.82   500.15   500.62   500.89
                                                        ***
                                 COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                  STORAGE       .00      .03      .08      .14      .19      .24      .27      .30      .35      .41
                  OUTFLOW       .00      .16      .81     1.73     2.87     4.13     4.45     4.76     5.32     5.82
                ELEVATION    495.22   495.42   495.82   496.22   496.62   497.02   497.22   497.42   497.82   498.22

                  STORAGE       .47      .51      .54      .57      .62      .67      .68      .73      .77
                  OUTFLOW      6.40     6.93     7.40     7.88     8.77     9.31     9.48    10.42    11.20
                ELEVATION    498.72   499.02   499.22   499.42   499.82   500.15   500.22   500.62   500.89
```

HYDROGRAPH AT STATION DETAIN

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	JAN	1200	1	0.	.0	495.2	1	JAN	1627	268	6.	.4	498.2	1	JAN	2054	535	0.	.0	495.4
1	JAN	1201	2	0.	.0	495.2	1	JAN	1628	269	6.	.4	498.1	1	JAN	2055	536	0.	.0	495.4
1	JAN	1202	3	0.	.0	495.2	1	JAN	1629	270	6.	.4	498.1	1	JAN	2056	537	0.	.0	495.4
1	JAN	1203	4	0.	.0	495.2	1	JAN	1630	271	6.	.4	498.1	1	JAN	2057	538	0.	.0	495.4
1	JAN	1204	5	0.	.0	495.2	1	JAN	1631	272	6.	.4	498.0	1	JAN	2058	539	0.	.0	495.4
1	JAN	1205	6	0.	.0	495.2	1	JAN	1632	273	6.	.4	498.0	1	JAN	2059	540	0.	.0	495.4
1	JAN	1206	7	0.	.0	495.2	1	JAN	1633	274	6.	.4	498.0	1	JAN	2100	541	0.	.0	495.4
1	JAN	1207	8	0.	.0	495.2	1	JAN	1634	275	5.	.4	498.0	1	JAN	2101	542	0.	.0	495.4
1	JAN	1208	9	0.	.0	495.2	1	JAN	1635	276	5.	.4	497.9	1	JAN	2102	543	0.	.0	495.4
1	JAN	1209	10	0.	.0	495.2	1	JAN	1636	277	5.	.4	497.9	1	JAN	2103	544	0.	.0	495.4
1	JAN	1210	11	0.	.0	495.2	1	JAN	1637	278	5.	.4	497.9	1	JAN	2104	545	0.	.0	495.4
1	JAN	1211	12	0.	.0	495.2	1	JAN	1638	279	5.	.4	497.8	1	JAN	2105	546	0.	.0	495.4
1	JAN	1212	13	0.	.0	495.3	1	JAN	1639	280	5.	.3	497.8	1	JAN	2106	547	0.	.0	495.4
1	JAN	1213	14	0.	.0	495.3	1	JAN	1640	281	5.	.3	497.8	1	JAN	2107	548	0.	.0	495.4
1	JAN	1214	15	0.	.0	495.3	1	JAN	1641	282	5.	.3	497.7	1	JAN	2108	549	0.	.0	495.4
1	JAN	1215	16	0.	.0	495.3	1	JAN	1642	283	5.	.3	497.7	1	JAN	2109	550	0.	.0	495.4
1	JAN	1216	17	0.	.0	495.3	1	JAN	1643	284	5.	.3	497.7	1	JAN	2110	551	0.	.0	495.4
1	JAN	1217	18	0.	.0	495.3	1	JAN	1644	285	5.	.3	497.6	1	JAN	2111	552	0.	.0	495.4
1	JAN	1218	19	0.	.0	495.3	1	JAN	1645	286	5.	.3	497.6	1	JAN	2112	553	0.	.0	495.4
1	JAN	1219	20	0.	.0	495.4	1	JAN	1646	287	5.	.3	497.6	1	JAN	2113	554	0.	.0	495.4
1	JAN	1220	21	0.	.0	495.4	1	JAN	1647	288	5.	.3	497.6	1	JAN	2114	555	0.	.0	495.4
1	JAN	1221	22	0.	.0	495.4	1	JAN	1648	289	5.	.3	497.5	1	JAN	2115	556	0.	.0	495.4
1	JAN	1222	23	0.	.0	495.4	1	JAN	1649	290	5.	.3	497.5	1	JAN	2116	557	0.	.0	495.4
1	JAN	1223	24	0.	.0	495.4	1	JAN	1650	291	5.	.3	497.5	1	JAN	2117	558	0.	.0	495.4
1	JAN	1224	25	0.	.0	495.4	1	JAN	1651	292	5.	.3	497.4	1	JAN	2118	559	0.	.0	495.3
1	JAN	1225	26	0.	.0	495.4	1	JAN	1652	293	5.	.3	497.4	1	JAN	2119	560	0.	.0	495.3
1	JAN	1226	27	0.	.0	495.5	1	JAN	1653	294	5.	.3	497.4	1	JAN	2120	561	0.	.0	495.3
1	JAN	1227	28	0.	.0	495.5	1	JAN	1654	295	5.	.3	497.4	1	JAN	2121	562	0.	.0	495.3
1	JAN	1228	29	0.	.0	495.5	1	JAN	1655	296	5.	.3	497.3	1	JAN	2122	563	0.	.0	495.3
1	JAN	1229	30	0.	.0	495.5	1	JAN	1656	297	5.	.3	497.3	1	JAN	2123	564	0.	.0	495.3
1	JAN	1230	31	0.	.0	495.5	1	JAN	1657	298	5.	.3	497.3	1	JAN	2124	565	0.	.0	495.3
1	JAN	1231	32	0.	.0	495.5	1	JAN	1658	299	5.	.3	497.3	1	JAN	2125	566	0.	.0	495.3
1	JAN	1232	33	0.	.0	495.5	1	JAN	1659	300	4.	.3	497.2	1	JAN	2126	567	0.	.0	495.3
1	JAN	1233	34	0.	.0	495.5	1	JAN	1700	301	4.	.3	497.2	1	JAN	2127	568	0.	.0	495.3
1	JAN	1234	35	0.	.0	495.6	1	JAN	1701	302	4.	.3	497.2	1	JAN	2128	569	0.	.0	495.3
1	JAN	1235	36	0.	.0	495.6	1	JAN	1702	303	4.	.3	497.2	1	JAN	2129	570	0.	.0	495.3
1	JAN	1236	37	0.	.0	495.6	1	JAN	1703	304	4.	.3	497.1	1	JAN	2130	571	0.	.0	495.3
1	JAN	1237	38	0.	.1	495.6	1	JAN	1704	305	4.	.3	497.1	1	JAN	2131	572	0.	.0	495.3
1	JAN	1238	39	0.	.1	495.6	1	JAN	1705	306	4.	.3	497.1	1	JAN	2132	573	0.	.0	495.3
1	JAN	1239	40	0.	.1	495.6	1	JAN	1706	307	4.	.2	497.1	1	JAN	2133	574	0.	.0	495.3
1	JAN	1240	41	1.	.1	495.6	1	JAN	1707	308	4.	.2	497.0	1	JAN	2134	575	0.	.0	495.3
1	JAN	1241	42	1.	.1	495.6	1	JAN	1708	309	4.	.2	497.0	1	JAN	2135	576	0.	.0	495.3
1	JAN	1242	43	1.	.1	495.7	1	JAN	1709	310	4.	.2	497.0	1	JAN	2136	577	0.	.0	495.3
1	JAN	1243	44	1.	.1	495.7	1	JAN	1710	311	4.	.2	497.0	1	JAN	2137	578	0.	.0	495.3
1	JAN	1244	45	1.	.1	495.7	1	JAN	1711	312	4.	.2	496.9	1	JAN	2138	579	0.	.0	495.3
1	JAN	1245	46	1.	.1	495.7	1	JAN	1712	313	4.	.2	496.9	1	JAN	2139	580	0.	.0	495.3
1	JAN	1246	47	1.	.1	495.7	1	JAN	1713	314	4.	.2	496.9	1	JAN	2140	581	0.	.0	495.3
1	JAN	1247	48	1.	.1	495.7	1	JAN	1714	315	4.	.2	496.9	1	JAN	2141	582	0.	.0	495.3
1	JAN	1248	49	1.	.1	495.7	1	JAN	1715	316	4.	.2	496.9	1	JAN	2142	583	0.	.0	495.3
1	JAN	1249	50	1.	.1	495.7	1	JAN	1716	317	4.	.2	496.9	1	JAN	2143	584	0.	.0	495.3
1	JAN	1250	51	1.	.1	495.7	1	JAN	1717	318	4.	.2	496.8	1	JAN	2144	585	0.	.0	495.3
1	JAN	1251	52	1.	.1	495.8	1	JAN	1718	319	3.	.2	496.8	1	JAN	2145	586	0.	.0	495.3
1	JAN	1252	53	1.	.1	495.8	1	JAN	1719	320	3.	.2	496.8	1	JAN	2146	587	0.	.0	495.3
1	JAN	1253	54	1.	.1	495.8	1	JAN	1720	321	3.	.2	496.8	1	JAN	2147	588	0.	.0	495.3
1	JAN	1254	55	1.	.1	495.8	1	JAN	1721	322	3.	.2	496.8	1	JAN	2148	589	0.	.0	495.3
1	JAN	1255	56	1.	.1	495.8	1	JAN	1722	323	3.	.2	496.7	1	JAN	2149	590	0.	.0	495.3
1	JAN	1256	57	1.	.1	495.8	1	JAN	1723	324	3.	.2	496.7	1	JAN	2150	591	0.	.0	495.3

1 JAN 1257	58	1.	.1	495.8 *	1 JAN 1724	325	3.	.2	496.7 *	1 JAN 2151	592	0.	.0	495.3
1 JAN 1258	59	1.	.1	495.8 *	1 JAN 1725	326	3.	.2	496.7 *	1 JAN 2152	593	0.	.0	495.3
1 JAN 1259	60	1.	.1	495.8 *	1 JAN 1726	327	3.	.2	496.7 *	1 JAN 2153	594	0.	.0	495.3
1 JAN 1300	61	1.	.1	495.8 *	1 JAN 1727	328	3.	.2	496.7 *	1 JAN 2154	595	0.	.0	495.3
1 JAN 1301	62	1.	.1	495.9 *	1 JAN 1728	329	3.	.2	496.7 *	1 JAN 2155	596	0.	.0	495.3
1 JAN 1302	63	1.	.1	495.9 *	1 JAN 1729	330	3.	.2	496.6 *	1 JAN 2156	597	0.	.0	495.3
1 JAN 1303	64	1.	.1	495.9 *	1 JAN 1730	331	3.	.2	496.6 *	1 JAN 2157	598	0.	.0	495.3
1 JAN 1304	65	1.	.1	495.9 *	1 JAN 1731	332	3.	.2	496.6 *	1 JAN 2158	599	0.	.0	495.3
1 JAN 1305	66	1.	.1	495.9 *	1 JAN 1732	333	3.	.2	496.6 *	1 JAN 2159	600	0.	.0	495.3
1 JAN 1306	67	1.	.1	495.9 *	1 JAN 1733	334	3.	.2	496.6 *	1 JAN 2200	601	0.	.0	495.3
1 JAN 1307	68	1.	.1	495.9 *	1 JAN 1734	335	3.	.2	496.6 *	1 JAN 2201	602	0.	.0	495.3
1 JAN 1308	69	1.	.1	495.9 *	1 JAN 1735	336	3.	.2	496.6 *	1 JAN 2202	603	0.	.0	495.3
1 JAN 1309	70	1.	.1	495.9 *	1 JAN 1736	337	3.	.2	496.6 *	1 JAN 2203	604	0.	.0	495.3
1 JAN 1310	71	1.	.1	495.9 *	1 JAN 1737	338	3.	.2	496.6 *	1 JAN 2204	605	0.	.0	495.3
1 JAN 1311	72	1.	.1	496.0 *	1 JAN 1738	339	3.	.2	496.5 *	1 JAN 2205	606	0.	.0	495.3
1 JAN 1312	73	1.	.1	496.0 *	1 JAN 1739	340	3.	.2	496.5 *	1 JAN 2206	607	0.	.0	495.3
1 JAN 1313	74	1.	.1	496.0 *	1 JAN 1740	341	3.	.2	496.5 *	1 JAN 2207	608	0.	.0	495.3
1 JAN 1314	75	1.	.1	496.0 *	1 JAN 1741	342	3.	.2	496.5 *	1 JAN 2208	609	0.	.0	495.3
1 JAN 1315	76	1.	.1	496.0 *	1 JAN 1742	343	3.	.2	496.5 *	1 JAN 2209	610	0.	.0	495.3
1 JAN 1316	77	1.	.1	496.0 *	1 JAN 1743	344	3.	.2	496.5 *	1 JAN 2210	611	0.	.0	495.3
1 JAN 1317	78	1.	.1	496.0 *	1 JAN 1744	345	3.	.2	496.5 *	1 JAN 2211	612	0.	.0	495.3
1 JAN 1318	79	1.	.1	496.0 *	1 JAN 1745	346	2.	.2	496.5 *	1 JAN 2212	613	0.	.0	495.3
1 JAN 1319	80	1.	.1	496.0 *	1 JAN 1746	347	2.	.2	496.5 *	1 JAN 2213	614	0.	.0	495.3
1 JAN 1320	81	1.	.1	496.0 *	1 JAN 1747	348	2.	.2	496.5 *	1 JAN 2214	615	0.	.0	495.3
1 JAN 1321	82	1.	.1	496.0 *	1 JAN 1748	349	2.	.2	496.5 *	1 JAN 2215	616	0.	.0	495.3
1 JAN 1322	83	1.	.1	496.0 *	1 JAN 1749	350	2.	.2	496.4 *	1 JAN 2216	617	0.	.0	495.3
1 JAN 1323	84	1.	.1	496.0 *	1 JAN 1750	351	2.	.2	496.4 *	1 JAN 2217	618	0.	.0	495.3
1 JAN 1324	85	1.	.1	496.1 *	1 JAN 1751	352	2.	.2	496.4 *	1 JAN 2218	619	0.	.0	495.3
1 JAN 1325	86	1.	.1	496.1 *	1 JAN 1752	353	2.	.2	496.4 *	1 JAN 2219	620	0.	.0	495.3
1 JAN 1326	87	1.	.1	496.1 *	1 JAN 1753	354	2.	.2	496.4 *	1 JAN 2220	621	0.	.0	495.3
1 JAN 1327	88	1.	.1	496.1 *	1 JAN 1754	355	2.	.2	496.4 *	1 JAN 2221	622	0.	.0	495.3
1 JAN 1328	89	1.	.1	496.1 *	1 JAN 1755	356	2.	.2	496.4 *	1 JAN 2222	623	0.	.0	495.3
1 JAN 1329	90	1.	.1	496.1 *	1 JAN 1756	357	2.	.2	496.4 *	1 JAN 2223	624	0.	.0	495.3
1 JAN 1330	91	1.	.1	496.1 *	1 JAN 1757	358	2.	.2	496.4 *	1 JAN 2224	625	0.	.0	495.3
1 JAN 1331	92	1.	.1	496.1 *	1 JAN 1758	359	2.	.2	496.4 *	1 JAN 2225	626	0.	.0	495.3
1 JAN 1332	93	1.	.1	496.1 *	1 JAN 1759	360	2.	.2	496.4 *	1 JAN 2226	627	0.	.0	495.3
1 JAN 1333	94	2.	.1	496.1 *	1 JAN 1800	361	2.	.2	496.4 *	1 JAN 2227	628	0.	.0	495.3
1 JAN 1334	95	2.	.1	496.1 *	1 JAN 1801	362	2.	.2	496.4 *	1 JAN 2228	629	0.	.0	495.3
1 JAN 1335	96	2.	.1	496.1 *	1 JAN 1802	363	2.	.2	496.4 *	1 JAN 2229	630	0.	.0	495.3
1 JAN 1336	97	2.	.1	496.1 *	1 JAN 1803	364	2.	.2	496.3 *	1 JAN 2230	631	0.	.0	495.3
1 JAN 1337	98	2.	.1	496.1 *	1 JAN 1804	365	2.	.2	496.3 *	1 JAN 2231	632	0.	.0	495.3
1 JAN 1338	99	2.	.1	496.2 *	1 JAN 1805	366	2.	.2	496.3 *	1 JAN 2232	633	0.	.0	495.3
1 JAN 1339	100	2.	.1	496.2 *	1 JAN 1806	367	2.	.1	496.3 *	1 JAN 2233	634	0.	.0	495.3
1 JAN 1340	101	2.	.1	496.2 *	1 JAN 1807	368	2.	.1	496.3 *	1 JAN 2234	635	0.	.0	495.3
1 JAN 1341	102	2.	.1	496.2 *	1 JAN 1808	369	2.	.1	496.3 *	1 JAN 2235	636	0.	.0	495.3
1 JAN 1342	103	2.	.1	496.2 *	1 JAN 1809	370	2.	.1	496.3 *	1 JAN 2236	637	0.	.0	495.3
1 JAN 1343	104	2.	.1	496.2 *	1 JAN 1810	371	2.	.1	496.3 *	1 JAN 2237	638	0.	.0	495.3
1 JAN 1344	105	2.	.1	496.2 *	1 JAN 1811	372	2.	.1	496.3 *	1 JAN 2238	639	0.	.0	495.3
1 JAN 1345	106	2.	.1	496.2 *	1 JAN 1812	373	2.	.1	496.3 *	1 JAN 2239	640	0.	.0	495.3
1 JAN 1346	107	2.	.1	496.2 *	1 JAN 1813	374	2.	.1	496.2 *	1 JAN 2240	641	0.	.0	495.3
1 JAN 1347	108	2.	.1	496.2 *	1 JAN 1814	375	2.	.1	496.2 *	1 JAN 2241	642	0.	.0	495.3
1 JAN 1348	109	2.	.1	496.2 *	1 JAN 1815	376	2.	.1	496.2 *	1 JAN 2242	643	0.	.0	495.3
1 JAN 1349	110	2.	.1	496.2 *	1 JAN 1816	377	2.	.1	496.2 *	1 JAN 2243	644	0.	.0	495.3
1 JAN 1350	111	2.	.1	496.2 *	1 JAN 1817	378	2.	.1	496.2 *	1 JAN 2244	645	0.	.0	495.3
1 JAN 1351	112	2.	.1	496.2 *	1 JAN 1818	379	2.	.1	496.2 *	1 JAN 2245	646	0.	.0	495.3
1 JAN 1352	113	2.	.1	496.3 *	1 JAN 1819	380	2.	.1	496.1 *	1 JAN 2246	647	0.	.0	495.3
1 JAN 1353	114	2.	.1	496.3 *	1 JAN 1820	381	2.	.1	496.1 *	1 JAN 2247	648	0.	.0	495.3
1 JAN 1354	115	2.	.1	496.3 *	1 JAN 1821	382	1.	.1	496.1 *	1 JAN 2248	649	0.	.0	495.3
1 JAN 1355	116	2.	.1	496.3 *	1 JAN 1822	383	1.	.1	496.1 *	1 JAN 2249	650	0.	.0	495.3
1 JAN 1356	117	2.	.1	496.3 *	1 JAN 1823	384	1.	.1	496.1 *	1 JAN 2250	651	0.	.0	495.3
1 JAN 1357	118	2.	.1	496.3 *	1 JAN 1824	385	1.	.1	496.1 *	1 JAN 2251	652	0.	.0	495.3
1 JAN 1358	119	2.	.1	496.3 *	1 JAN 1825	386	1.	.1	496.1 *	1 JAN 2252	653	0.	.0	495.3
1 JAN 1359	120	2.	.1	496.3 *	1 JAN 1826	387	1.	.1	496.0 *	1 JAN 2253	654	0.	.0	495.3
1 JAN 1400	121	2.	.1	496.3 *	1 JAN 1827	388	1.	.1	496.0 *	1 JAN 2254	655	0.	.0	495.3
1 JAN 1401	122	2.	.1	496.3 *	1 JAN 1828	389	1.	.1	496.0 *	1 JAN 2255	656	0.	.0	495.3
1 JAN 1402	123	2.	.1	496.3 *	1 JAN 1829	390	1.	.1	496.0 *	1 JAN 2256	657	0.	.0	495.3
1 JAN 1403	124	2.	.2	496.3 *	1 JAN 1830	391	1.	.1	496.0 *	1 JAN 2257	658	0.	.0	495.3
1 JAN 1404	125	2.	.2	496.3 *	1 JAN 1831	392	1.	.1	496.0 *	1 JAN 2258	659	0.	.0	495.3
1 JAN 1405	126	2.	.2	496.4 *	1 JAN 1832	393	1.	.1	496.0 *	1 JAN 2259	660	0.	.0	495.3
1 JAN 1406	127	2.	.2	496.4 *	1 JAN 1833	394	1.	.1	496.0 *	1 JAN 2300	661	0.	.0	495.3
1 JAN 1407	128	2.	.2	496.4 *	1 JAN 1834	395	1.	.1	495.9 *	1 JAN 2301	662	0.	.0	495.3
1 JAN 1408	129	2.	.2	496.4 *	1 JAN 1835	396	1.	.1	495.9 *	1 JAN 2302	663	0.	.0	495.3
1 JAN 1409	130	2.	.2	496.4 *	1 JAN 1836	397	1.	.1	495.9 *	1 JAN 2303	664	0.	.0	495.3
1 JAN 1410	131	2.	.2	496.4 *	1 JAN 1837	398	1.	.1	495.9 *	1 JAN 2304	665	0.	.0	495.3
1 JAN 1411	132	2.	.2	496.4 *	1 JAN 1838	399	1.	.1	495.9 *	1 JAN 2305	666	0.	.0	495.3
1 JAN 1412	133	2.	.2	496.4 *	1 JAN 1839	400	1.	.1	495.9 *	1 JAN 2306	667	0.	.0	495.3
1 JAN 1413	134	2.	.2	496.4 *	1 JAN 1840	401	1.	.1	495.9 *	1 JAN 2307	668	0.	.0	495.3
1 JAN 1414	135	2.	.2	496.4 *	1 JAN 1841	402	1.	.1	495.9 *	1 JAN 2308	669	0.	.0	495.3
1 JAN 1415	136	2.	.2	496.4 *	1 JAN 1842	403	1.	.1	495.9 *	1 JAN 2309	670	0.	.0	495.3
1 JAN 1416	137	2.	.2	496.4 *	1 JAN 1843	404	1.	.1	495.9 *	1 JAN 2310	671	0.	.0	495.3
1 JAN 1417	138	2.	.2	496.5 *	1 JAN 1844	405	1.	.1	495.8 *	1 JAN 2311	672	0.	.0	495.3
1 JAN 1418	139	2.	.2	496.5 *	1 JAN 1845	406	1.	.1	495.8 *	1 JAN 2312	673	0.	.0	495.3
1 JAN 1419	140	2.	.2	496.5 *	1 JAN 1846	407	1.	.1	495.8 *	1 JAN 2313	674	0.	.0	495.3
1 JAN 1420	141	2.	.2	496.5 *	1 JAN 1847	408	1.	.1	495.8 *	1 JAN 2314	675	0.	.0	495.3
1 JAN 1421	142	3.	.2	496.5 *	1 JAN 1848	409	1.	.1	495.8 *	1 JAN 2315	676	0.	.0	495.3
1 JAN 1422	143	3.	.2	496.5 *	1 JAN 1849	410	1.	.1	495.8 *	1 JAN 2316	677	0.	.0	495.3
1 JAN 1423	144	3.	.2	496.5 *	1 JAN 1850	411	1.	.1	495.8 *	1 JAN 2317	678	0.	.0	495.3
1 JAN 1424	145	3.	.2	496.5 *	1 JAN 1851	412	1.	.1	495.8 *	1 JAN 2318	679	0.	.0	495.3
1 JAN 1425	146	3.	.2	496.5 *	1 JAN 1852	413	1.	.1	495.8 *	1 JAN 2319	680	0.	.0	495.3
1 JAN 1426	147	3.	.2	496.5 *	1 JAN 1853	414	1.	.1	495.8 *	1 JAN 2320	681	0.	.0	495.3
1 JAN 1427	148	3.	.2	496.6 *	1 JAN 1854	415	1.	.1	495.8 *	1 JAN 2321	682	0.	.0	495.3
1 JAN 1428	149	3.	.2	496.6 *	1 JAN 1855	416	1.	.1	495.8 *	1 JAN 2322	683	0.	.0	495.3
1 JAN 1429	150	3.	.2	496.6 *	1 JAN 1856	417	1.	.1	495.8 *	1 JAN 2323	684	0.	.0	495.3
1 JAN 1430	151	3.	.2	496.6 *	1 JAN 1857	418	1.	.1	495.7 *	1 JAN 2324	685	0.	.0	495.3
1 JAN 1431	152	3.	.2	496.6 *	1 JAN 1858	419	1.	.1	495.7 *	1 JAN 2325	686	0.	.0	495.3
1 JAN 1432	153	3.	.2	496.6 *	1 JAN 1859	420	1.	.1	495.7 *	1 JAN 2326	687	0.	.0	495.3
1 JAN 1433	154	3.	.2	496.6 *	1 JAN 1900	421	1.	.1	495.7 *	1 JAN 2327	688	0.	.0	495.3
1 JAN 1434	155	3.	.2	496.6 *	1 JAN 1901	422	1.	.1	495.7 *	1 JAN 2328	689	0.	.0	495.3
1 JAN 1435	156	3.	.2	496.7 *	1 JAN 1902	423	1.	.1	495.7 *	1 JAN 2329	690	0.	.0	495.3
1 JAN 1436	157	3.	.2	496.7 *	1 JAN 1903	424	1.	.1	495.7 *	1 JAN 2330	691	0.	.0	495.3
1 JAN 1437	158	3.	.2	496.7 *	1 JAN 1904	425	1.	.1	495.7 *	1 JAN 2331	692	0.	.0	495.3
1 JAN 1438	159	3.	.2	496.7 *	1 JAN 1905	426	1.	.1	495.7 *	1 JAN 2332	693	0.	.0	495.3
1 JAN 1439	160	3.	.2	496.7 *	1 JAN 1906	427	1.	.1	495.7 *	1 JAN 2333	694	0.	.0	495.3
1 JAN 1440	161	3.	.2	496.7 *	1 JAN 1907	428	1.	.1	495.7 *	1 JAN 2334	695	0.	.0	495.3
1 JAN 1441	162	3.	.2	496.8 *	1 JAN 1908	429	1.	.1	495.7 *	1 JAN 2335	696	0.	.0	495.3
1 JAN 1442	163	3.	.2	496.8 *	1 JAN 1909	430	1.	.1	495.7 *	1 JAN 2336	697	0.	.0	495.3
1 JAN 1443	164	3.	.2	496.8 *	1 JAN 1910	431	1.	.1	495.7 *	1 JAN 2337	698	0.	.0	495.3
1 JAN 1444	165	3.	.2	496.8 *	1 JAN 1911	432	1.	.1	495.7 *	1 JAN 2338	699	0.	.0	495.3
1 JAN 1445	166	4.	.2	496.8 *	1 JAN 1912	433	1.	.1	495.7 *	1 JAN 2339	700	0.	.0	495.3
1 JAN 1446	167	4.	.2	496.9 *	1 JAN 1913	434	1.	.1	495.6 *	1 JAN 2340	701	0.	.0	495.3
1 JAN 1447	168	4.	.2	496.9 *	1 JAN 1914	435	1.	.1	495.6 *	1 JAN 2341	702	0.	.0	495.3
1 JAN 1448	169	4.	.2	496.9 *	1 JAN 1915	436	1.	.1	495.6 *	1 JAN 2342	703	0.	.0	495.3
1 JAN 1449	170	4.	.2	496.9 *	1 JAN 1916	437	1.	.1	495.6 *	1 JAN 2343	704	0.	.0	495.3
1 JAN 1450	171	4.	.2	497.0 *	1 JAN 1917	438	0.	.1	495.6 *	1 JAN 2344	705	0.	.0	495.3
1 JAN 1451	172	4.	.2	497.0 *	1 JAN 1918	439	0.	.1	495.6 *	1 JAN 2345	706	0.	.0	495.3
1 JAN 1452	173	4.	.2	497.0 *	1 JAN 1919	440	0.	.1	495.6 *	1 JAN 2346	707	0.	.0	495.3
1 JAN 1453	174	4.	.2	497.1 *	1 JAN 1920	441	0.	.1	495.6 *	1 JAN 2347	708	0.	.0	495.3
1 JAN 1454	175	4.	.3	497.1 *	1 JAN 1921	442	0.	.1	495.6 *	1 JAN 2348	709	0.	.0	495.3
1 JAN 1455	176	4.	.3	497.1 *	1 JAN 1922	443	0.	.1	495.6 *	1 JAN 2349	710	0.	.0	495.3
1 JAN 1456	177	4.	.3	497.2 *	1 JAN 1923	444	0.	.1	495.6 *	1 JAN 2350	711	0.	.0	495.3
1 JAN 1457	178	5.	.3	497.3 *	1 JAN 1924	445	0.	.1	495.6 *	1 JAN 2351	712	0.	.0	495.3
1 JAN 1458	179	5.	.3	497.4 *	1 JAN 1925	446	0.	.0	495.6 *	1 JAN 2352	713	0.	.0	495.3
1 JAN 1459	180	5.	.3	497.5 *	1 JAN 1926	447	0.	.0	495.6 *	1 JAN 2353	714	0.	.0	495.3

1	JAN	1500	181	5.	.3	497.7	*	1	JAN	1927	448	0.	.0	495.6	*	1	JAN	2354	715	0.	.0	495.3
1	JAN	1501	182	5.	.4	497.8	*	1	JAN	1928	449	0.	.0	495.6	*	1	JAN	2355	716	0.	.0	495.3
1	JAN	1502	183	6.	.4	498.0	*	1	JAN	1929	450	0.	.0	495.6	*	1	JAN	2356	717	0.	.0	495.3
1	JAN	1503	184	6.	.4	498.3	*	1	JAN	1930	451	0.	.0	495.6	*	1	JAN	2357	718	0.	.0	495.3
1	JAN	1504	185	6.	.4	498.5	*	1	JAN	1931	452	0.	.0	495.6	*	1	JAN	2358	719	0.	.0	495.3
1	JAN	1505	186	7.	.5	498.8	*	1	JAN	1932	453	0.	.0	495.6	*	1	JAN	2359	720	0.	.0	495.3
1	JAN	1506	187	7.	.5	499.1	*	1	JAN	1933	454	0.	.0	495.6	*	2	JAN	0000	721	0.	.0	495.3
1	JAN	1507	188	8.	.6	499.3	*	1	JAN	1934	455	0.	.0	495.6	*	2	JAN	0001	722	0.	.0	495.3
1	JAN	1508	189	8.	.6	499.6	*	1	JAN	1935	456	0.	.0	495.5	*	2	JAN	0002	723	0.	.0	495.3
1	JAN	1509	190	9.	.6	499.8	*	1	JAN	1936	457	0.	.0	495.5	*	2	JAN	0003	724	0.	.0	495.3
1	JAN	1510	191	9.	.6	500.0	*	1	JAN	1937	458	0.	.0	495.5	*	2	JAN	0004	725	0.	.0	495.3
1	JAN	1511	192	9.	.7	500.1	*	1	JAN	1938	459	0.	.0	495.5	*	2	JAN	0005	726	0.	.0	495.3
1	JAN	1512	193	10.	.7	500.3	*	1	JAN	1939	460	0.	.0	495.5	*	2	JAN	0006	727	0.	.0	495.3
1	JAN	1513	194	10.	.7	500.4	*	1	JAN	1940	461	0.	.0	495.5	*	2	JAN	0007	728	0.	.0	495.3
1	JAN	1514	195	10.	.7	500.5	*	1	JAN	1941	462	0.	.0	495.5	*	2	JAN	0008	729	0.	.0	495.3
1	JAN	1515	196	10.	.7	500.6	*	1	JAN	1942	463	0.	.0	495.5	*	2	JAN	0009	730	0.	.0	495.3
1	JAN	1516	197	11.	.7	500.7	*	1	JAN	1943	464	0.	.0	495.5	*	2	JAN	0010	731	0.	.0	495.3
1	JAN	1517	198	11.	.7	500.7	*	1	JAN	1944	465	0.	.0	495.5	*	2	JAN	0011	732	0.	.0	495.3
1	JAN	1518	199	11.	.8	500.8	*	1	JAN	1945	466	0.	.0	495.5	*	2	JAN	0012	733	0.	.0	495.3
1	JAN	1519	200	11.	.8	500.8	*	1	JAN	1946	467	0.	.0	495.5	*	2	JAN	0013	734	0.	.0	495.3
1	JAN	1520	201	11.	.8	500.8	*	1	JAN	1947	468	0.	.0	495.5	*	2	JAN	0014	735	0.	.0	495.3
1	JAN	1521	202	11.	.8	500.8	*	1	JAN	1948	469	0.	.0	495.5	*	2	JAN	0015	736	0.	.0	495.3
1	JAN	1522	203	11.	.8	500.8	*	1	JAN	1949	470	0.	.0	495.5	*	2	JAN	0016	737	0.	.0	495.3
1	JAN	1523	204	11.	.8	500.8	*	1	JAN	1950	471	0.	.0	495.5	*	2	JAN	0017	738	0.	.0	495.3
1	JAN	1524	205	11.	.8	500.8	*	1	JAN	1951	472	0.	.0	495.5	*	2	JAN	0018	739	0.	.0	495.2
1	JAN	1525	206	11.	.7	500.8	*	1	JAN	1952	473	0.	.0	495.5	*	2	JAN	0019	740	0.	.0	495.2
1	JAN	1526	207	11.	.7	500.7	*	1	JAN	1953	474	0.	.0	495.5	*	2	JAN	0020	741	0.	.0	495.2
1	JAN	1527	208	11.	.7	500.7	*	1	JAN	1954	475	0.	.0	495.5	*	2	JAN	0021	742	0.	.0	495.2
1	JAN	1528	209	10.	.7	500.6	*	1	JAN	1955	476	0.	.0	495.5	*	2	JAN	0022	743	0.	.0	495.2
1	JAN	1529	210	10.	.7	500.6	*	1	JAN	1956	477	0.	.0	495.5	*	2	JAN	0023	744	0.	.0	495.2
1	JAN	1530	211	10.	.7	500.5	*	1	JAN	1957	478	0.	.0	495.5	*	2	JAN	0024	745	0.	.0	495.2
1	JAN	1531	212	10.	.7	500.5	*	1	JAN	1958	479	0.	.0	495.5	*	2	JAN	0025	746	0.	.0	495.2
1	JAN	1532	213	10.	.7	500.4	*	1	JAN	1959	480	0.	.0	495.5	*	2	JAN	0026	747	0.	.0	495.2
1	JAN	1533	214	10.	.7	500.4	*	1	JAN	2000	481	0.	.0	495.5	*	2	JAN	0027	748	0.	.0	495.2
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1	JAN	1535	216	10.	.7	500.3	*	1	JAN	2002	483	0.	.0	495.5	*	2	JAN	0029	750	0.	.0	495.2
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1	JAN	1537	218	9.	.7	500.2	*	1	JAN	2004	485	0.	.0	495.5	*	2	JAN	0031	752	0.	.0	495.2
1	JAN	1538	219	9.	.7	500.2	*	1	JAN	2005	486	0.	.0	495.5	*	2	JAN	0032	753	0.	.0	495.2
1	JAN	1539	220	9.	.7	500.1	*	1	JAN	2006	487	0.	.0	495.5	*	2	JAN	0033	754	0.	.0	495.2
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1	JAN	1546	227	9.	.6	499.8	*	1	JAN	2013	494	0.	.0	495.4	*	2	JAN	0040	761	0.	.0	495.2
1	JAN	1547	228	9.	.6	499.7	*	1	JAN	2014	495	0.	.0	495.4	*	2	JAN	0041	762	0.	.0	495.2
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1	JAN	1550	231	8.	.6	499.6	*	1	JAN	2017	498	0.	.0	495.4	*	2	JAN	0044	765	0.	.0	495.2
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1	JAN	1559	240	7.	.5	499.2	*	1	JAN	2026	507	0.	.0	495.4	*	2	JAN	0053	774	0.	.0	495.2
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1	JAN	1603	244	7.	.5	499.0	*	1	JAN	2030	511	0.	.0	495.4	*	2	JAN	0057	778	0.	.0	495.2
1	JAN	1604	245	7.	.5	499.0	*	1	JAN	2031	512	0.	.0	495.4	*	2	JAN	0058	779	0.	.0	495.2
1	JAN	1605	246	7.	.5	499.0	*	1	JAN	2032	513	0.	.0	495.4	*	2	JAN	0059	780	0.	.0	495.2
1	JAN	1606	247	7.	.5	498.9	*	1	JAN	2033	514	0.	.0	495.4	*	2	JAN	0100	781	0.	.0	495.2
1	JAN	1607	248	7.	.5	498.9	*	1	JAN	2034	515	0.	.0	495.4	*	2	JAN	0101	782	0.	.0	495.2
1	JAN	1608	249	7.	.5	498.8	*	1	JAN	2035	516	0.	.0	495.4	*	2	JAN	0102	783	0.	.0	495.2
1	JAN	1609	250	7.	.5	498.8	*	1	JAN	2036	517	0.	.0	495.4	*	2	JAN	0103	784	0.	.0	495.2
1	JAN	1610	251	6.	.5	498.8	*	1	JAN	2037	518	0.	.0	495.4	*	2	JAN	0104	785	0.	.0	495.2
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1	JAN	1615	256	6.	.5	498.6	*	1	JAN	2042	523	0.	.0	495.4	*	2	JAN	0109	790	0.	.0	495.2
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1	JAN	1618	259	6.	.4	498.5	*	1	JAN	2045	526	0.	.0	495.4	*	2	JAN	0112	793	0.	.0	495.2
1	JAN	1619	260	6.	.4	498.5	*	1	JAN	2046	527	0.	.0	495.4	*	2	JAN	0113	794	0.	.0	495.2
1	JAN	1620	261	6.	.4	498.4	*	1	JAN	2047	528	0.	.0	495.4	*	2	JAN	0114	795	0.	.0	495.2
1	JAN	1621	262	6.	.4	498.4	*	1	JAN	2048	529	0.	.0	495.4	*	2	JAN	0115	796	0.	.0	495.2
1	JAN	1622	263	6.	.4	498.4	*	1	JAN	2049	530	0.	.0	495.4	*	2	JAN	0116	797	0.	.0	495.2
1	JAN	1623	264	6.	.4	498.3	*	1	JAN	2050	531	0.	.0	495.4	*	2	JAN	0117	798	0.	.0	495.2
1	JAN	1624	265	6.	.4	498.3	*	1	JAN	2051	532	0.	.0	495.4	*	2	JAN	0118	799	0.	.0	495.2
1	JAN	1625	266	6.	.4	498.3	*	1	JAN	2052	533	0.	.0	495.4	*	2	JAN	0119	800	0.	.0	495.2
1	JAN	1626	267	6.	.4	498.2	*	1	JAN	2053	534	0.	.0	495.4	*							

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	13.32-HR	
(CFS)	(HR)					
		(CFS)				
11.	3.35	4.	2.	2.	2.	
		(INCHES) 1.960	2.054	2.054	2.054	
		(AC-FT) 2.	2.	2.	2.	

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	13.32-HR
(AC-FT)	(HR)				
1.	3.35	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	13.32-HR
(FEET)	(HR)				
500.85	3.35	497.25	496.22	496.22	496.22

CUMULATIVE AREA = .02 SQ MI

1 STATION DETAIN

(I) INFLOW, (O) OUTFLOW

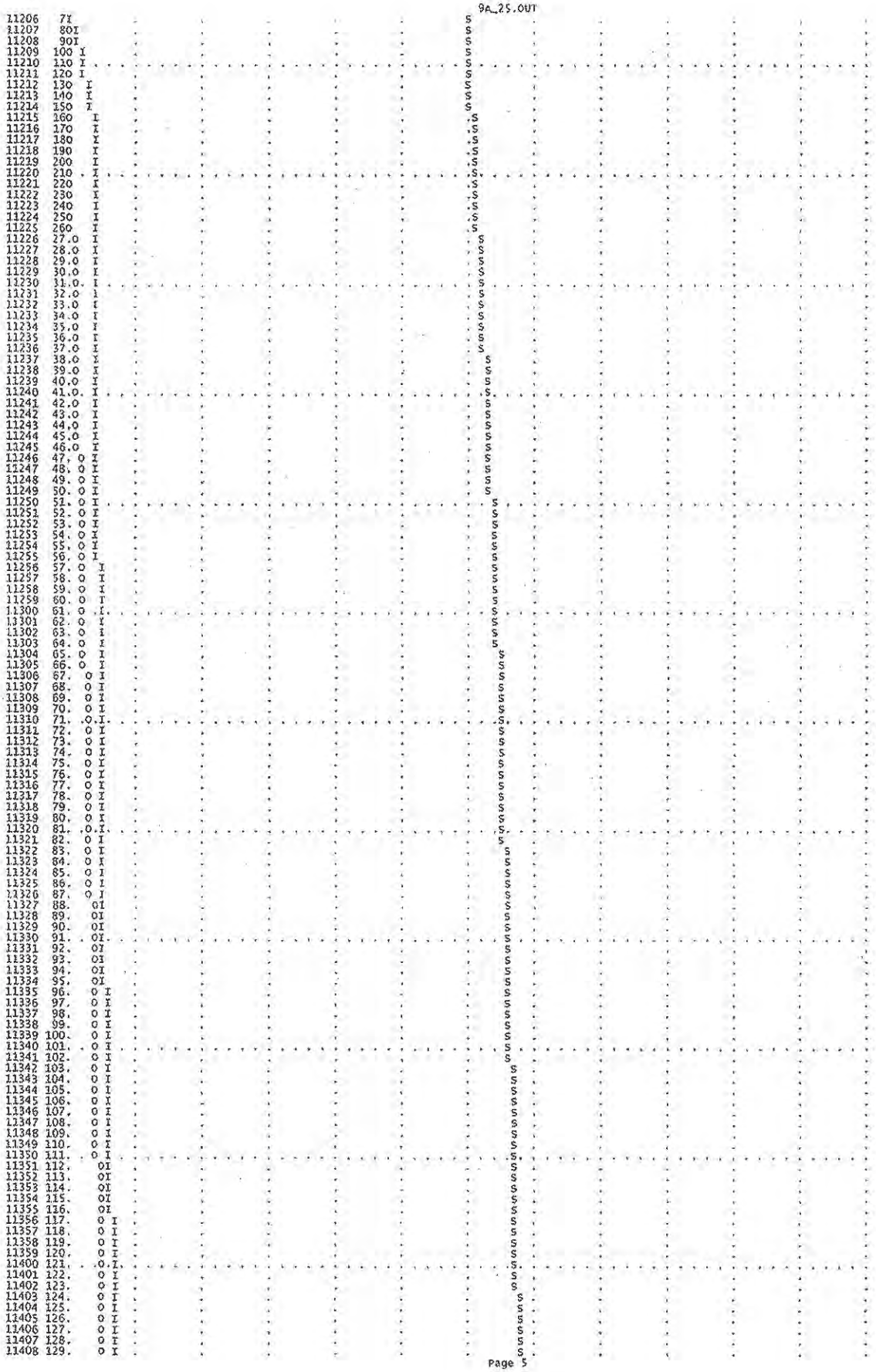
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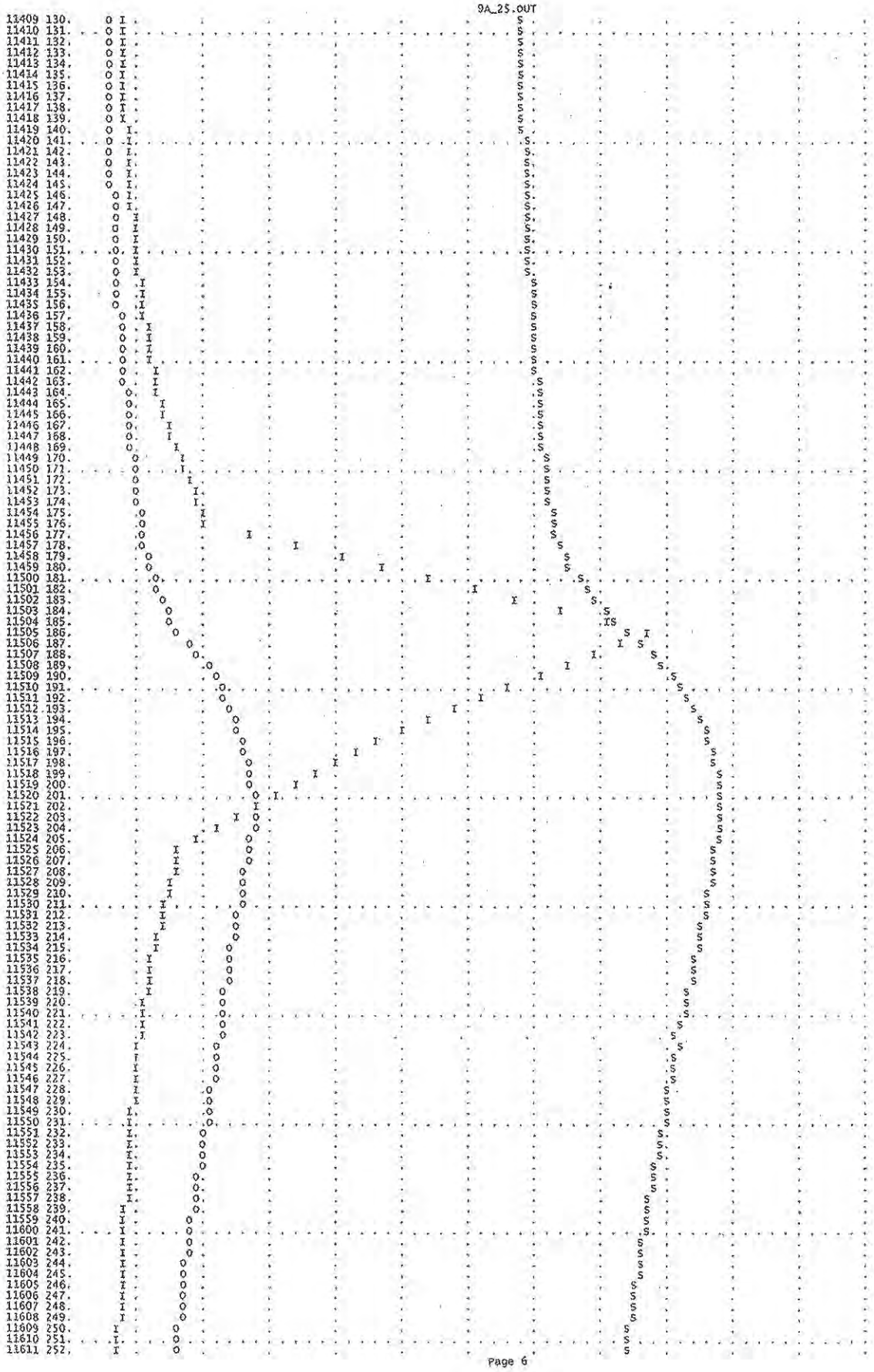
(S) STORAGE

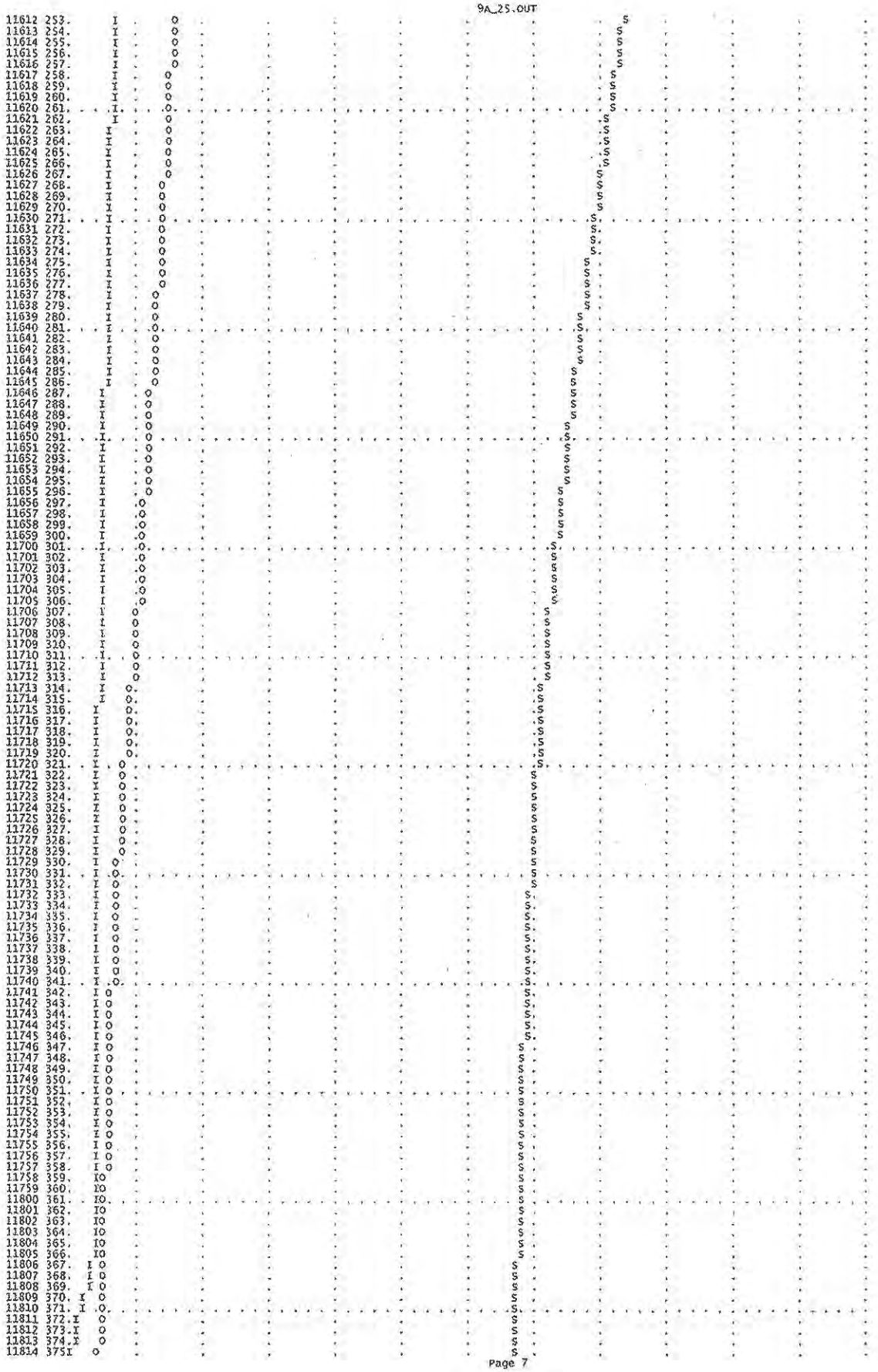
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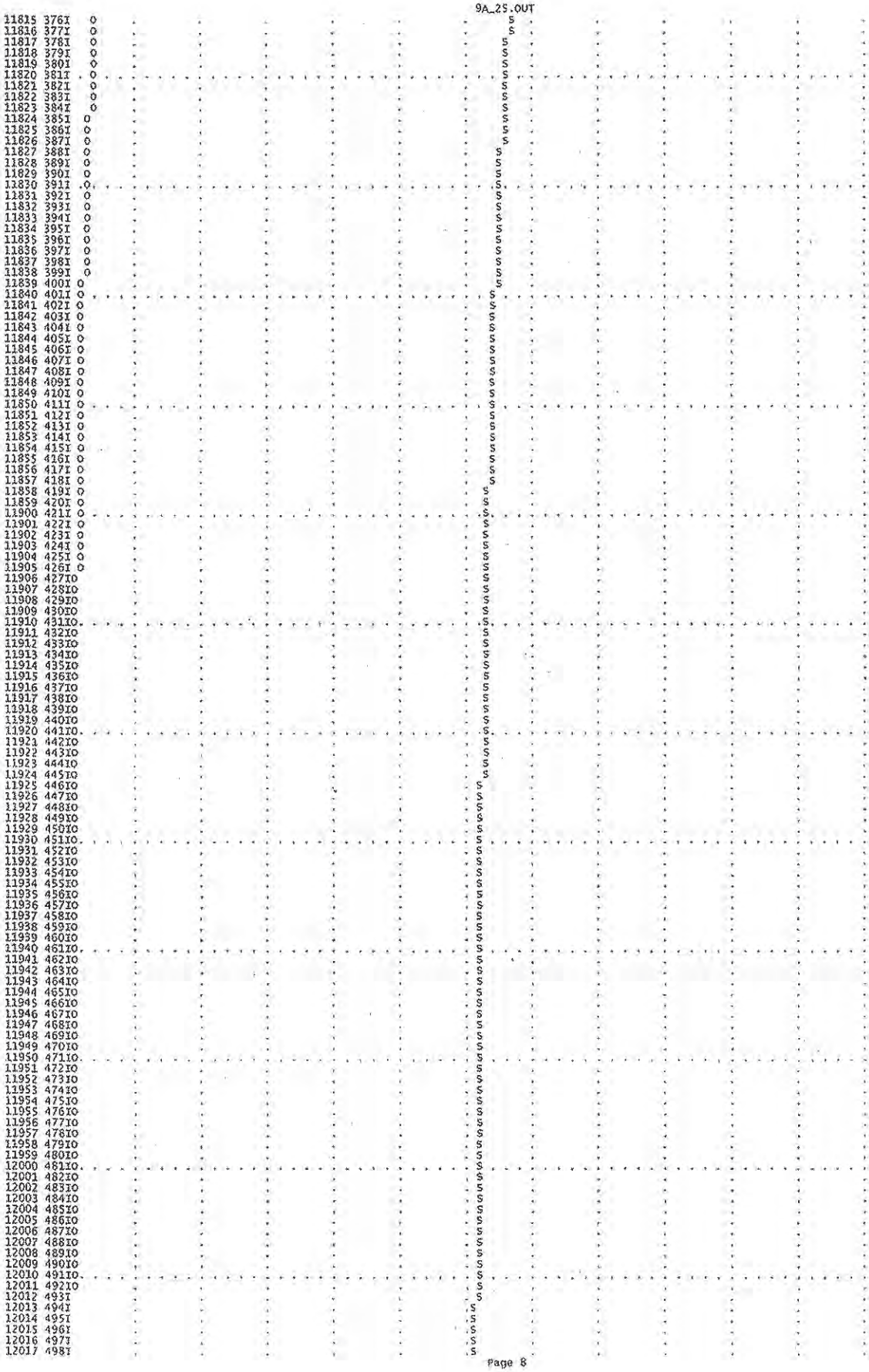
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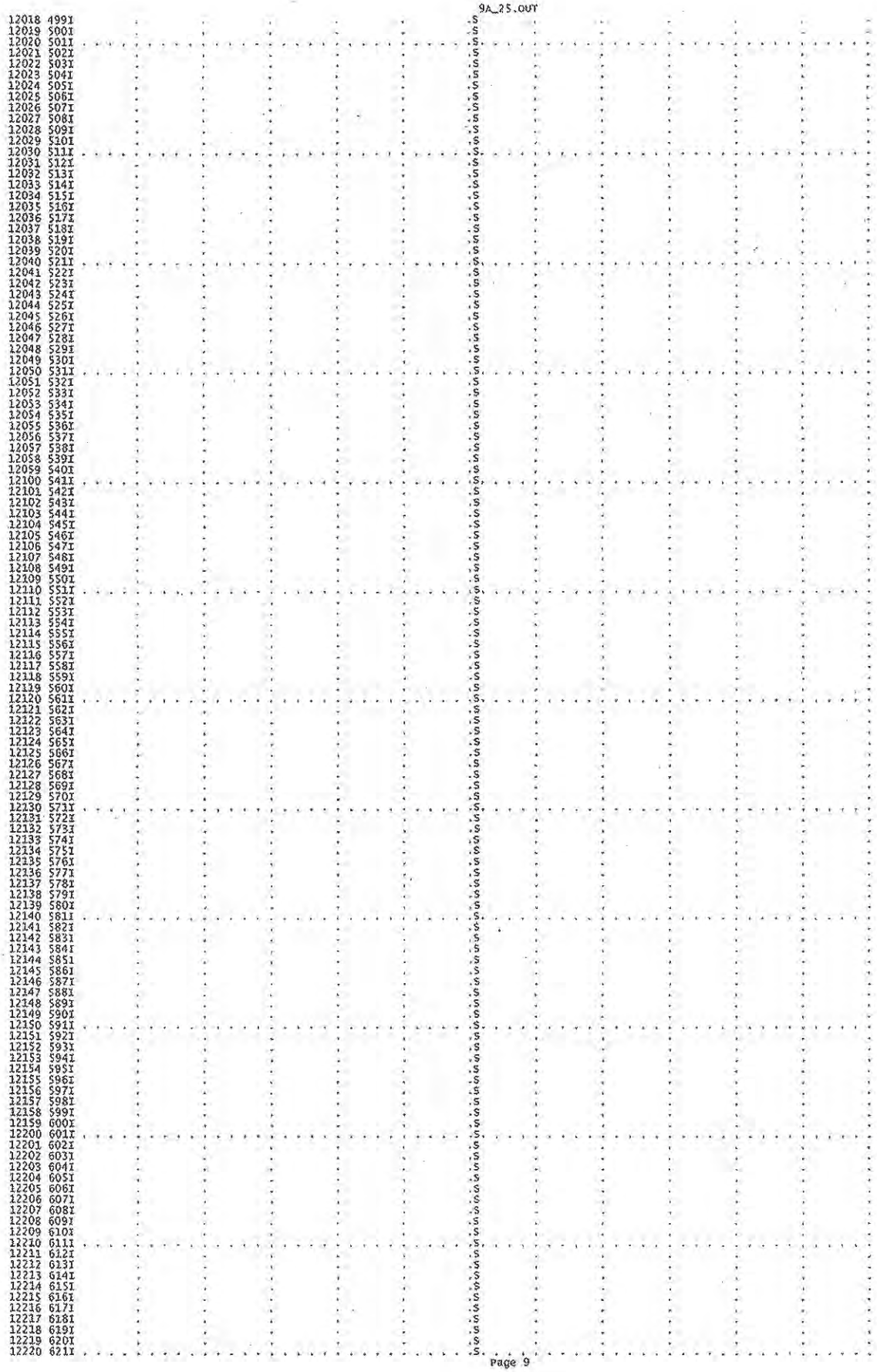
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11201 2I . . . . . S . . . . . .
11202 3I . . . . . S . . . . . .
11203 4I . . . . . S . . . . . .
11204 5I . . . . . S . . . . . .
11205 6I . . . . . S . . . . . .

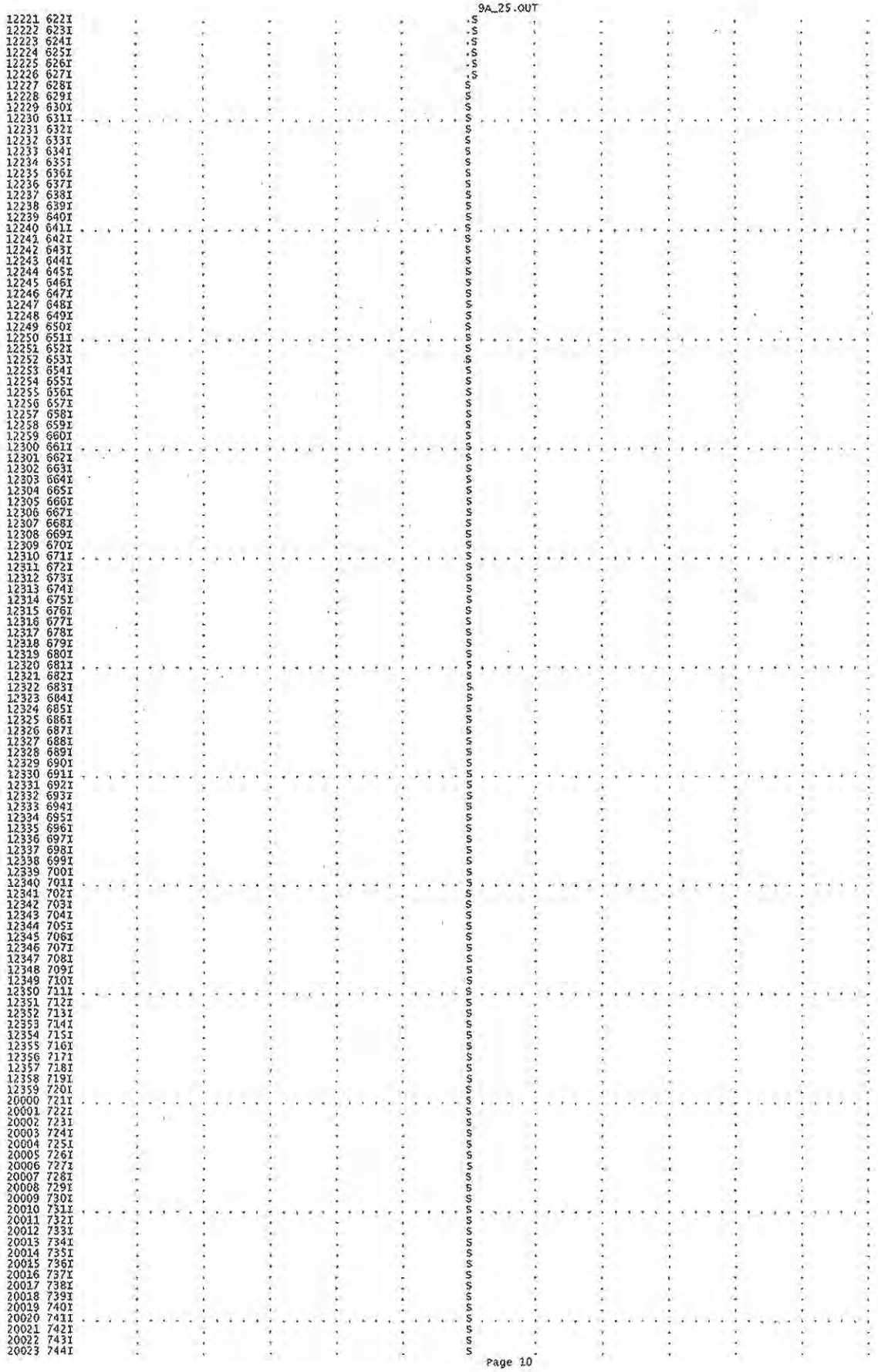


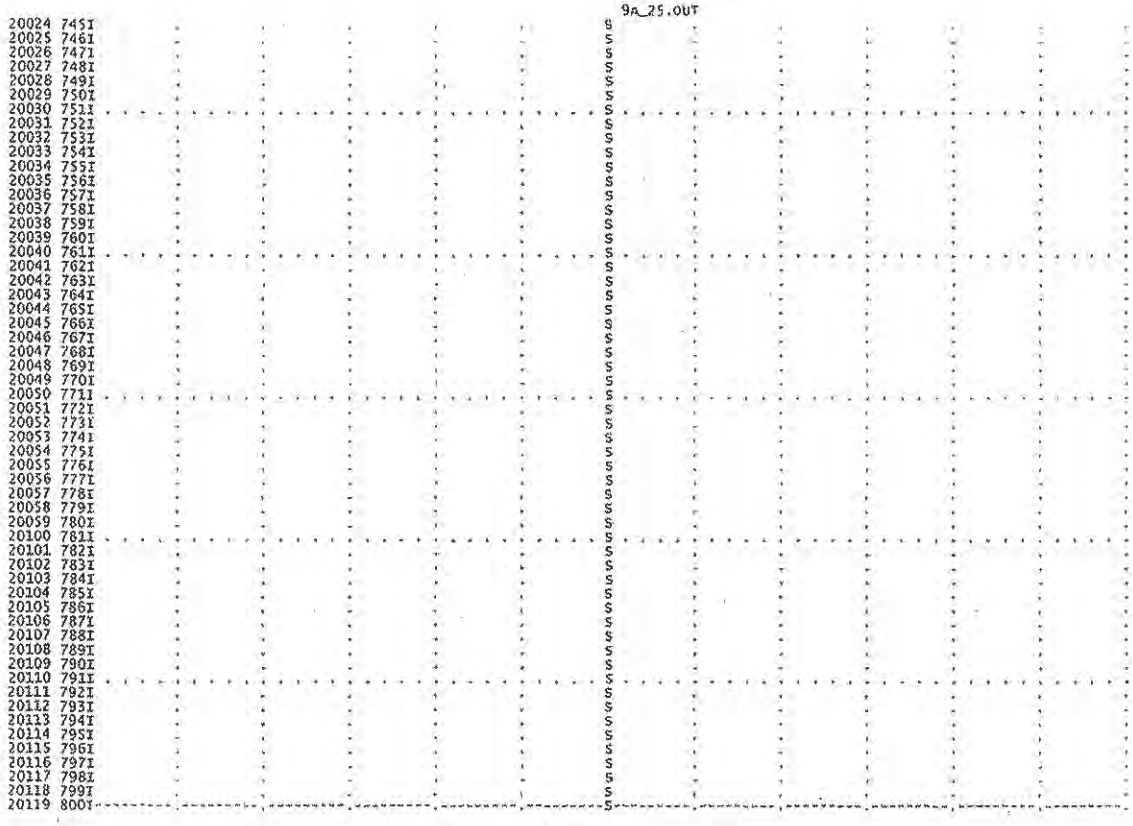












RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	9A_25	35.	3.08	4.	2.	2.	.02		
+	ROUTED TO	DETAIN	11.	3.35	4.	2.	2.	.02	500.85	3.35

*** NORMAL END OF HEC-1 ***

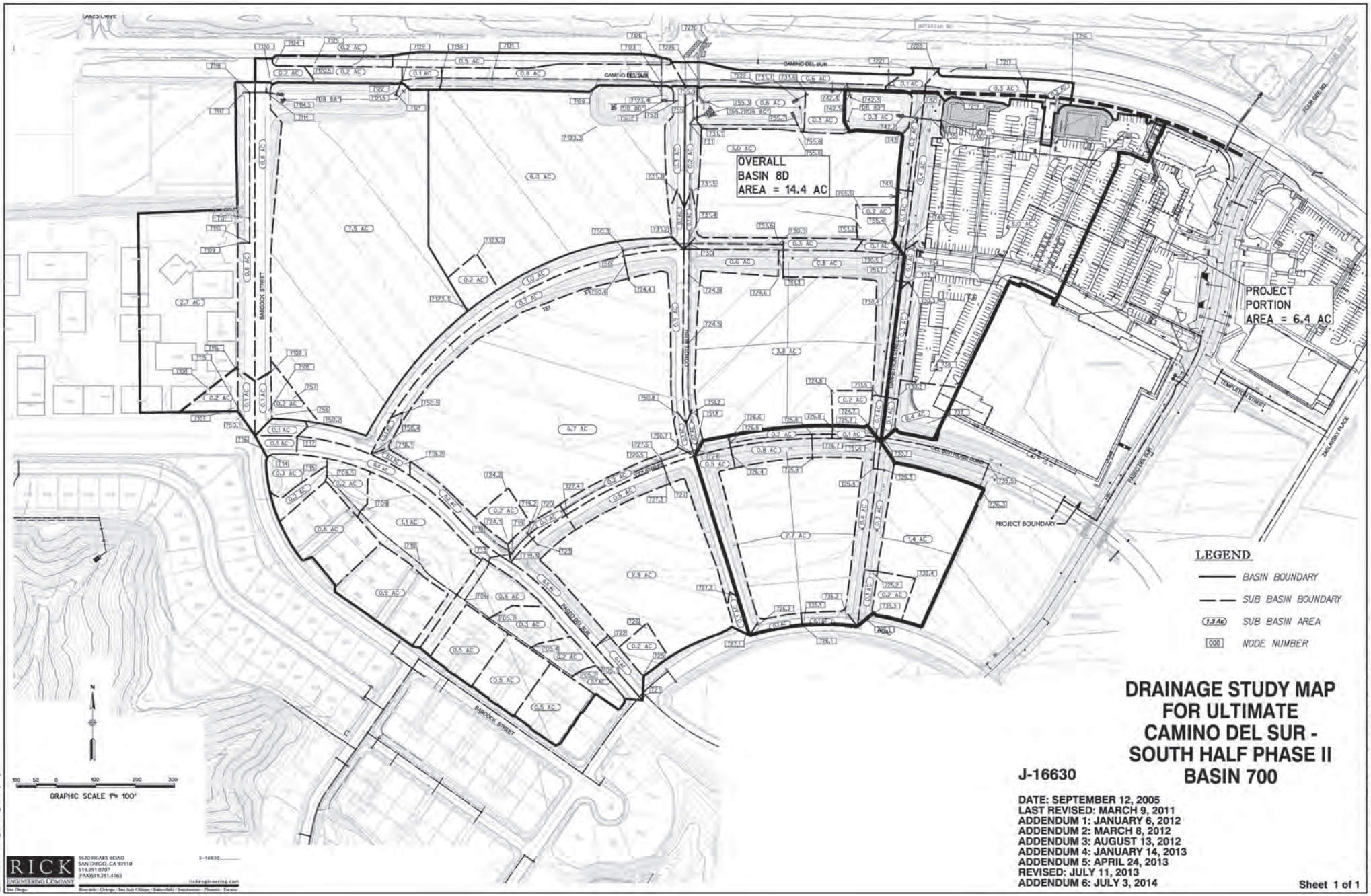
MAP POCKET 5

Drainage Study Map

For

Camino Del Sur South Half Phase II Basin 700

[Ultimate Condition]



DRAINAGE STUDY MAP FOR ULTIMATE CAMINO DEL SUR - SOUTH HALF PHASE II BASIN 700

J-16630

DATE: SEPTEMBER 12, 2005
LAST REVISED: MARCH 9, 2011
ADDENDUM 1: JANUARY 6, 2012
ADDENDUM 2: MARCH 8, 2012
ADDENDUM 3: AUGUST 13, 2012
ADDENDUM 4: JANUARY 14, 2013
ADDENDUM 5: APRIL 24, 2013
REVISED: JULY 11, 2013
ADDENDUM 6: JULY 3, 2014

Sheet 1 of 1

RICK ENGINEERING COMPANY
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rickengineering.com
San Diego · Riverside · Orange · San Luis Obispo · Bakersfield · Sacramento · Phoenix · Tucson

J-16630

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MAP POCKET 6

Drainage Study Map

For

Camino Del Sur South Half Phase II Basin 900

[Ultimate Condition]



LEGEND

- BASIN BOUNDARY
- SUB BASIN BOUNDARY
- (3.3 AC) SUB BASIN AREA
- [000] NODE NUMBER

DRAINAGE STUDY MAP FOR ULTIMATE CAMINO DEL SUR - SOUTH HALF PHASE II BASIN 900

J-16630

DATE: SEPTEMBER 12, 2005
LAST REVISED: MARCH 9, 2011
ADDENDUM 1: JANUARY 6, 2012
ADDENDUM 2: MARCH 8, 2012
ADDENDUM 3: AUGUST 13, 2012
ADDENDUM 4: JANUARY 14, 2013
ADDENDUM 5: APRIL 24, 2013
REVISED: JULY 11, 2013
ADDENDUM 6: JULY 3, 2014

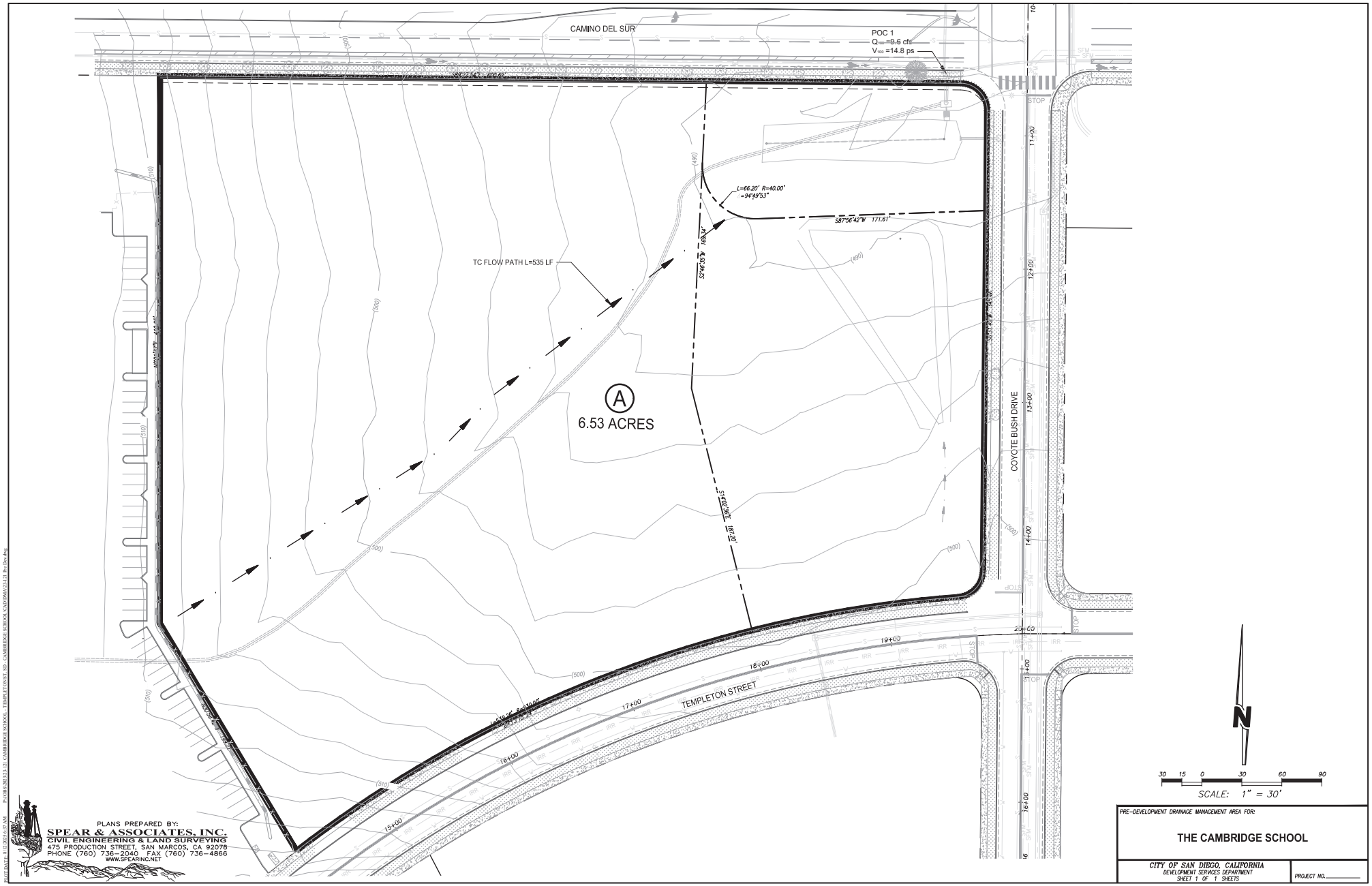
Sheet 1 of 1

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ATTACHMENT E



PLANS PREPARED BY:
SPEAR & ASSOCIATES, INC.
CIVIL ENGINEERING & LAND SURVEYING
475 PRODUCTION STREET, SAN MARCOS, CA 92078
PHONE (760) 736-2040 FAX (760) 736-4866
WWW.SPEARINC.NET

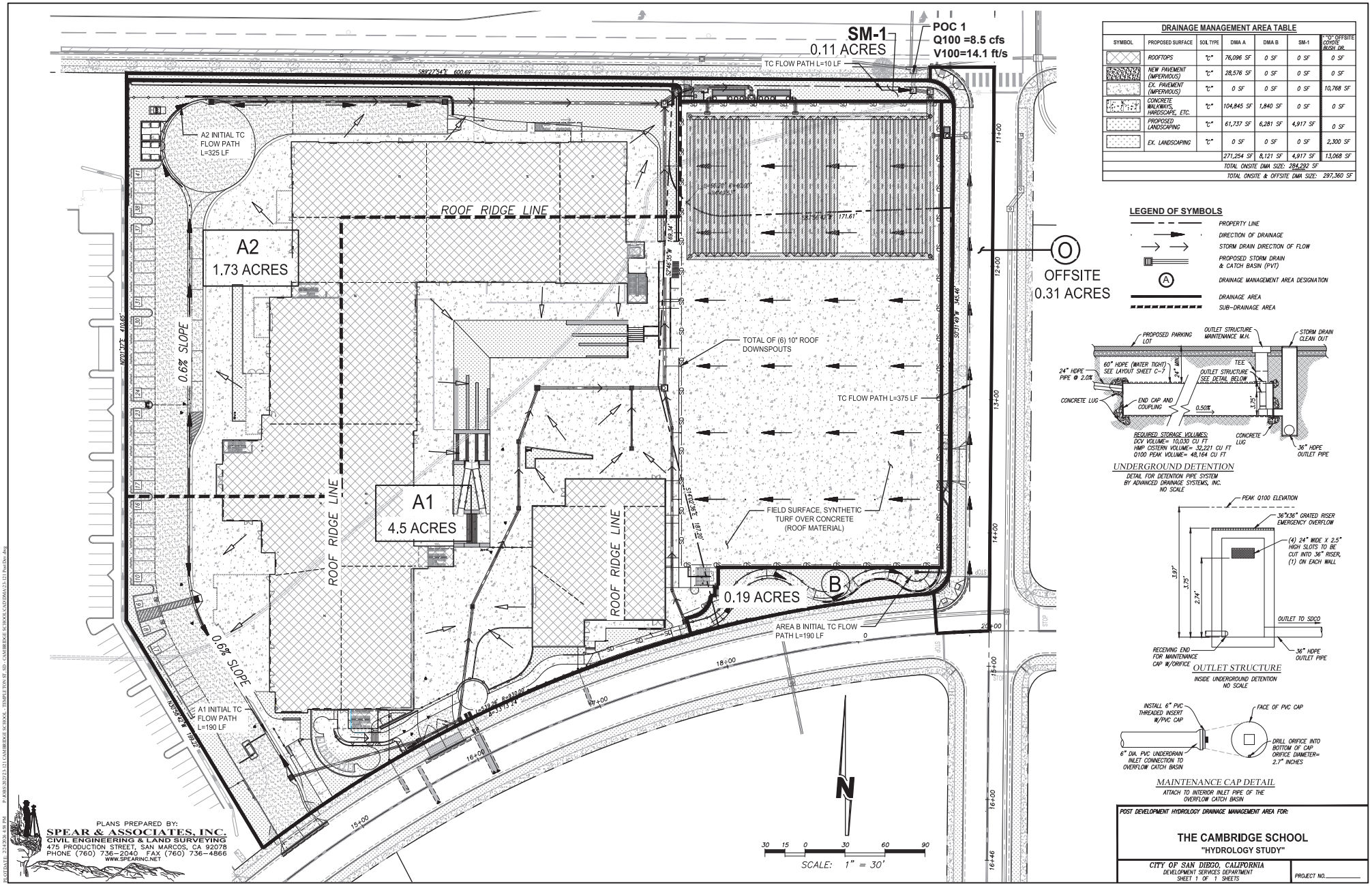
PRE-DEVELOPMENT DRAINAGE MANAGEMENT AREA FOR:

THE CAMBRIDGE SCHOOL

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 1 OF 1 SHEETS

PROJECT NO._____

PLOT DATE: 8/17/2023 6:37 AM P:\JOBS\2023\23-121 CAMBRIDGE SCHOOL - TEMPLETON\CONST. SD - CAMBRIDGE SCHOOL CAD\DMA\23-121 Pre Dev.dwg



DRAINAGE MANAGEMENT AREA TABLE						
SYMBOL	PROPOSED SURFACE	SOIL TYPE	DMA A	DMA B	SM-1	"O" OFFSITE COYOTE BUSH DR.
	ROOFTOPS	"C"	76,096 SF	0 SF	0 SF	0 SF
	NEW PAVEMENT (IMPERVIOUS)	"C"	28,576 SF	0 SF	0 SF	0 SF
	EX. PAVEMENT (IMPERVIOUS)	"C"	0 SF	0 SF	0 SF	10,768 SF
	CONCRETE WALKWAYS, HARDSCAPE, ETC.	"C"	104,845 SF	1,840 SF	0 SF	0 SF
	PROPOSED LANDSCAPING	"C"	61,737 SF	6,281 SF	4,917 SF	0 SF
	EX. LANDSCAPING	"C"	0 SF	0 SF	0 SF	2,300 SF
			271,254 SF	8,121 SF	4,917 SF	13,068 SF
			TOTAL ONSITE DMA SIZE: 284,292 SF			
			TOTAL ONSITE & OFFSITE DMA SIZE: 297,360 SF			

LEGEND OF SYMBOLS

- PROPERTY LINE
- DIRECTION OF DRAINAGE
- STORM DRAIN DIRECTION OF FLOW
- PROPOSED STORM DRAIN & CATCH BASIN (PVT)
- (A) DRAINAGE MANAGEMENT AREA DESIGNATION
- DRAINAGE AREA
- SUB-DRAINAGE AREA

UNDERGROUND DETENTION
DETAIL FOR DETENTION PIPE SYSTEM BY ADVANCED DRAINAGE SYSTEMS, INC.
NO SCALE

OUTLET STRUCTURE
INSIDE UNDERGROUND DETENTION
NO SCALE

MAINTENANCE CAP DETAIL
ATTACH TO INTERIOR INLET PIPE OF THE OVERFLOW CATCH BASIN

PLANS PREPARED BY:
SPEAR & ASSOCIATES, INC.
CIVIL ENGINEERING & LAND SURVEYING
475 PRODUCTION STREET, SAN MARCOS, CA 92078
PHONE (760) 736-2040 FAX (760) 736-4866
WWW.SPEARINC.NET

POST DEVELOPMENT HYDROLOGY DRAINAGE MANAGEMENT AREA FOR:

THE CAMBRIDGE SCHOOL

"HYDROLOGY STUDY"

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 1 OF 1 SHEETS

PROJECT NO._____

PLOT DATE: 2/24/2020, 4:38 PM P:\JOBS\2023\23-12 | CAMBRIDGE SCHOOL - TEMPLETON ST. SD - CAMBRIDGE SCHOOL\CAD\DMA\23-12 | Pwd Dev -Any

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Attachment 6
Geotechnical and Groundwater Investigation Report

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

GEOTECHNICAL INVESTIGATION
PROPOSED CAMBRIDGE SCHOOL
SOUTHWEST CORNER OF CAMINO DEL SUR AND COYOTE BUSH DRIVE
SAN DIEGO, CALIFORNIA

Prepared for:

THE CAMBRIDGE SCHOOL
ATTENTION: MR. BRANDON HONG
12855 BLACK MOUNTAIN ROAD
SAN DIEGO, CALIFORNIA 92129

Prepared by:

CONSTRUCTION TESTING & ENGINEERING, INC.
1441 MONTIEL ROAD, SUITE 115
ESCONDIDO, CALIFORNIA 92026

CTE JOB NO.: 4830.2300106

October 5, 2023

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1.0 INTRODUCTION AND SCOPE OF SERVICES

1.1 Introduction

This report presents the results of the geotechnical investigation, performed by Construction Testing and Engineering, Inc. (CTE), and provides conclusions and recommendations for the proposed Cambridge School campus in San Diego, California. This investigation was performed in general accordance with the terms of CTE proposal 4830.0623.00012, dated July 6, 2023.

CTE understands that the proposed improvements are to consist of multiple campus buildings, parking areas, driveways, an athletic field, flatwork, landscaping, utilities and other associated improvements. It is understood that the site was previously graded through 2011 to 2013 under the observation of Geocon, Inc. (Geocon, 2014). Based on previous site usage, Toxaphene was found present in site soils. Environmental reports indicate that soils exceeding threshold values were placed in specific encapsulation zones below the depth of recommended removals provided in this report. In accordance with RWQCB-approved 2006 Limited Pesticide Assessment and Soil Reuse Plan, the soil encapsulated was placed at least 10 feet below ultimate ground surface and at least 5 feet above highest anticipated groundwater level. Given noted site conditions, the recent geotechnical investigation including exploratory borings and soil sampling was limited to the area within ten feet below ground surface (bgs) of the existing graded site. It should be noted that the two existing stormwater drainage basins in the northeast corner of the property were not included in the investigation. Further evaluation of the environmental aspects of the underlying soil is not a part of

the proposed scope. Preliminary recommendations for excavations, site preparation, fill placement, and foundation design are presented herein. References reviewed for this report are provided in Appendix A.

1.2 Scope of Services

The scope of services provided included:

- Review of referenced geologic and soils reports.
- Coordination of utility mark-out and location.
- Excavation of exploratory borings and soil sampling utilizing a truck-mounted drill rig.
- Laboratory testing of selected soil samples.
- Description of the geology and evaluation of potential geologic hazards.
- Engineering and geologic analysis.
- Preparation of this summary report.

2.0 SITE DESCRIPTION

The proposed improvement area is located southwest of the Camino Del Sur and Coyote Bush Drive intersection in San Diego, California (Figure 1). The near-rectangular shaped site is bounded by Camino Del Sur to the north, Coyote Bush Drive to the east, Templeton Street to the south, and the property addressed 16067 Babcock Street, San Diego, CA to the west. The general layout of the subject site and proposed improvement area are shown on Figures 1 and 2.

The improvement area generally descends gradually to the northeast with elevations ranging from approximately 528 feet msl in the southwest to approximately 510 feet msl to the east.

3.0 FIELD INVESTIGATION AND LABORATORY TESTING

3.1 Field Investigation

CTE performed the recent subsurface investigation on August 10, 2023, to evaluate underlying soil conditions. This fieldwork consisted of site reconnaissance, and the excavation of seven exploratory soil borings. As indicated, the borings were advanced to a maximum explored depth of 10 feet below ground surface (bgs). Bulk samples were collected from the cuttings, and relatively undisturbed samples were collected by driving Standard Penetration Test (SPT) and Modified California (CAL) samplers. The borings were excavated with a CME-75 truck-mounted drill rig equipped with eight-inch-diameter, hollow-stem augers. Approximate locations of the borings are shown on the attached Figure 2.

Soils were logged in the field by a CTE geologist and were visually classified in general accordance with the Unified Soil Classification System. The field descriptions have been modified, where appropriate, to reflect laboratory test results. Boring logs, including descriptions of the soils encountered, are included in Appendix B.

3.2 Laboratory Testing

Laboratory tests on selected soil samples were scheduled for classification purposes, and to evaluate physical properties and engineering characteristics. Scheduled laboratory tests include:

- In-Place Moisture and Density
- Maximum Density/Proctor
- Expansion Index (EI)
- R-value
- Gradation
- Chemical Characteristics.

Test descriptions and laboratory test results for the selected soils are included in Appendix C.

4.0 GEOLOGY

4.1 General Setting

San Diego is located within the Peninsular Ranges physiographic province that is characterized by northwest-trending mountain ranges, intervening valleys, and predominantly northwest trending regional faults. The region can be further subdivided into the coastal plain area, a central mountain–valley area and the eastern mountain-valley area. The project site is located within the coastal plain area. The coastal plain sub-province ranges in elevation from approximately sea level to 1,200 feet above mean sea level (msl) and is characterized by Cretaceous and Tertiary sedimentary deposits that onlap an eroded basement surface consisting of Jurassic and Cretaceous crystalline rocks that have been repeatedly eroded and infilled, and by alluvial processes throughout the Quaternary Period in response to regional uplift. This has resulted in a geomorphic landscape of uplifted alluvial and marine terraces that are dissected by current active alluvial drainages.

4.2 Geologic Conditions

Based on the regional geologic map prepared by Kennedy and Tan (2007), the near surface geologic unit underlying the site consists of the Tertiary Mission Valley Formation. However, because site explorations were limited due to the noted conditions, only the Previously Placed Fill was encountered throughout the site. Descriptions of the observed soils during the recent investigation are presented below. Near surface geologic materials are depicted on Figure 2.

4.2.1 Previously Placed Fill

Based on as-graded conditions and recent investigation findings, near surface fill materials generally consist of loose to medium dense/soft to stiff, brown to gray-brown, fine- to coarse-grained clayey sand/sandy clay. The previously placed fill was observed in all the borings to the explored depth of approximately 10.0 feet below the ground surface (bgs). As indicated, the fill soils were placed under observation of Geocon in 2014. Based on regional geologic mapping and the as-graded report, the site is underlain at depth by dense sandstone materials of the Tertiary Mission Valley Formation.

4.3 Groundwater Conditions

Groundwater was not encountered in the recent borings to an explored depth of approximately 10.0 feet bgs. While groundwater conditions may vary, especially following periods of sustained precipitation or irrigation, it is generally not anticipated to adversely affect completed improvements, if irrigation is limited and proper site drainage is designed, installed, and maintained per the recommendations of the project civil engineer.

4.4 Geologic Hazards

Geologic hazards that were considered to have potential impacts to site development were evaluated based on field observations, literature review, and laboratory test results. It appears that geologic hazards at the site are primarily limited to those caused by shaking from earthquake-generated ground motions on distant faults. The following paragraphs discuss the geologic hazards considered and their potential risk to the site.

4.4.1 Surface Fault Rupture

In accordance with the Alquist-Priolo Earthquake Fault Zoning Act, (ACT), the State of California established Earthquake Fault Zones around known active faults. The purpose of the ACT is to regulate the development of structures intended for human occupancy near active fault traces in order to mitigate hazards associated with surface fault rupture. According to the California Geological Survey (Special Publication 42, Revised 2018), a fault that has had surface displacement within the last 11,700 years is defined as a Holocene-active fault and is either already zoned or is pending zonation in accordance with the ACT. There are several other definitions of fault activity that are used to regulate dams, power plants, and other critical facilities, and some agencies designate faults that are documented as older than Holocene (last 11,700 years) and younger than late Quaternary (1.6 million years) as potentially active faults that are subject to local jurisdictional regulations.

Based on reconnaissance and review of referenced literature, the site is not located within a local or State designated Earthquake Fault Zone, no known active fault traces underlie or project toward the site, and no known potentially active fault traces project toward the site.

4.4.2 Local and Regional Faulting

The United States Geological Survey (USGS), with support of State Geological Surveys, and reviewed published work by various researchers, have developed a Quaternary Fault and Fold Database of faults and associated folds that are believed to be sources of earthquakes with magnitudes greater than 6.0 that have occurred during the Quaternary (the past 1.6 million years). The faults and folds within the database have been categorized into four Classes (Class A-D) based on the level of evidence confirming that a Quaternary fault is of tectonic origin and whether the structure is exposed for mapping or inferred from fault related deformational features. Class A faults have been mapped and categorized based on age of documented activity ranging from Historical faults (activity within last 150 years), Latest Quaternary faults (activity within last 15,000 years), Late Quaternary (activity within last 130,000 years), to Middle to late Quaternary (activity within last 1.6 million years). Class A faults are considered to have the highest potential to generate earthquakes and/or surface rupture, and the earthquake and surface rupture potential generally increases from oldest to youngest. The evidence for Quaternary deformation and/or tectonic activity progressively decreases for Class B and Class C faults. When geologic evidence indicates

that a fault is not of tectonic origin it is considered to be a Class D structure. Such evidence includes features such as joints, fractures, landslides, or erosional and fluvial scarps that resemble fault scarps, but demonstrate a non-tectonic origin.

The nearest known Class A fault is the Newport-Inglewood Fault Zone (<15,000 years), which is approximately 16.1 miles west of the site. The attached Figure 4 shows regional faults and seismicity with respect to the site.

4.4.3 Historic Seismicity

The level of seismicity within recent history (last 50 years) of the San Diego area is relatively low compared to other areas of southern California and northwestern Baja California. Only a few small to moderate earthquakes have been reported in the San Diego area during the period of instrumental recordings, which began in the early 1900s. Most of the high seismic activity in the region is associated with the Elsinore Fault Zone and the San Jacinto Fault Zone, located approximately 22.2 and 46.1 miles northeast of the site, respectively. In the western portion of San Diego County, a series of small-to-moderate earthquakes in July 1985 were reportedly associated with the Rose Canyon Fault Zone (Reichle, 1985). The largest event in that series was M4.7, which was centered within San Diego Bay. A similar series of earthquakes in coastal San Diego occurred in 1964 (Simons, 1979).

Review of the USGS Earthquake Archives (http://earthquake.usgs. gov/earthquakes/search/) for significant earthquakes within 100 kilometers of the site with magnitudes greater than M5.5 are provided in Table 4.4.3.

TABLE 4.4.3
Regional Earthquake History

EARTHQUAKE DATE (yr-mo-day)	EARTHQUAKE TIME (UTC)	MAGNITUDE	ESTIMATED DEPTH (km)	GENERAL LOCATION
1918-04-21	22:32:29	6.7	10.0	Southern California
1937-03-25	16:49:02	6.0	6.0	WSW of Oasis CA
1954-03-19	09:54:27	6.4	6.0	West of Salton Sea, CA
1968-04-09	02:28:58	6.6	10.0	NNE of Ocotillo Wells

The site could be subjected to significant shaking in the event of a major earthquake on any of the faults discussed above or other faults in the southern California or northern Baja California area.

4.4.4 Liquefaction and Seismic Settlement Evaluation

Liquefaction occurs when saturated fine-grained sands or silts lose their physical strength during earthquake-induced shaking and behave like a liquid. This is due to loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking. Seismic settlement can occur with or without liquefaction; it results from densification of loose soils.

Under the previous grading (Geocon, 2014), topsoil alluvium, and colluvium were removed to dense formational materials and replaced as compacted fill. These compacted fill materials are not considered liquefiable, and underlying, dense formational materials are also not considered liquefiable. Based on the presence of non-liquefiable soils and lack of a shallow groundwater table, the potential for liquefaction or significant seismic settlement at the site is considered to be low.

4.4.5 Landsliding

According to mapping by Tan and Giffen (1995), the site is considered "Generally Susceptible" to landsliding. No landslides are mapped in the site area and no evidence of landsliding was observed during the recent field exploration at the gently sloping site. Existing slopes at the site were generally constructed at a gradient of 2:1 (H:V) or less steep. Based on the noted conditions and investigation findings, landsliding is not considered to be a significant geologic hazard at the subject site.

4.4.8 Compressible and Expansive Soils

Based on investigation observations and testing, the desiccated upper portion of fill materials are considered to be potentially compressible in their current condition. Expansion testing of near surface soils generally indicates a low to moderate expansion potential. However, clayey soils are known to be present in the area and, if encountered during grading, should be blended with granular materials, as necessary, such that the expansion index is no greater than 50. Based on the noted conditions and recommended grading, expansive soils are generally not anticipated to present adverse impacts to site development provided the

recommendations herein are implemented. However, additional evaluation of potential expansion of near-surface fill soils should be conducted during field observations and grading activities.

4.4.9 Corrosive Soils

Testing of representative site soils was performed to evaluate the potential corrosive effects on concrete foundations and buried metallic utilities. Soil environments detrimental to concrete generally have elevated levels of soluble sulfates and/or pH levels less than 5.5. According to the American Concrete Institute (ACI) Table 318 4.3.1, specific guidelines have been provided for concrete where concentrations of soluble sulfate (SO_4) in soil exceed 0.10 percent by weight. These guidelines include low water:cement ratios, increased compressive strength, and specific cement type requirements. A minimum resistivity value less than approximately 5,000 ohm-cm and/or soluble chloride levels in excess of 200 ppm generally indicate a corrosive environment for buried metallic utilities and untreated conduits.

Chemical test results indicate that near-surface soils generally present a negligible corrosion potential for Portland cement concrete. Based on resistivity testing, regional soils have generally been interpreted to have a moderate corrosivity potential to buried metallic improvements. Based on these findings, it may be prudent to utilize plastic piping and conduits where buried and feasible. However, CTE does not practice corrosion engineering.

Therefore, if corrosion of metallic or other improvements is of more significant concern, a qualified corrosion engineer could be consulted. Corrosivity of site improvements may be further evaluated following completion of fine grading and site-specific chemical testing.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

CTE concludes that the proposed improvements at the site are feasible from a geotechnical standpoint, provided the recommendations in this report are incorporated into the design and construction of the project. Recommendations for the proposed earthwork and improvements are included in the following sections and Appendix D. However, recommendations in the text of this report supersede those presented in Appendix D should conflicts exist. These recommendations should either be confirmed as appropriate or should be updated following rough grading at the site.

5.2 Site Preparation

Prior to grading, the site should be cleared of any existing vegetation not suitable for structural backfill and be properly disposed of offsite. In areas to receive structures, overexcavation should extend to a minimum depth of 24 inches or to the depth of competent material, whichever is deeper. Overexcavation should extend laterally at least five feet beyond the limits of the proposed improvements, where feasible.

For other proposed improvements, such as pavement and hardscape areas, existing soils should be excavated to the depth of competent materials, or to a minimum of 24 inches below existing grade, whichever depth is shallowest.

Exposed subgrades should be scarified, moisture conditioned, and properly compacted, as described below, prior to receiving compacted fill. Overexcavations adjacent to existing structures or property limits should generally not extend below a 1:1 plane extended down from the property line or as recommended during grading based on the exposed conditions. Depending on the depth and proximity of the existing improvements, alternating slot excavations could potentially be required during earthwork.

Suitability of the bottom of all overexcavations and footing excavations should be verified by a CTE geotechnical representative during site grading. If localized areas of loose or unsuitable materials are encountered at the base of the recommended excavations, deeper removals to the depth of competent material may be necessary.

Existing below-ground utilities should be redirected around the proposed structures. Existing utilities at an elevation to extend through the proposed footings should generally be sleeved and caulked to minimize the potential for moisture migration below the building slabs. Abandoned pipes exposed by grading should be securely capped or filled with minimum two-sack cement/sand slurry to help prevent moisture from migrating beneath foundation and slab soils.

5.3 Site Excavation

Generally, shallow excavation of site materials may be accomplished with heavy-duty construction equipment under normal conditions. Deeper excavations may be difficult and locally require specialized excavation equipment or techniques for advancement.

5.4 Fill Placement and Compaction

Following recommended removals of loose or disturbed soils, the areas to receive fills or improvements should be scarified a minimum of eight inches, moisture conditioned, and properly compacted. Properly blended granular fill and backfill with expansion index less than 50 should be compacted to a minimum relative compaction of 90 percent at approximately three percent above optimum due to clayey soils, as evaluated by ASTM D 1557. The optimum lift thickness for fill soil will depend on the type of compaction equipment used. Generally, backfill should be placed in uniform, horizontal lifts not exceeding eight inches in loose thickness. Fill placement and compaction should be conducted in conformance with local ordinances.

5.5 Fill Materials

Properly blended and moisture conditioned, low expansion potential soils derived from the on-site materials are considered suitable for reuse on the site as compacted fill. If used, these materials should be screened of organics and materials generally greater than three inches in maximum dimension. Irreducible materials greater than three inches in maximum dimension should not be used in shallow fills (within three feet of proposed grades). In utility trenches, adequate bedding should surround pipes.

Imported fill beneath structures and flatwork should have an Expansion Index of 20 or less (ASTM D 4829). Imported fill soils for use in structural or slope areas should be evaluated by the soils engineer before being imported to the site. Although this report is not intended to address environmental conditions at the subject site, we anticipate that imported soils will be screened, sampled, and tested in accordance with appropriate environmental guidelines.

If proposed, retaining wall backfill located within a 45-degree wedge extending up from the bottom of the heel foundation of the wall should consist of soil having an Expansion Index of 20 or less (ASTM D 4829) with less than 30 percent passing the No. 200 sieve. The upper 12 to 18 inches of wall backfill should consist of lower permeability soils, in order to reduce surface water infiltration behind walls. The project structural engineer and/or architect should detail proper wall backdrains, including gravel drain zones, fills, filter fabric and perforated drain pipes. A conceptual wall drainage detail is provided in Figure 4.

5.6 Temporary Construction Slopes

The following recommended slopes should be relatively stable against deep-seated failure but may experience localized sloughing. On-site soils are considered Type C soils with recommended slope ratios as set forth in Table 5.6.

TABLE 5.6
RECOMMENDED TEMPORARY SLOPE RATIOS

SOIL TYPE	SLOPE RATIO (Horizontal: vertical)	MAXIMUM HEIGHT
C (Previously Placed Fill)	1.5:1 (OR FLATTER)	10 Feet

Actual field conditions and soil type designations must be verified by a "competent person" while excavations exist, according to Cal-OSHA regulations. In addition, the above sloping recommendations do not allow for surcharge loading at the top of slopes by vehicular traffic, equipment or materials. Appropriate surcharge setbacks must be maintained from the top of all unshored slopes.

5.7 Foundations and Slab Recommendations

The following recommendations are for preliminary design purposes only. These foundation recommendations should be re-evaluated after review of the project grading and foundation plans, and after completion of rough grading of the building pad areas. Upon completion of rough pad grading, Expansion Index of near surface soils should be verified, and these recommendations should be updated, if necessary.

5.7.1 Foundations

Following the recommended preparatory grading, continuous and isolated spread footings are anticipated to be suitable for use at this site. Foundation dimensions and reinforcement should be based on allowable bearing values of 2,500 pounds per square foot (psf) for footings embedded a minimum of 24-inches below lowest adjacent subgrade elevation. Isolated footings should be at least 24 inches in minimum dimension. The allowable bearing value may be increased by one-third for short-duration loading, which includes the effects of wind or seismic forces. Based on the recommended preparatory grading, it is anticipated that all footings will be founded entirely in properly compacted fill materials. Footings should not span cut to fill interfaces.

Minimum reinforcement for continuous footings should consist of four No. 6 reinforcing bars; two placed near the top and two placed near the bottom, or as per the project structural engineer. The structural engineer should design isolated footing reinforcement. An uncorrected subgrade modulus of 125 pounds per cubic inch is considered suitable for elastic foundation design.

The structural engineer should provide recommendations for reinforcement of spread footings and footings with pipe penetrations. Footing excavations should generally be maintained at a minimum of three percent above optimum moisture content until concrete placement. Exposed soils and potential expansion characteristics should be evaluated at the time of grading to verify that conditions are as anticipated by the preliminary findings.

5.7.2 Foundation Settlement

The maximum total static settlement is expected to be on the order of one inch and the maximum differential settlement is expected to be on the order of 0.5 inch. Due to the generally dense nature of underlying materials, dynamic settlement is not expected to adversely affect the proposed buildings.

5.7.3 Foundation Setback

Footings for structures should be designed such that the horizontal distance from the face of adjacent slopes to the outer edge of the footing is at least 12 feet. In addition, footings should bear beneath a 1:1 plane extended up from the nearest bottom edge of adjacent trenches and/or excavations. Deepening of affected footings may be a suitable means of attaining the prescribed setbacks.

5.7.4 Interior Concrete Slabs

Lightly loaded concrete slabs for non-traffic areas without heavy loading should be a minimum of 5.0 inches thick. Minimum slab reinforcement should consist of No. 4 reinforcing bars placed on maximum 15-inch centers, each way, at or above mid-slab height, but with proper cover. More stringent recommendations per project structural engineer supersede these recommendations, as applicable.

In moisture-sensitive floor areas, a suitable vapor retarder of at least 15-mil thickness (with all laps or penetrations sealed or taped) overlying a four-inch layer of consolidated aggregate base or gravel (or sand with SE of 30 or more) should be installed. An optional maximum two-inch layer of similar material may be placed above the vapor retarder to help protect the membrane during steel and concrete placement. This recommended protection is generally considered typical in the industry. If proposed floor areas or coverings are considered especially sensitive to moisture emissions, additional recommendations from a specialty consultant could be obtained. CTE is not an expert at preventing moisture penetration through slabs. A qualified architect or other experienced professional should be contacted if moisture penetration is a more significant concern.

Slabs subjected to heavier loads will require thicker slab sections and/or increased reinforcement. A 110-pci subgrade modulus is considered suitable for elastic design of minimally embedded improvements such as slabs-on-grade.

Subgrade materials should be maintained or brought to a minimum of three percent or greater above optimum moisture content until slab underlayment and concrete are placed.

5.8 Seismic Design Criteria

The seismic ground motion values listed in the table below were derived in accordance with the ASCE 7-16 Standard that is incorporated into the 2022 California Building Code. This was accomplished by establishing the Site Class based on the soil properties at the site and calculating site coefficients and parameters using the using the SEAOC-OSHPD U.S. Seismic Design Maps application. Seismic ground motion values are based on the approximate site coordinates of 33.0213° latitude and –117.1285° longitude. These values are intended for the design of structures to resist the effects of earthquake ground motions.

TABLE 5.8
SEISMIC GROUND MOTION VALUES (CODE-BASED)
2022 CBC AND ASCE 7-16

PARAMETER	VALUE	2022 CBC/ASCE 7-16 REFERENCE
Site Class	D	ASCE 16, Chapter 20
Mapped Spectral Response Acceleration Parameter, S_S	0.845	Figure 1613.2.1 (1)
Mapped Spectral Response Acceleration Parameter, S_1	0.312	Figure 1613.2.1 (2)
Seismic Coefficient, F_a	1.162	Table 1613.2.3 (1)
Seismic Coefficient, F_v	null	Table 1613.2.3 (2)
MCE Spectral Response Acceleration Parameter, S_{MS}	0.982	Section 1613.2.3
MCE Spectral Response Acceleration Parameter, S_{M1}	Null	Section 1613.2.3
Design Spectral Response Acceleration, Parameter S_{DS}	0.655	Section 1613.2.5(1)
Design Spectral Response Acceleration, Parameter S_{D1}	null	Section 1613.2.5 (2)
Peak Ground Acceleration PGA_M	0.45	ASCE 16, Section 11.8.3

The code-based seismic parameters provided above are considered to be acceptable, and a ground motion hazard analysis is not required, provided that the provisions of Exception 2 in ASCE/SEI 7-16, Section 11.4.8, are applied in structural design.

5.9 Lateral Resistance and Earth Pressures

Lateral loads acting against structures may be resisted by friction between the footings and the supporting soil or passive pressure acting against structures. If frictional resistance is used, allowable coefficients of friction of 0.30 (total frictional resistance equals the coefficient of friction multiplied by the dead load) for concrete cast directly against compacted fill is recommended. A design passive resistance value of 250 pounds per square foot per foot of depth (with a maximum value of 2,000 pounds per square foot) may be used. The allowable lateral resistance can be taken as the sum of the frictional resistance and the passive resistance, provided the passive resistance does not exceed two-thirds of the total allowable resistance.

If proposed, retaining walls backfilled using select granular soils may be designed using the equivalent fluid unit weights given in Table 5.9 below.

TABLE 5.9
EQUIVALENT FLUID UNIT WEIGHTS (G_h)
(pounds per cubic foot)

WALL TYPE	LEVEL BACKFILL	SLOPE BACKFILL 2:1 (HORIZONTAL: VERTICAL)
CANTILEVER WALL (YIELDING)	55	75
RESTRAINED WALL	65	85

Lateral pressures on cantilever retaining walls (yielding walls) over six feet high due to earthquake motions may be calculated based on work by Seed and Whitman (1970). The total lateral earth pressure against a properly drained and backfilled cantilever retaining wall above the groundwater level can be expressed as:

$$P_{AE} = P_A + \Delta P_{AE}$$

For non-yielding (or "restrained") walls, the total lateral earth pressure may be similarly calculated based on work by Wood (1973):

$$P_{KE} = P_K + \Delta P_{KE}$$

Where P_A/b = Static Active Earth Pressure = $G_h H^2/2$

P_K/b = Static Restrained Wall Earth Pressure = $G_h H^2/2$

$\Delta P_{AE}/b$ = Dynamic Active Earth Pressure Increment = $(3/8)\ k_h\ \gamma H^2$

$\Delta P_{KE}/b$ = Dynamic Restrained Earth Pressure Increment = $k_h\ \gamma H^2$

b = unit length of wall (usually 1 foot)

k_h = 1/2* PGA_m (PGA_m given previously Table 5.8)

G_h = Equivalent Fluid Unit Weight (given previously Table 5.9)

H = Total Height of the retained soil

γ = Total Unit Weight of Soil ≈ 135 pounds per cubic foot

*It is anticipated that the 1/2 reduction factor will be appropriate for proposed walls that are not substantially sensitive to movement during the design seismic event. Proposed walls that are more sensitive to such movement could utilize a 2/3 reduction factor. If any proposed walls require minimal to no movement during the design seismic event, no reduction factor to the peak ground acceleration should be used. The project structural engineer of record should determine the appropriate reduction factor to use (if any) based on the specific proposed wall characteristics.

The static and increment of dynamic earth pressure in both cases may be applied with a line of action located at H/3 above the bottom of the wall (SEAOC, 2013).

These values assume non-expansive backfill and free-draining conditions. Measures should be taken to prevent moisture buildup behind all retaining walls. Drainage measures should include free-draining backfill materials and sloped, perforated drains. These drains should discharge to an appropriate off-site location. Waterproofing should be as specified by the project architect.

In addition to the recommended earth pressure, subterranean structure walls adjacent to the streets or other traffic loads should be designed to resist a uniform lateral pressure of 100 psf. This is the result of an assumed 300-psf surcharge behind the walls due to normal street traffic. If the traffic is kept back at least 10 feet or a distance equal to the retained soil height from the subject walls, whichever is less, the traffic surcharge may be neglected. The project architect or structural engineer should determine the necessity of waterproofing the subterranean structure walls to reduce moisture infiltration.

Temporary shoring is generally not anticipated to be necessary based on current conceptual plans. However, temporary shoring recommendations may be provided should conditions arise to necessitate such.

5.10 Exterior Flatwork

Lightly loaded flatwork should be installed with crack-control joints at appropriate spacing as designed by the project architect to reduce the potential for cracking in exterior flatwork caused by minor movement of subgrade soils and concrete shrinkage, it is recommended that such flatwork be installed with crack-control joints at appropriate spacing as designed by the project architect and measure a minimum 5.0 inches in thickness. Additionally, it is recommended that flatwork be

installed with at least No. 4 reinforcing bars at 18-inch centers, each way, at or above mid-height of slab, but with proper concrete cover, or with other reinforcement per the applicable project designer. Flatwork that should be installed with crack control joints, includes sidewalks and architectural features. All subgrades should be prepared according to the earthwork recommendations previously given before placing concrete. Positive drainage should be established and maintained next to all flatwork. Subgrade materials should be maintained at a minimum of three percent above optimum moisture content until the time of concrete placement.

5.11 Vehicular Pavement

The proposed improvements include paved vehicle drive and parking areas. Presented in Table 5.11 are preliminary pavement sections utilizing preliminary Resistance "R" Value. Actual traffic area slab sections to be provided by the structural designer. Beneath proposed pavement areas, the upper 12 inches of subgrade and all base materials should be compacted to 95% relative compaction in accordance with ASTM D1557, and at a minimum of three percent above optimum moisture content.

TABLE 5.11
RECOMMENDED PAVEMENT THICKNESS

Traffic Area	Assumed Traffic Index	Preliminary Subgrade "R"-Value	Asphalt Pavements		Portland Cement Concrete Pavements, on Subgrade Soils (inches)
			AC Thickness (inches)	Class II Aggregate Base Thickness (inches)	
Fire Lanes & Infrequent Heavy Vehicle Access	7.0	5+	4.0	16.0	7.5
Automobile Drive Areas	5.5	5+	3.0	12.0	7.0
Automobile Parking Areas	4.0	5+	3.0	7.0	6.0

* Caltrans Class 2 aggregate base
** Concrete should have a modulus of rupture of at least 600 psi

Following rough site grading, CTE laboratory testing of representative subgrade soils should be performed to verify as-graded "R"-Value and suitability of pavement sections. Asphalt paved areas should be designed, constructed, and maintained in accordance with the recommendations of the Asphalt Institute, or other widely recognized authority. Concrete paved areas should be designed and constructed in accordance with the recommendations of the American Concrete Institute or other widely recognized authority, particularly with regard to thickened edges, joints, and drainage. The Standard Specifications for Public Works construction ("Greenbook") or Caltrans Standard Specifications may be referenced for pavement materials specifications.

5.12 Drainage

Surface runoff should be collected and directed away from improvements by means of appropriate erosion-reducing devices and positive drainage should be established around the proposed improvements. Positive drainage should be directed away from improvements at a gradient of at least two percent for a distance of at least five feet. However, the project civil engineers should evaluate the on-site drainage and make necessary provisions to keep surface water from affecting the site.

Generally, CTE recommends against allowing water to infiltrate building pads or adjacent to slopes. CTE understands that some agencies are encouraging the use of storm-water cleansing devices. Use of such devices tends to increase the possibility of adverse effects associated with high groundwater including slope instability and liquefaction.

5.13 Slopes

Based on anticipated soil strength characteristics slopes, if proposed, should be constructed at ratios of 2:1 (horizontal: vertical) or flatter. These slope inclinations should exhibit factors of safety greater than 1.5.

Although properly constructed slopes on this site should be grossly stable, the soils will be somewhat erodible. Therefore, runoff water should not be permitted to drain over the edges of slopes unless that water is confined to properly designed and constructed drainage facilities. Erosion-resistant vegetation should be maintained on the face of all slopes.

Typically, soils along the top portion of a fill slope face will creep laterally. CTE recommends against building distress-sensitive hardscape improvements within five feet of slope crests.

5.14 Controlled Low Strength Materials (CLSM)

Where approved, Controlled Low Strength Materials (CLSM) may be used in deepened footing excavation areas, building pads, and/or adjacent to retaining walls or other structures, provided the appropriate following recommendations are also incorporated. Minimum overexcavation depths recommended herein beneath slabs, flatwork, and other areas may be applicable beneath CLSM if/where CLSM is to be used, and excavation bottoms should be observed by CTE prior to placement of CLSM. Prior to CLSM placement, the excavation should be free of debris, loose soil materials, and water. Once specific areas to utilize CLSM have been determined, CTE should review the locations to determine if additional recommendations are appropriate. CLSM should consist of a minimum three-sack cement/sand slurry with a minimum 28-day compressive strength of 100 psi (or equal to or greater than the maximum allowable short term soil bearing pressure provided herein, whichever is higher) as determined by ASTM D4832. If re-excavation is anticipated, the compressive strength of CLSM should generally be limited to a maximum of 150 psi per ACI 229R-99. Where re-excavation is required, two-sack cement/sand slurry may be used to help limit the compressive strength. The allowable soils bearing pressure and coefficient of friction provided herein should still govern foundation design. CLSM may not be used in lieu of structural concrete where required by the structural engineer.

5.15 Plan Review

CTE should be authorized to review the project grading and foundation plans prior to commencement of earthwork in order to provide additional recommendations, if necessary.

5.16 Construction Observation

The recommendations provided in this report are based on preliminary design information for the proposed construction and the subsurface conditions observed in the soil borings. The interpolated subsurface conditions should be confirmed by CTE during construction with respect to anticipated conditions. Upon completion of precise grading, if necessary, soil samples will be collected to evaluate as-built Expansion Index. Foundation recommendations may be revised upon completion of grading, and as-built laboratory tests results. Additionally, soil samples should be taken in pavement subgrade areas upon rough grading to refine pavement recommendations as necessary.

Recommendations provided in this report are based on the understanding and assumption that CTE will provide the observation and testing services for the project. All earthwork should be observed and tested in accordance with recommendations contained within this report. CTE should evaluate footing excavations before reinforcing steel placement.

6.0 LIMITATIONS OF INVESTIGATION

The field evaluation, laboratory testing, and geotechnical analysis presented in this report have been conducted according to current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area. No other warranty, expressed or implied, is made regarding the conclusions, recommendations and opinions expressed in this report.

Variations may exist and conditions not observed or described in this report may be encountered during construction. This report is prepared for the project as described. It is not prepared for any other property or party.

The recommendations presented herein have been developed in order to reduce the potential adverse effects of expansive and/or differential soil conditions. However, even with the design and construction precautions provided, some post-construction soil movement and associated distress may occur.

CTE understands that, as part of grading performed under the observation of Geocon, Inc. (grading documented geotechnically by Geocon, 2014), toxaphene-impacted soils were buried and encapsulated at the site. CTE's scope for this project does not include an environmental scope, and hence CTE does not offer conclusions, opinions, or recommendations regarding the environmentally impacted soils at the site.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside CTE's involvement. Therefore, this report is subject to review and should not be relied upon after a period of three years.

CTE's conclusions and recommendations are based on an analysis of the observed conditions. If conditions different from those described in this report are encountered, CTE should be notified and additional recommendations, if required, will be provided subject to CTE remaining as authorized geotechnical consultant of record. This report is for use of the project as described. It should not be utilized for any other project.

CTE appreciates this opportunity to be of service on this project. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Respectfully submitted,

CONSTRUCTION TESTING & ENGINEERING, INC.

Colm J. Kenny, GE #3201
Principal Engineer

Jay F. Lynch, CEG# 1890
Principal Engineering Geologist

Dylan DeJauregui, PG #10119
Project Geologist

DD/JFL/DTM:ach





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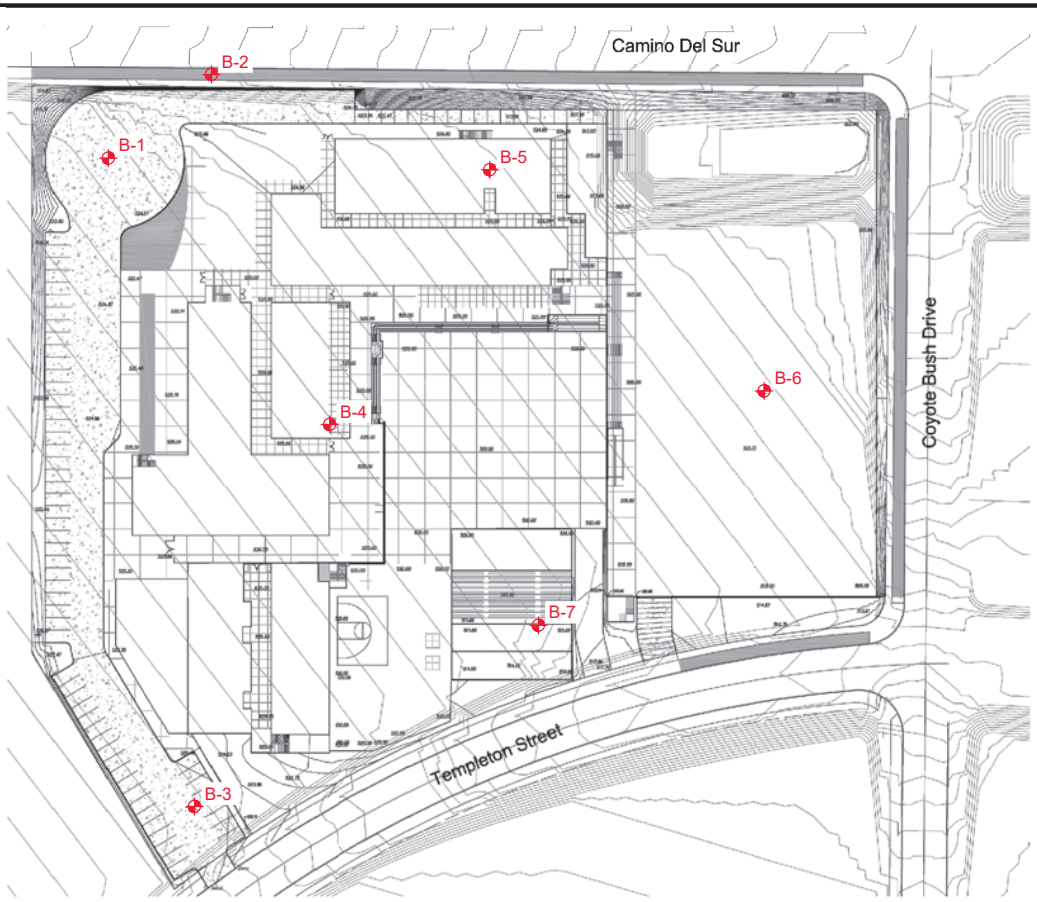
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Inspection | Testing | Geotechnical | Environmental & Construction Engineering | Civil Engineering | Surveying

SITE INDEX MAP

PROPOSED CAMBRIDGE SCHOOL
SW CORNER OF CAMINO DEL SUR & COYOTE BUSH DRIVE
SAN DIEGO, CALIFORNIA

SCALE:	DATE:
AS SHOWN	9/23
CTE JOB NO.: 4830.2300106	FIGURE: 1



EXPLANATION

B-7 ⊕ APPROXIMATE BORING LOCATION

Qppf QUATERNARY PREVIOUSLY PLACED FILL

GRAPHIC SCALE

60' 0 30' 60' 120'

1 inch =60 ft.

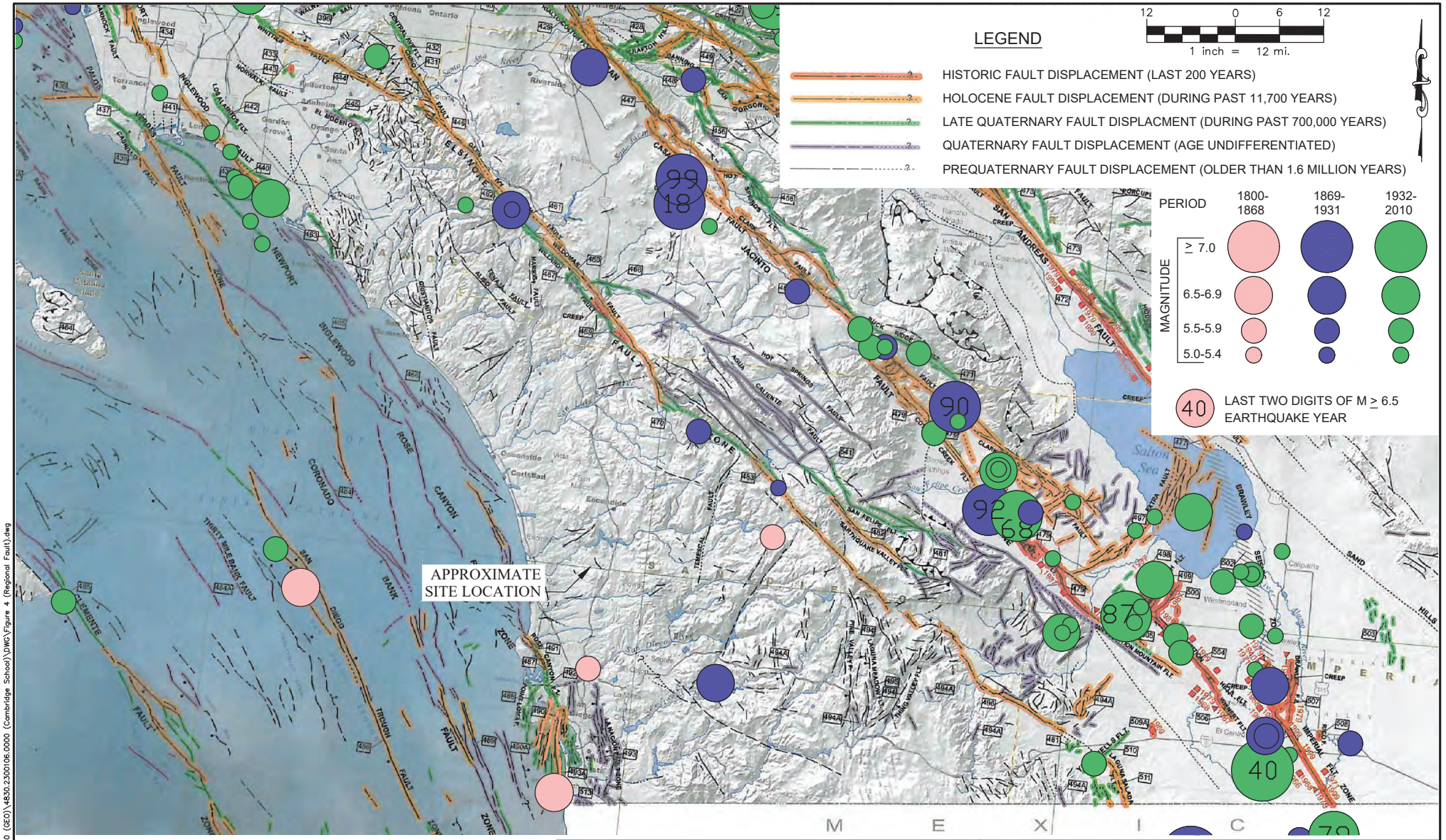
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GEOTECHNICAL EXPLORATION LOCATION MAP

PROPOSED CAMBRIDGE SCHOOL
SW CORNER OF CAMINO DEL SUR & COYOTE BUSH ROAD
SAN DIEGO, CALIFORNIA

CTE JOB NO:	4830.2300106
SCALE:	1" ~ 60'
DATE:	9/23
FIGURE:	2

S:\Projects\4830 (GEO)\4830.2300106.0000 (Cambridge School)\DWG\Figure 2 (Exploration Map) 11x17.dwg



NOTES: FAULT ACTIVITY MAP OF CALIFORNIA, 2010, CALIFORNIA GEOLOGIC DATA MAP SERIES MAP NO. 6;
EPICENTERS OF AND AREAS DAMAGED BY M≥5 CALIFORNIA EARTHQUAKES, 1800-1999 ADAPTED AFTER TOPPOZADA, BRANUM, PETERSEN, HALLSTORM, CRAMER, AND REICHLE, 2000, CDMG MAP SHEET 49
REFERENCE FOR ADDITIONAL EXPLANATION; MODIFIED WITH CISN AND USGS SEISMIC MAPS

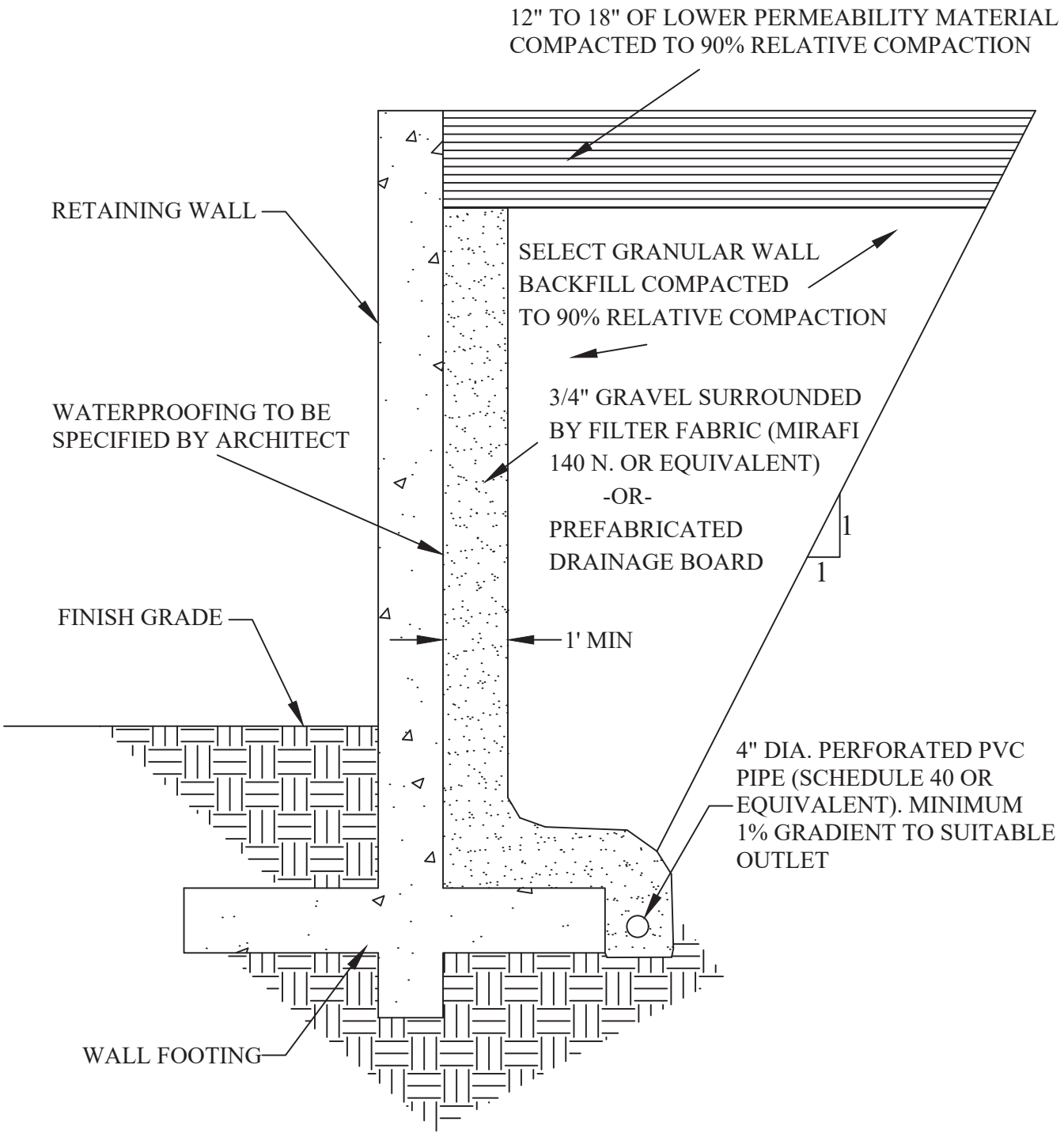
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REGIONAL FAULT AND SEISMICITY MAP

PROPOSED CAMBRIDGE SCHOOL
SW CORNER OF CAMINO DEL SUR & COYOTE BUSH ROAD
SAN DIEGO, CALIFORNIA

CTE JOB NO: 4830.2300106
SCALE: 1 inch = 12 miles
DATE: 9/23
FIGURE: 3

S:\Projects\4830 (GEO)\4830.2300106.0000 (Cambridge School)\DWG\Figure 4 (Regional Fault).dwg



*CONCEPTUAL DRAWING

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RETAINING WALL DRAINAGE DETAIL

PROPOSED CAMBRIDGE SCHOOL
SW CORNER OF CAMINO DEL SUR & COYOTE BUSH ROAD
SAN DIEGO, CALIFORNIA

SCALE:	DATE:
NO SCALE	9/23
CTE JOB NO.: 4830.2300106	FIGURE: 4

APPENDIX A

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REFERENCES

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APPENDIX B

EXPLORATION LOGS

CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS < 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES, LITTLE OF NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS < 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, SLIGHTLY PLASTIC CLAYEY SILTS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTS OR LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILTS AND CLAYS
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" 3/4" 4 10 40 200

CLEAR SQUARE SIEVE OPENING U.S. STANDARD SIEVE SIZE

ADDITIONAL TESTS

(OTHER THAN TEST PIT AND BORING LOG COLUMN HEADINGS)

MAX- Maximum Dry Density
GS- Grain Size Distribution
SE- Sand Equivalent
EI- Expansion Index
CHM- Sulfate and Chloride Content , pH, Resistivity
COR - Corrosivity
SD- Sample Disturbed
PM- Permeability
SG- Specific Gravity
HA- Hydrometer Analysis
AL- Atterberg Limits
RV- R-Value
CN- Consolidation
CP- Collapse Potential
HC- Hydrocollapse
REM- Remolded
PP- Pocket Penetrometer
WA- Wash Analysis
DS- Direct Shear
UC- Unconfined Compression
MD- Moisture/Density
M- Moisture
SC- Swell Compression
OI- Organic Impurities

FIGURE: BL1

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT: | DRILLER: | SHEET: of
CTE JOB NO: | DRILL METHOD: | DRILLING DATE:
LOGGED BY: | SAMPLE METHOD: | ELEVATION:

Depth (Feet) | Bulk Sample | Driven Type | Blows/Foot | Dry Density (pcf) | Moisture (%) | U.S.C.S. Symbol | Graphic Log

BORING LEGEND

DESCRIPTION

Laboratory Tests

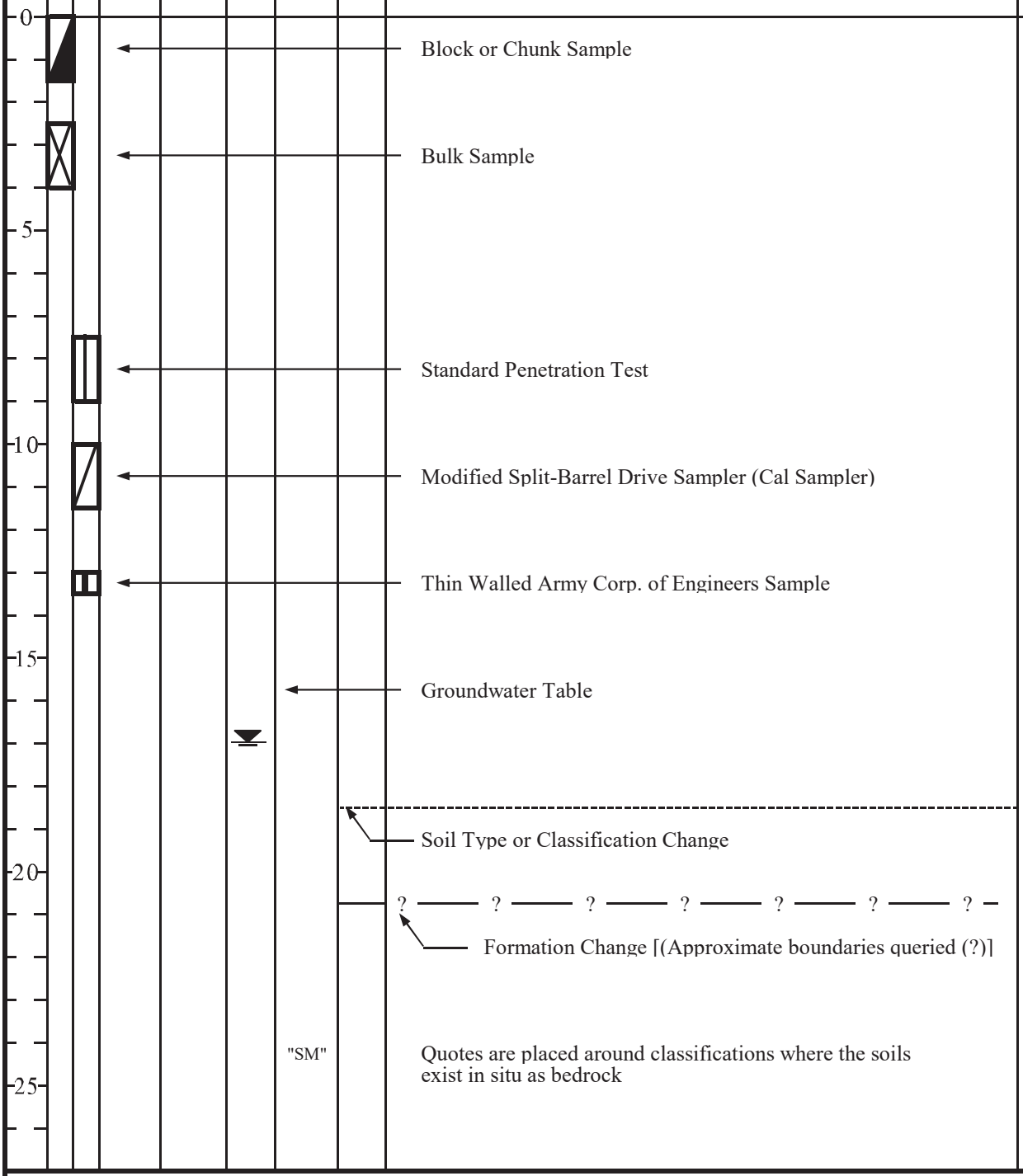


FIGURE: BL2

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Inspection | Testing | Geotechnical | Environmental & Construction Engineering | Civil Engineering | Surveying

PROJECT:	Cambridge School	WORKERS:	Baja Exploration	SHEET:	1 of 1
CTE JOB NO:	4830.2300106	EXCAVATION METHOD:	CME-75	DRILLING DATE:	8/10/2023
LOGGED BY:	DD	SAMPLE METHOD:	Bulk Bags, SPT, Rings	ELEVATION:	520 ft msl

BORING LOG: B-1

Depth (Feet)	Sample: Bulk	Sample: Driven	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		**PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, dry, light-tan, fine- to medium-grained silty sand with trace gravels.	
1									GS
2								Becomes yellow-brown	
3						CL		Stiff, slightly moist, dark gray-brown, fine- to medium-grained sandy clay.	
4			4						
5			6						
6			7						
7									
8									
9			7						MD
10			11						
			15						
11								Excavation terminated at 10.0 ft bgs. (non-refusal) No groundwater encountered. Backfilled with cement from 10 ft to 9 ft bgs. Grouted to surface and compacted with bentonite chips at surface.	
12									
13									

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PROJECT:	Cambridge School	WORKERS:	Baja Exploration	SHEET:	1 of 1
CTE JOB NO:	4830.2300106	EXCAVATION METHOD:	Manual Hand Auger	DRILLING DATE:	8/10/2023
LOGGED BY:	DD	SAMPLE METHOD:	Bulk Bags	ELEVATION:	509 ft msl

BORING LOG: B-2

Depth (Feet)	Sample: Bulk	Sample: Driven	Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0							SC		**PREVIOUSLY PLACED FILL (Qppf):** Medium to very dense, dry, gray-brown, fine- to coarse-grained clayey sand with trace gravels.	
1					119.1	11.0				
2							CL		Stiff to hard, dry, red-brown, fine- to medium-grained sandy clay.	EI, MAX
3							SC		Medium to very dense, dry, gray-brown, fine- to coarse-grained clayey sand with trace gravels.	
4									Gravels present.	
5									Excavation terminated at 4.5 ft bgs. (refusal on gravels) No groundwater encountered. Backfilled bentonite chips.	
6										
7										
8										
9										
10										
11										
12										
13										

PROJECT:	Cambridge School		WORKERS:	Baja Exploration	SHEET:	1 of 1	
CTE JOB NO:	4830.2300106		EXCAVATION METHOD:	CME-75	DRILLING DATE:	8/10/2023	
LOGGED BY:	DD		SAMPLE METHOD:	Bulk Bags, SPT	ELEVATION:	526 ft msl	

BORING LOG: B-3

Depth (Feet)	Sample: Bulk	Sample: Driven	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		**PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, dry, light-gray, fine- to medium-grained silty sand with trace gravels.	
1				117.0	13.5				MAX
2								Becomes yellow-gray-brown.	RV, CHEM
3						SC		Medium dense, slightly moist, light brown, fine- to medium-grained clayey sand.	
4			5						GS
5			6			CL		Very stiff, dry, dark-brown, fine- to medium-grained sandy clay with trace gravels and sand lenses throughout.	
6			15						
7									
8								Becomes gray-brown.	
9			5						
10			10						
			50/5"					Excavation terminated at 10.0 ft bgs. (non-refusal) No groundwater encountered. Backfilled with cement from 10 ft to 9 ft bgs. Grouted to surface and compacted with bentonite chips at surface.	
11									
12									
13									

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PROJECT:	Cambridge School	WORKERS:	Baja Exploration	SHEET:	1 of 1
CTE JOB NO:	4830.2300106	EXCAVATION METHOD:	CME-75	DRILLING DATE:	8/10/2023
LOGGED BY:	DD	SAMPLE METHOD:	SPT, Rings	ELEVATION:	520 ft msl

BORING LOG: B-4

Depth (Feet)	Sample: Bulk	Sample: Driven	Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0							SM		**PREVIOUSLY PLACED FILL (Qppf):** Loose, dry, light-gray, fine- to medium-grained silty sand..	
1										
2										
3									Becomes yellow-gray-brown.	
4				2						EI, GS
5				2 3			SC		Medium stiff, dry to slightly moist, light brown, fine- to medium-grained sandy clay with abundant sandy layers.	
6										
7										
8										
9				9 9						
10				12						
11									Excavation terminated at 10.0 ft bgs. (non-refusal) No groundwater encountered. Backfilled with cement from 10 ft to 9 ft bgs. Grouted to surface and compacted with bentonite chips at surface.	
12										
13										

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PROJECT:	Cambridge School	WORKERS:	Baja Exploration	SHEET:	1 of 1
CTE JOB NO:	4830.2300106	EXCAVATION METHOD:	CME-75	DRILLING DATE:	8/10/2023
LOGGED BY:	DD	SAMPLE METHOD:	SPT	ELEVATION:	513 ft msl

BORING LOG: B-5

Depth (Feet)	Sample: Bulk	Sample: Driven	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		**PREVIOUSLY PLACED FILL (Qppf):** Loose, dry, light-gray, fine- to medium-grained silty sand.	
1									
2									
3								Becomes yellow-gray-brown.	
4		■	3						
5		■	3			CL		Stiff, dry, gray-brown, fine- to medium-grained sandy clay with trace sandy layers.	
6		■	3						
7									
8									
9		■	6			SM/CL		Becomes brown, ine- to medium-grained silty sand and clay.	GS
10		■	15						
		■	20						
11								Excavation terminated at 10.0 ft bgs. (non-refusal) No groundwater encountered. Backfilled with cement from 10 ft to 9 ft bgs. Grouted to surface and compacted with bentonite chips at surface.	
12									
13									

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PROJECT:	Cambridge School	WORKERS:	Baja Exploration	SHEET:	1 of 1
CTE JOB NO:	4830.2300106	EXCAVATION METHOD:	CME-75	DRILLING DATE:	8/10/2023
LOGGED BY:	DD	SAMPLE METHOD:	SPT	ELEVATION:	510 ft msl

BORING LOG: B-6

Depth (Feet)	Sample: Bulk	Sample: Driven	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		Gravel at surface **PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, dry, light gray-brown, fine- to medium-grained silty sand.	
1									
2									
3								Becomes dark yellow-brown.	
4			3			CL		Stiff, dry, dark brown, fine- to medium-grained sandy clay with trace sandy layers.	
5			3			SC		Loose, slightly moist, yellow-brown, fine- to medium-grained clayey sand.	
6			3						
7									
8								Becomes dense, dry, mottled brown, gray, and light-gray.	
9			6						
10			15 20						
11								Excavation terminated at 10.0 ft bgs. (non-refusal) No groundwater encountered. Backfilled with cement from 10 ft to 9 ft bgs. Grouted to surface and compacted with bentonite chips at surface.	
12									
13									

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PROJECT:	Cambridge School	WORKERS:	Baja Exploration	SHEET:	1 of 1
CTE JOB NO:	4830.2300106	EXCAVATION METHOD:	CME-75	DRILLING DATE:	8/10/2023
LOGGED BY:	DD	SAMPLE METHOD:	SPT	ELEVATION:	520 ft msl

BORING LOG: B-7

Depth (Feet)	Sample: Bulk	Sample: Driven	Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0							SM		**PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, dry, light gray, fine- to medium-grained silty sand.	
1										
2										
3									Becomes yellow-brown.	
4				25						
5				17 10			CL		Stiff, dry, dark brown, fine- to medium-grained sandy clay with trace sandy layers.	
6										
7							SC		Medium dense, slightly moist, mottled gray and brown, fine- to medium-grained clayey sand.	
8										
9				9						
10				13 17						
11									Excavation terminated at 10.0 ft bgs. (non-refusal) No groundwater encountered. Backfilled with cement from 10 ft to 9 ft bgs. Grouted to surface and compacted with bentonite chips at surface.	
12										
13										

APPENDIX C

LABORATORY TEST METHODS AND RESULTS

LABORATORY TEST METHODS

Laboratory tests were performed on selected soil samples to evaluate their engineering properties. Tests were performed following test methods of the American Society for Testing and Materials, or other accepted standards. The following presents a brief description of the various test methods used. Laboratory results are presented in the following section of this Appendix.

Classification (ASTM D2487)

Earth materials encountered were visually and texturally classified in accordance with the Unified Soil Classification System (USCS/ASTM D2487) and ASTM D2488. Material classifications are indicated on the logs of the exploratory borings presented in Appendix B.

Particle-size Distribution Tests (ASTM D6913)

Particle-size distribution (gradation) testing was performed on selected samples of the materials encountered in general accordance with the latest version of the ASTM D6913 test method. The test results were utilized in evaluating the soil classifications in accordance with the Unified Soil Classification System and to evaluate the geotechnical engineering characteristics of the tested material. The test results are plotted on grain-size distribution graphs and are presented in the following section of this appendix.

Expansion Index Test (ASTM D4829)

Expansion index testing was performed on selected samples of the earth materials encountered in general accordance with the ASTM D4829 test method. The test determines the expansion potential of the materials encountered. The test results are presented in the following section of this appendix.

Laboratory Compaction Characteristics Test (ASTM D1557)

Laboratory compaction characteristics testing was performed on selected samples of the earth materials encountered in general accordance with the ASTM D1557 test method. The test establishes the laboratory maximum dry density and optimum moisture content of the tested materials and are also used to aid in evaluating the strength characteristics of the materials.

Resistance "R" Value Test (CTM 301/ ASTM D2844)

R-Value testing was performed on selected samples of the earth materials encountered in general accordance with the California Test Method 301/ ASTM D2844. The test results are presented in the following section of this appendix.

Soil Corrosivity Tests

The water-soluble sulfate and chloride content, the resistivity, and pH of selected samples were performed by a third-party laboratory in general accordance with California Test Methods. The tests results are useful in the assessment of the degree of corrosivity of the earth materials encountered with regard to concrete and normal grade steel.

EXPANSION INDEX
(ASTM D4829)

Sample Location / Depth (feet)	Expansion Index	Expansion Potential
B-2 @ 0 – 3.5	43	LOW

LABORATORY COMPACTION CHARACTERISTICS
(ASTM D1557)

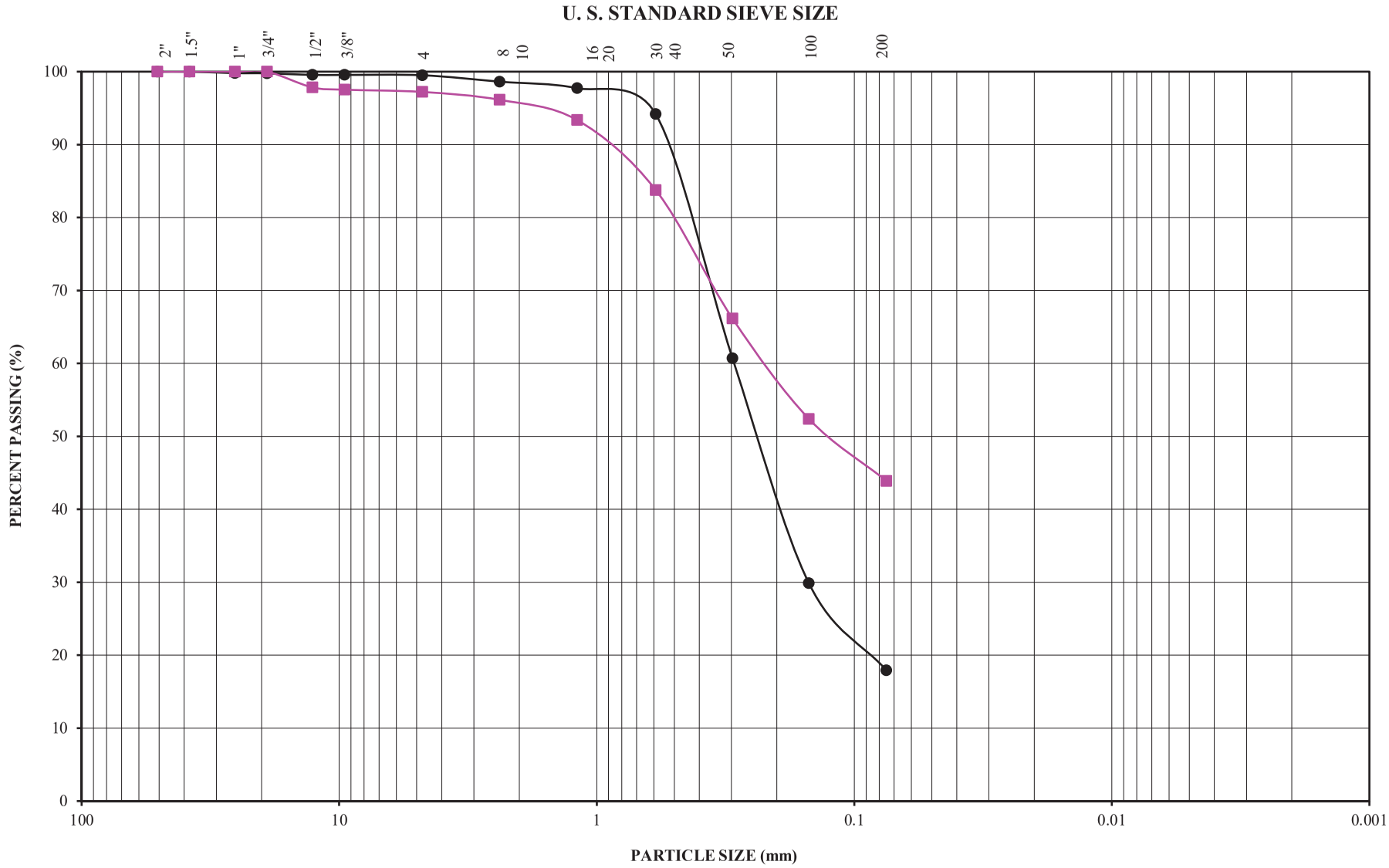
Sample Location / Depth (feet)	Maximum Dry Density (pounds per cubic foot)	Optimum Moisture (percent)
B-2 @ 0 – 3.5	119.1	11.0
B-3 @ 0 – 4	117.0	13.5

R-VALUE
(CTM 301/ASTM D2844)

Sample Location / Depth (feet)	Material Type (USCS)	R-Value
B-3 @ 0 – 4	Light Tan (CL)	8

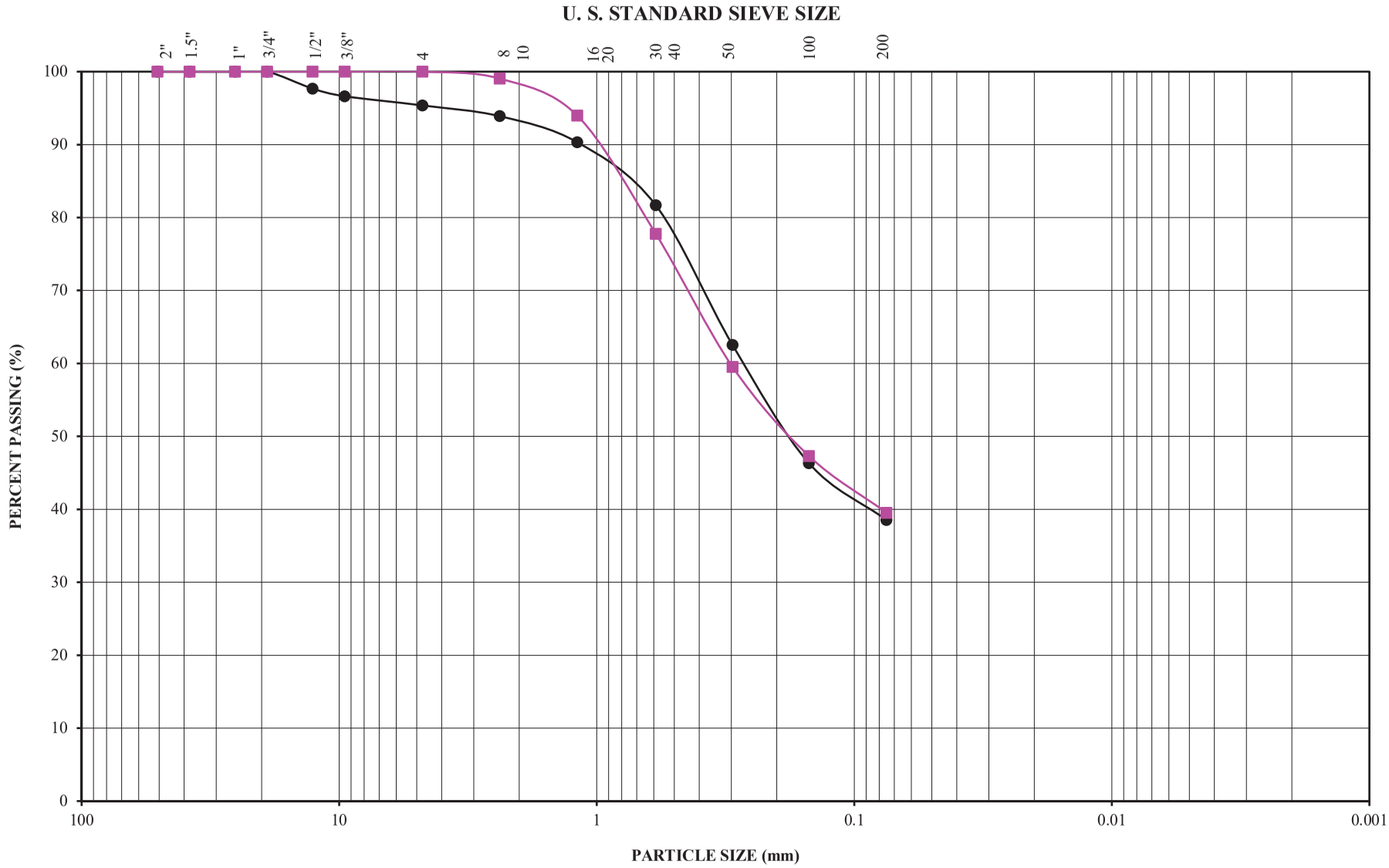
CORROSIVITY
(CTM 417, CTM 422 and CTM 643)

Sample Location / Depth (feet)	Material Type (USCS)	pH	Minimum Resistivity (Ohm-cm)	Water Soluble Sulfates (ppm)	Water Soluble Chlorides (ppm)
B-3 @ 0 – 4	Sandy Clay (SC)	8.46	3690	30.7	19.6



PARTICLE SIZE ANALYSIS

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	0-3	●	N/A	N/A	SM
B-3	4	■	N/A	N/A	SC
UES JOB NUMBER:		4830.2300106		FIGURE:	C-1



PARTICLE SIZE ANALYSIS

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-4	4	●	N/A	N/A	SC
B-5	8.5	■	N/A	N/A	SC
UES JOB NUMBER:		4830.2300106		FIGURE:	C-2

APPENDIX D

STANDARD SPECIFICATIONS FOR GRADING

Section 1 - General

Construction Testing & Engineering, Inc. presents the following standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications. Recommendations contained in the body of the previously presented soils report shall supersede the recommendations and or requirements as specified herein. The project geotechnical consultant shall interpret disputes arising out of interpretation of the recommendations contained in the soils report or specifications contained herein.

Section 2 - Responsibilities of Project Personnel

The geotechnical consultant should provide observation and testing services sufficient to general conformance with project specifications and standard grading practices. The geotechnical consultant should report any deviations to the client or his authorized representative.

The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the geotechnical consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor is responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including, but not limited to, earth work in accordance with the project plans, specifications and controlling agency requirements.

Section 3 - Preconstruction Meeting

A preconstruction site meeting should be arranged by the owner and/or client and should include the grading contractor, design engineer, geotechnical consultant, owner's representative and representatives of the appropriate governing authorities.

Section 4 - Site Preparation

The client or contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, root of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the geotechnical consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the geotechnical consultant.

Section 5 - Site Protection

Protection of the site during the period of grading should be the responsibility of the contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the geotechnical consultant, the client and the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions as determined by the geotechnical consultant. Soil adversely affected should be classified as unsuitable materials and should be subject to overexcavation and replacement with compacted fill or other remedial grading as recommended by the geotechnical consultant.

The contractor should be responsible for the stability of all temporary excavations. Recommendations by the geotechnical consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the contractor. Recommendations by the geotechnical consultant should not be considered to preclude requirements that are more restrictive by the regulating agencies. The contractor should provide during periods of extensive rainfall plastic sheeting to prevent unprotected slopes from becoming saturated and unstable. When deemed appropriate by the geotechnical consultant or governing agencies the contractor shall install checkdams, desilting basins, sand bags or other drainage control measures.

In relatively level areas and/or slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1.0 foot; they should be overexcavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1.0 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be overexcavated and replaced as compacted fill in accordance with the slope repair recommendations herein. If field conditions dictate, the geotechnical consultant may recommend other slope repair procedures.

Section 6 - Excavations

6.1 Unsuitable Materials

Materials that are unsuitable should be excavated under observation and recommendations of the geotechnical consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and nonengineered or otherwise deleterious fill materials.

Material identified by the geotechnical consultant as unsatisfactory due to its moisture conditions should be overexcavated; moisture conditioned as needed, to a uniform at or above optimum moisture condition before placement as compacted fill.

If during the course of grading adverse geotechnical conditions are exposed which were not anticipated in the preliminary soil report as determined by the geotechnical consultant additional exploration, analysis, and treatment of these problems may be recommended.

6.2 Cut Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal: vertical).

The geotechnical consultant should observe cut slope excavation and if these excavations expose loose cohesionless, significantly fractured or otherwise unsuitable material, the materials should be overexcavated and replaced with a compacted stabilization fill. If encountered specific cross section details should be obtained from the Geotechnical Consultant.

When extensive cut slopes are excavated or these cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top of the slope.

6.3 Pad Areas

All lot pad areas, including side yard terrace containing both cut and fill materials, transitions, located less than 3 feet deep should be overexcavated to a depth of 3 feet and replaced with a uniform compacted fill blanket of 3 feet. Actual depth of overexcavation may vary and should be delineated by the geotechnical consultant during grading, especially where deep or drastic transitions are present.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm drainage swale and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

Section 7 - Compacted Fill

All fill materials should have fill quality, placement, conditioning and compaction as specified below or as approved by the geotechnical consultant.

7.1 Fill Material Quality

Excavated on-site or import materials which are acceptable to the geotechnical consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement. All import materials anticipated for use on-site should be sampled tested and approved prior to and placement is in conformance with the requirements outlined.

Rocks 12 inches in maximum and smaller may be utilized within compacted fill provided sufficient fill material is placed and thoroughly compacted over and around all rock to effectively fill rock voids. The amount of rock should not exceed 40 percent by dry weight passing the 3/4-inch sieve. The geotechnical consultant may vary those requirements as field conditions dictate.

Where rocks greater than 12 inches but less than four feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the recommendations below. Rocks greater than four feet should be broken down or disposed off-site.

7.2 Placement of Fill

Prior to placement of fill material, the geotechnical consultant should observe and approve the area to receive fill. After observation and approval, the exposed ground surface should be scarified to a depth of 6 to 8 inches. The scarified material should be conditioned (i.e. moisture added or air dried by continued discing) to achieve a moisture content at or slightly above optimum moisture conditions and compacted to a minimum of 90 percent of the maximum density or as otherwise recommended in the soils report or by appropriate government agencies.

Compacted fill should then be placed in thin horizontal lifts not exceeding eight inches in loose thickness prior to compaction. Each lift should be moisture conditioned as needed, thoroughly blended to achieve a consistent moisture content at or slightly above optimum and thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials and weather conditions.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal: vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least six-foot wide benches and a minimum of four feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area after keying and benching until the geotechnical consultant has reviewed the area. Material generated by the benching operation should be moved sufficiently away from

the bench area to allow for the recommended review of the horizontal bench prior to placement of fill.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, moisture conditioning as needed to at or slightly above optimum moisture content, thoroughly blended and recompacted to a minimum of 90 percent of laboratory maximum dry density. Where unsuitable materials exist to depths of greater than one foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Rocks 12 inch in maximum dimension and smaller may be utilized in the compacted fill provided the fill is placed and thoroughly compacted over and around all rock. No oversize material should be used within 3 feet of finished pad grade and within 1 foot of other compacted fill areas. Rocks 12 inches up to four feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 15 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean, overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so those successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the geotechnical consultant at the time of placement.

The contractor should assist the geotechnical consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill. The contractor should provide this work at no additional cost to the owner or contractor's client.

Fill should be tested by the geotechnical consultant for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-00, D 2922-04. Tests should be conducted at a minimum of approximately two vertical feet or approximately 1,000 to 2,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the geotechnical consultant.

7.3 Fill Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal: vertical).

Except as specifically recommended in these grading guidelines compacted fill slopes should be over-built two to five feet and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be overexcavated and reconstructed under the guidelines of the geotechnical consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

At the discretion of the geotechnical consultant, slope face compaction may be attempted by conventional construction procedures including backrolling. The procedure must create a firmly compacted material throughout the entire depth of the slope face to the surface of the previously compacted firm fill intercore.

During grading operations, care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately established desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not

exceeding four feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly dozer trackrolled.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished using a berm and pad gradient of at least two percent.

Section 8 - Trench Backfill

Utility and/or other excavation of trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Within slab areas, but outside the influence of foundations, trenches up to one foot wide and two feet deep may be backfilled with sand and consolidated by jetting, flooding or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted or spot testing may be elected if deemed necessary, based on review of backfill operations during construction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the contractor may elect the utilization of light weight mechanical compaction equipment and/or shading of the conduit with clean, granular material, which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate, upon review of the geotechnical consultant at the time of construction.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the geotechnical consultant. Clean granular backfill and/or bedding are not recommended in slope areas.

Section 9 - Drainage

Where deemed appropriate by the geotechnical consultant, canyon subdrain systems should be installed in accordance with CTE's recommendations during grading.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, and concrete swales).

For drainage in extensively landscaped areas near structures, (i.e., within four feet) a minimum of 5 percent gradient away from the structure should be maintained. Pad drainage of at least 2 percent should be maintained over the remainder of the site.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns could be detrimental to slope stability and foundation performance.

Section 10 - Slope Maintenance

10.1 - Landscape Plants

To enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect should be the best party to consult regarding actual types of plants and planting configuration.

10.2 - Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

10.3 - Repair

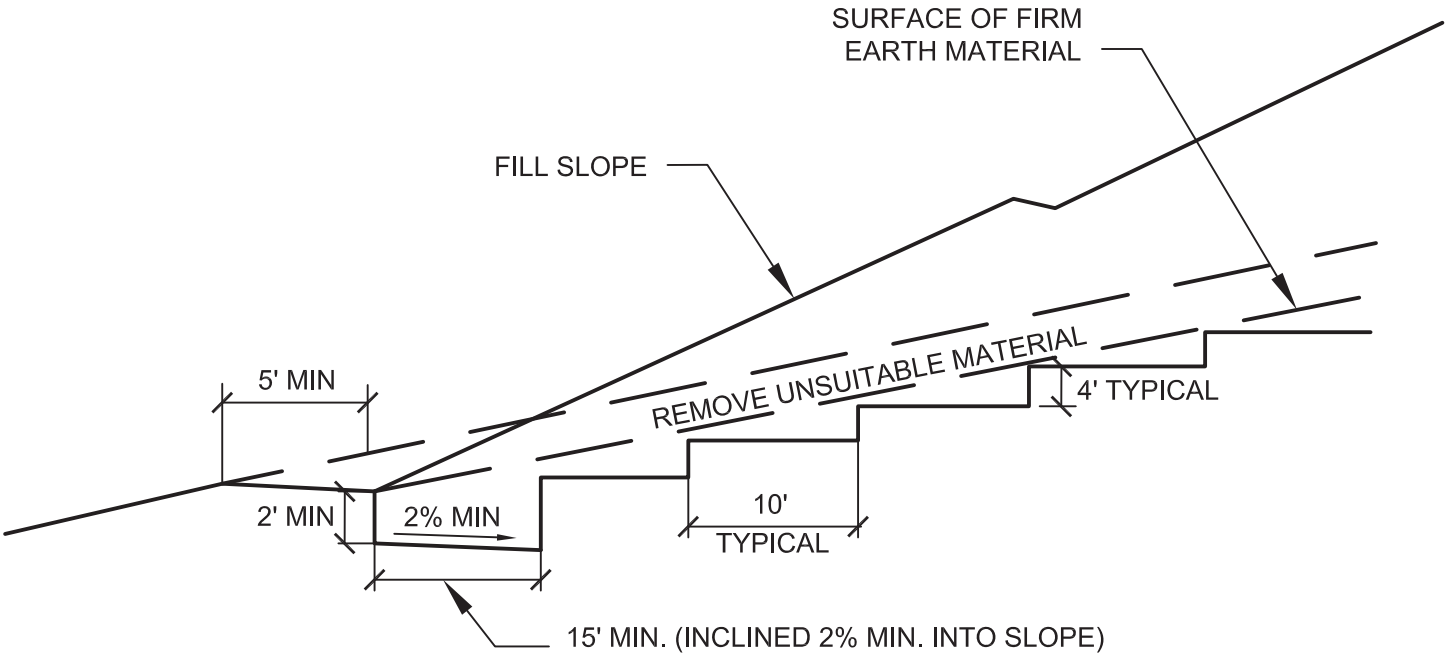
As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period prior to landscape planting.

If slope failures occur, the geotechnical consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

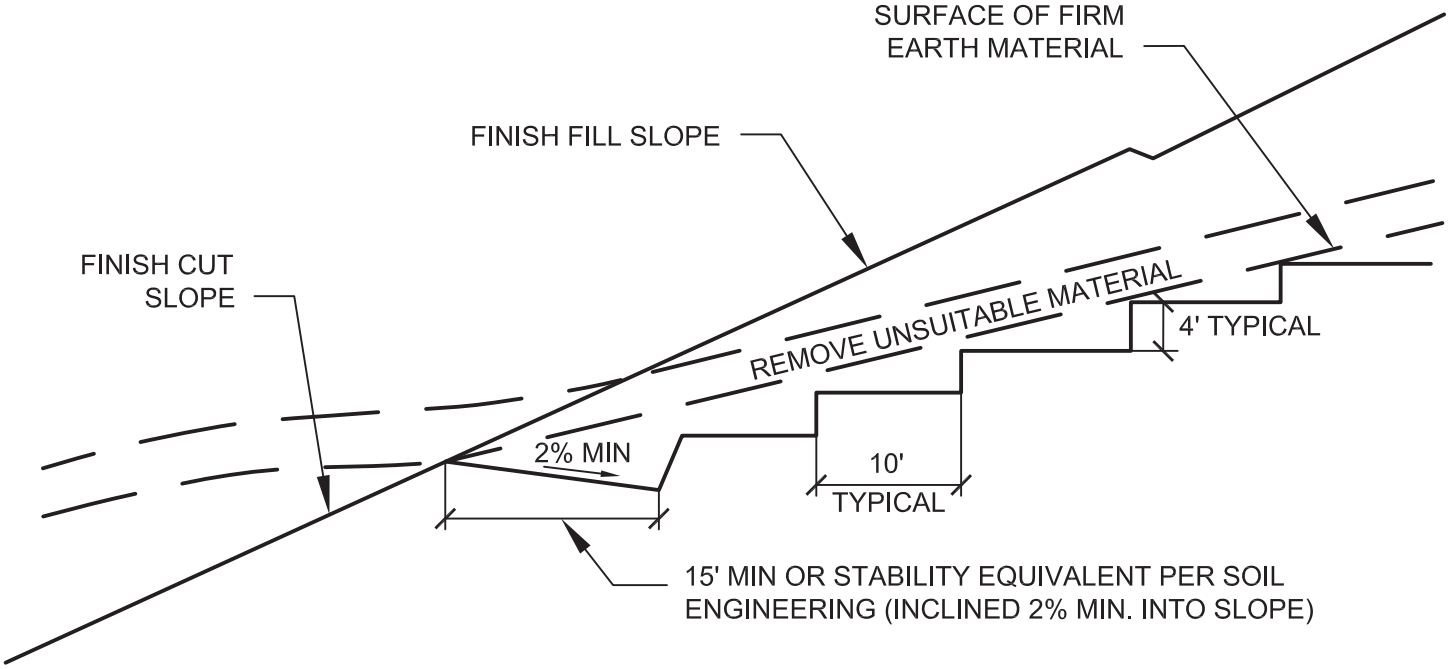
If slope failures occur as a result of exposure to period of heavy rainfall, the failure areas and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer one foot to three feet of a slope face).

BENCHING FILL OVER NATURAL

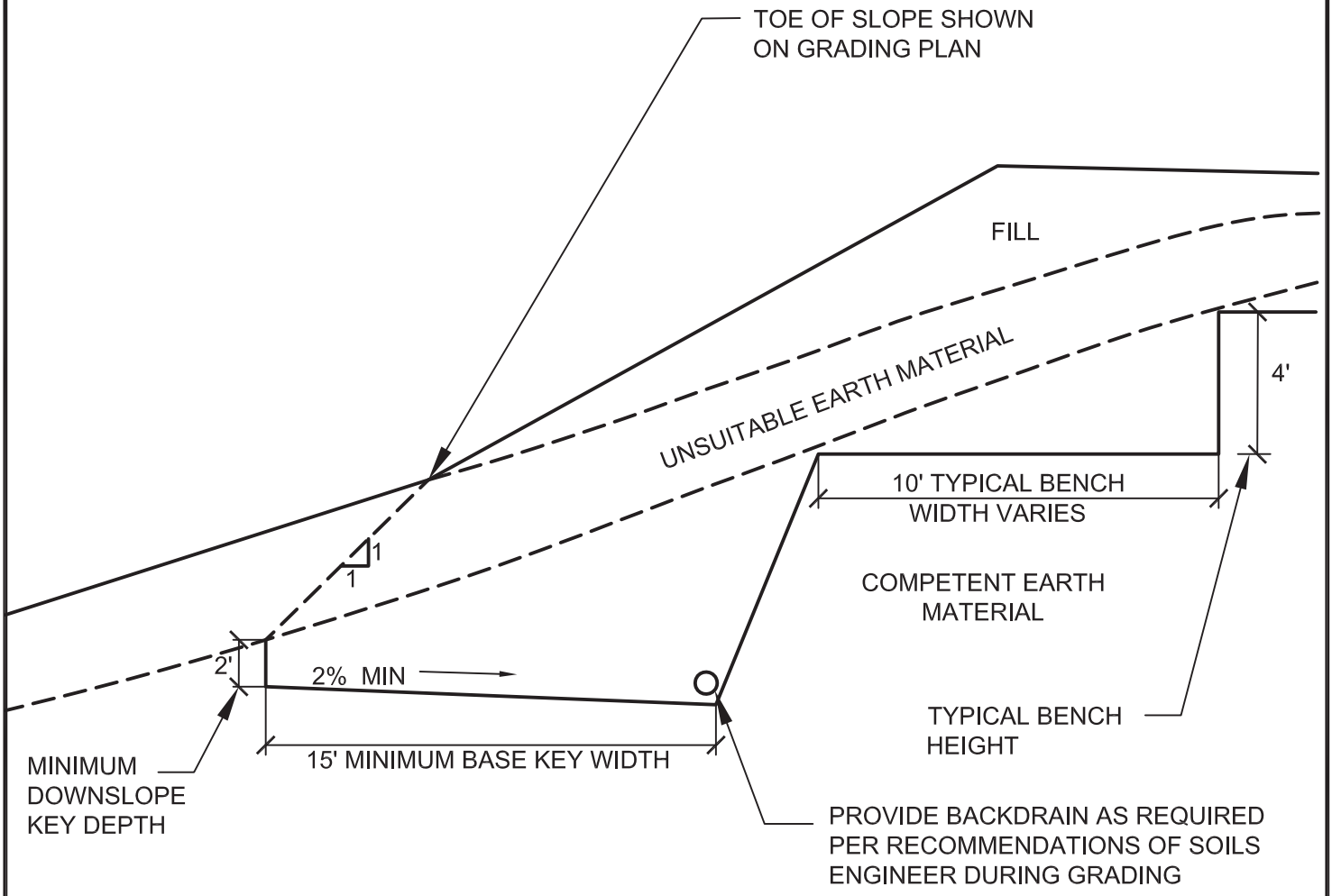


BENCHING FILL OVER CUT



NOT TO SCALE

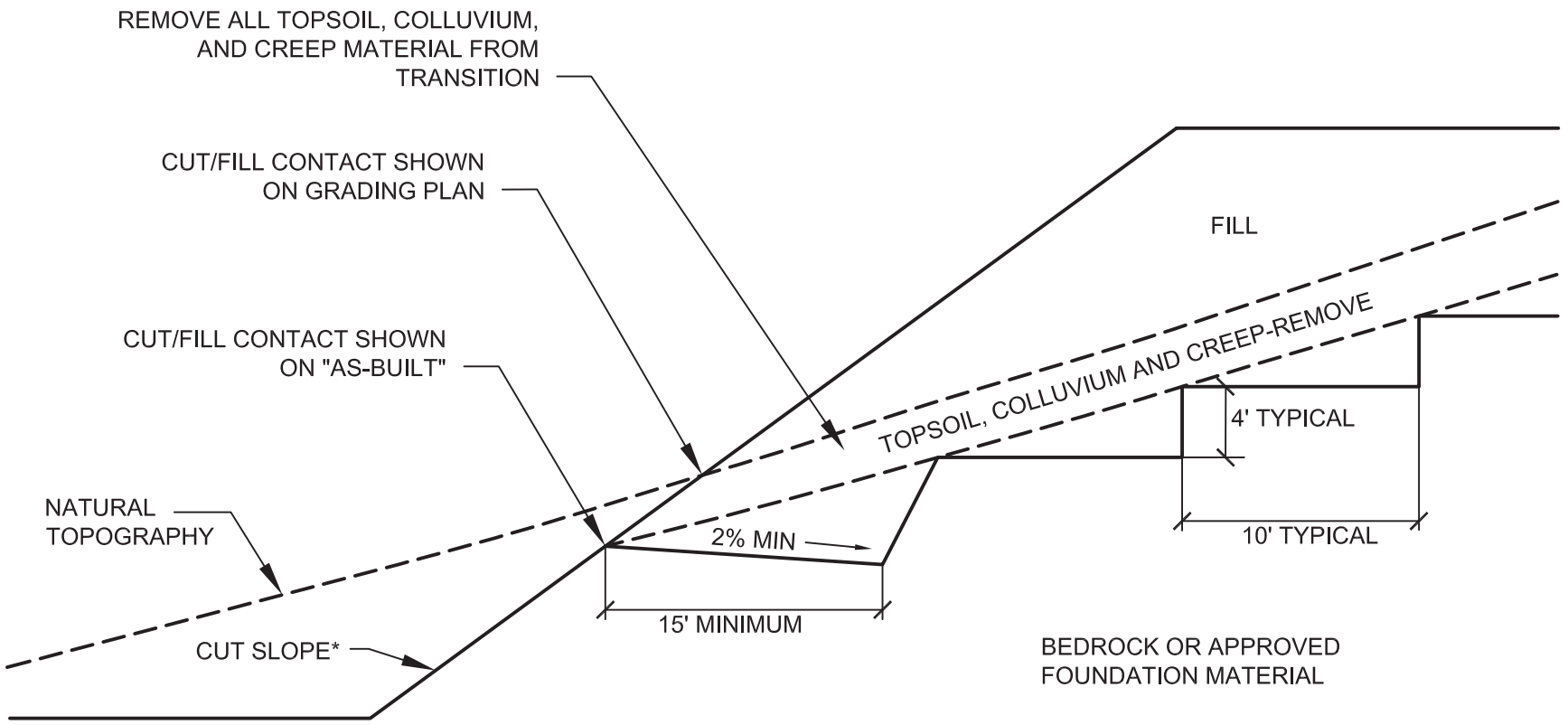
BENCHING FOR COMPACTED FILL DETAIL



WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

NOT TO SCALE

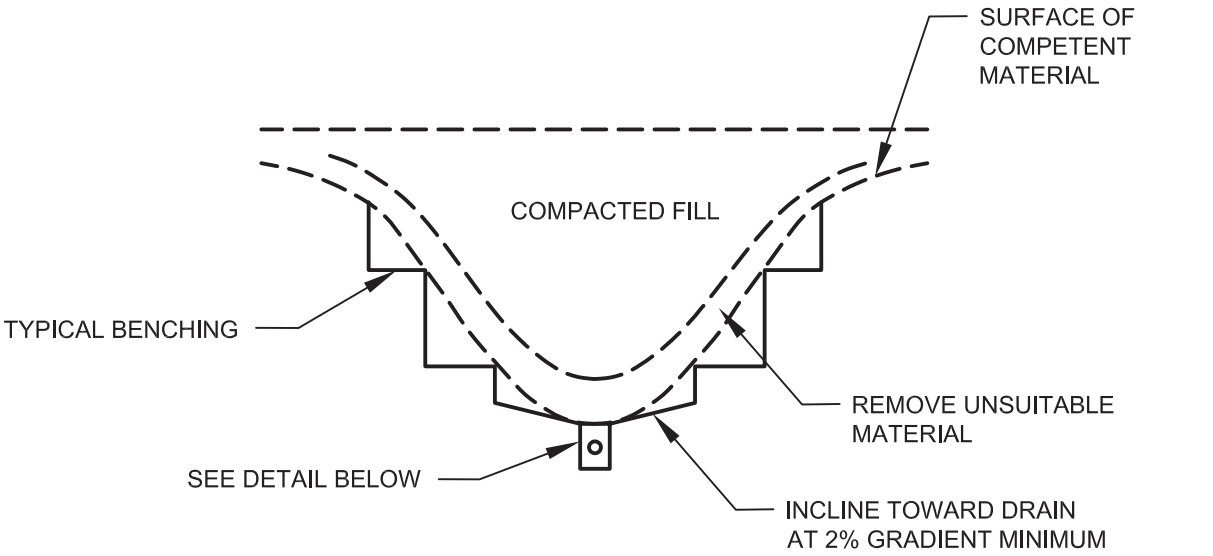
FILL SLOPE ABOVE NATURAL GROUND DETAIL



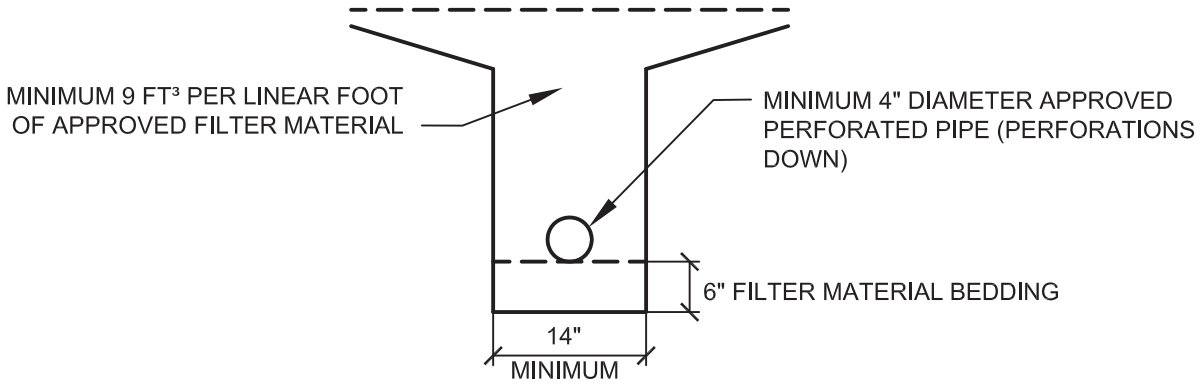
*NOTE: CUT SLOPE PORTION SHOULD BE MADE PRIOR TO PLACEMENT OF FILL

NOT TO SCALE

FILL SLOPE ABOVE CUT SLOPE DETAIL



DETAIL



CALTRANS CLASS 2 PERMEABLE MATERIAL FILTER MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi

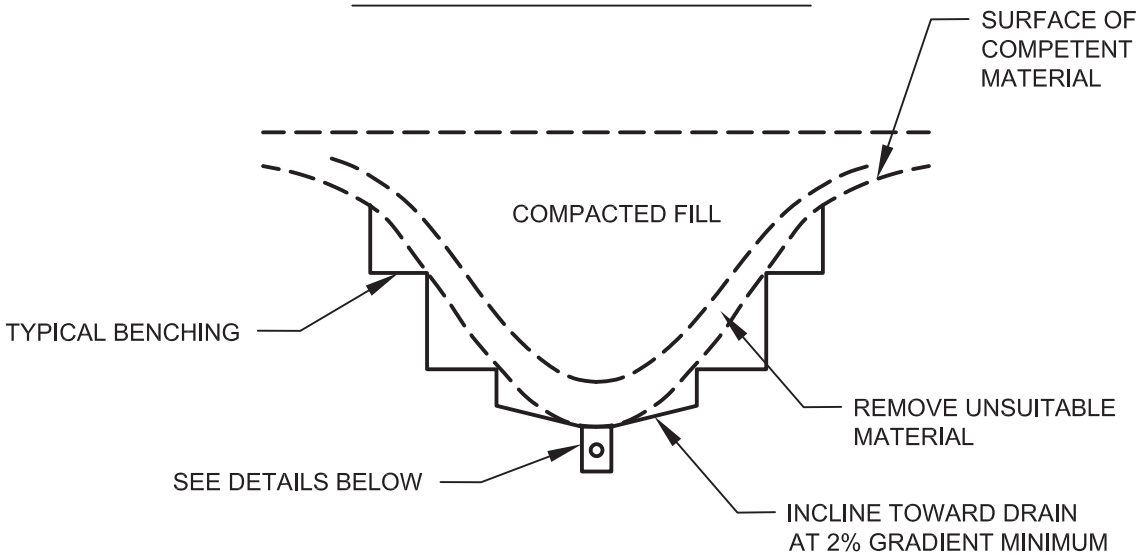
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

NOT TO SCALE

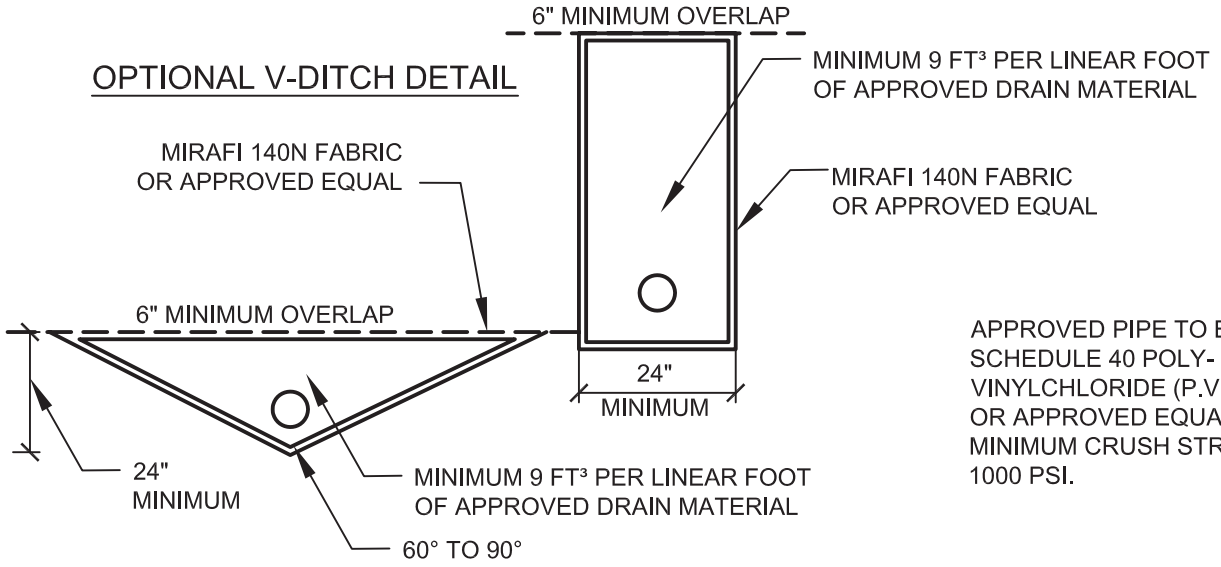
TYPICAL CANYON SUBDRAIN DETAIL

CANYON SUBDRAIN DETAILS



TRENCH DETAILS

OPTIONAL V-DITCH DETAIL



APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYLCHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 PSI.

DRAIN MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	88-100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

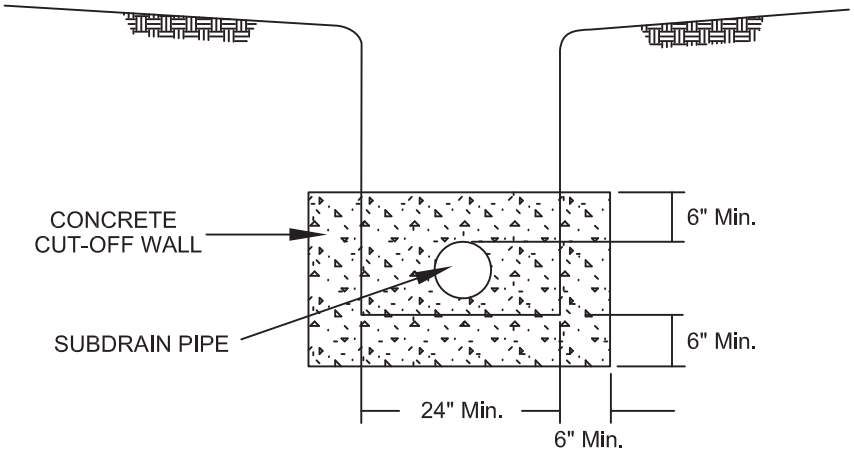
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

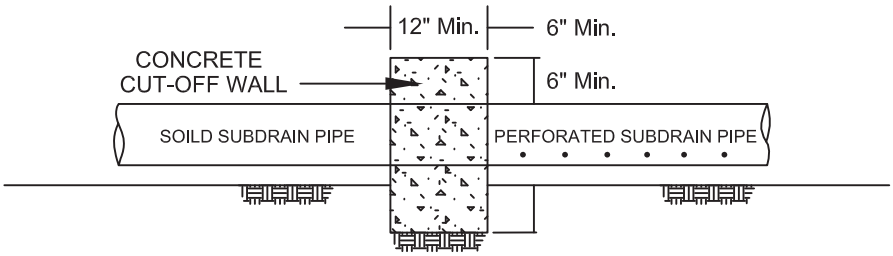
NOT TO SCALE

GEOFABRIC SUBDRAIN

FRONT VIEW



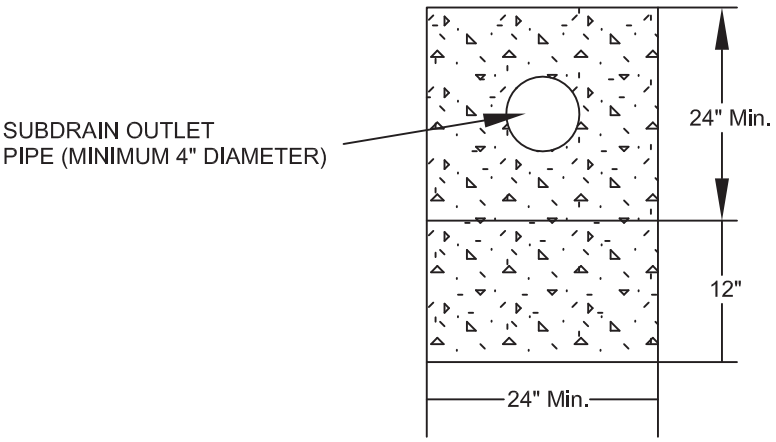
SIDE VIEW



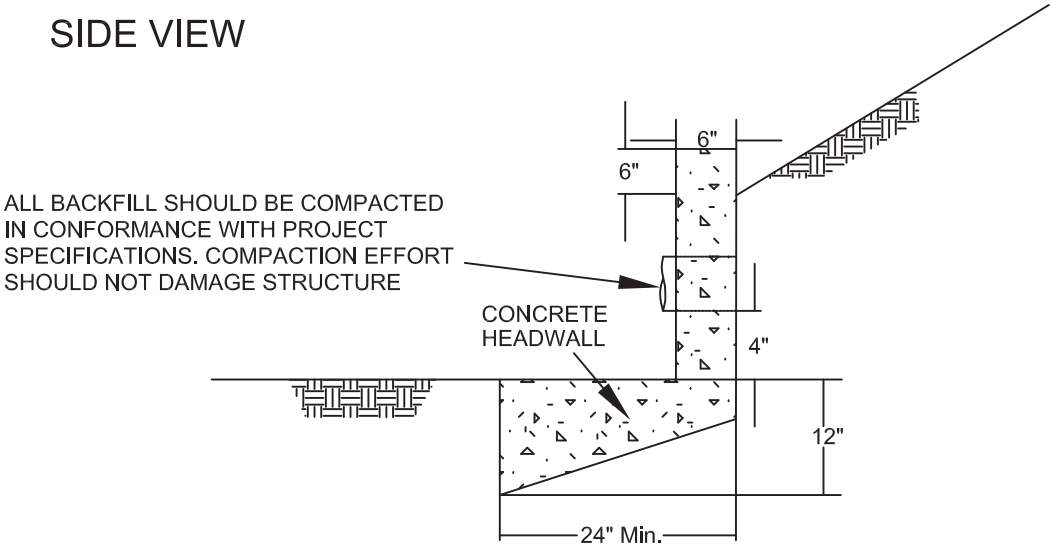
NOT TO SCALE

RECOMMENDED SUBDRAIN CUT-OFF WALL

FRONT VIEW



SIDE VIEW



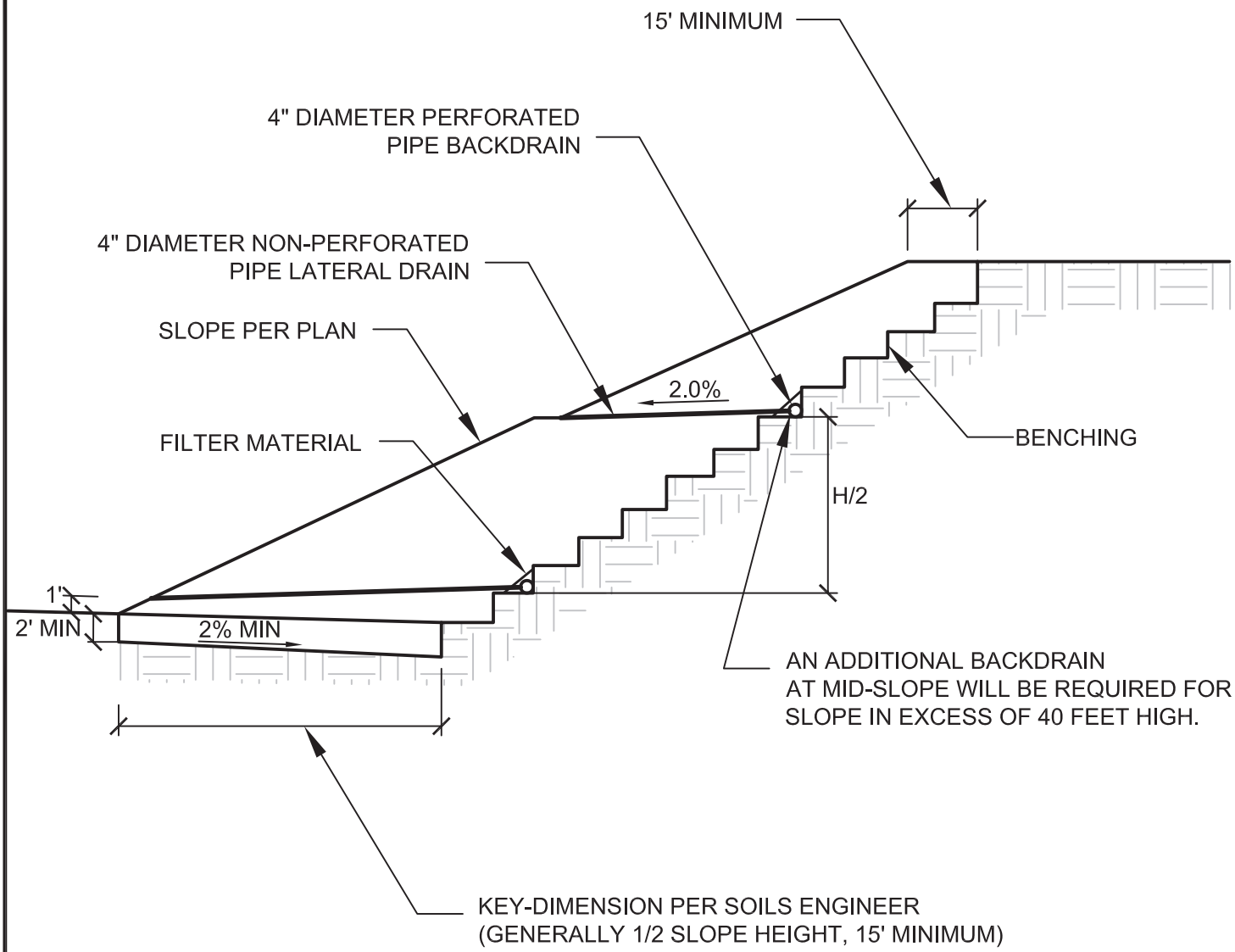
NOTE: HEADWALL SHOULD OUTLET AT TOE OF SLOPE
OR INTO CONTROLLED SURFACE DRAINAGE DEVICE

ALL DISCHARGE SHOULD BE CONTROLLED

THIS DETAIL IS A MINIMUM DESIGN AND MAY BE
MODIFIED DEPENDING UPON ENCOUNTERED
CONDITIONS AND LOCAL REQUIREMENTS

NOT TO SCALE

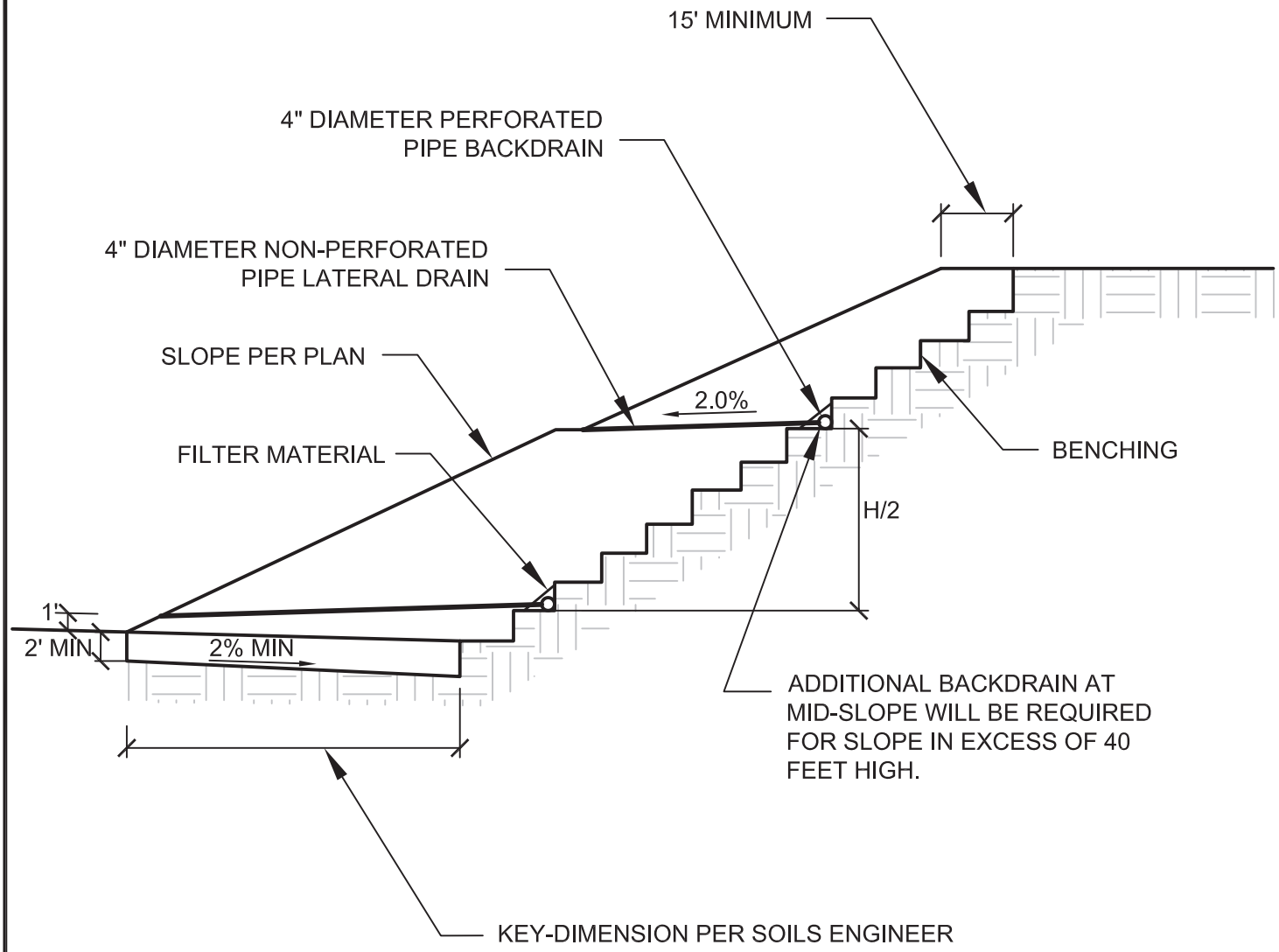
TYPICAL SUBDRAIN OUTLET HEADWALL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

NOT TO SCALE

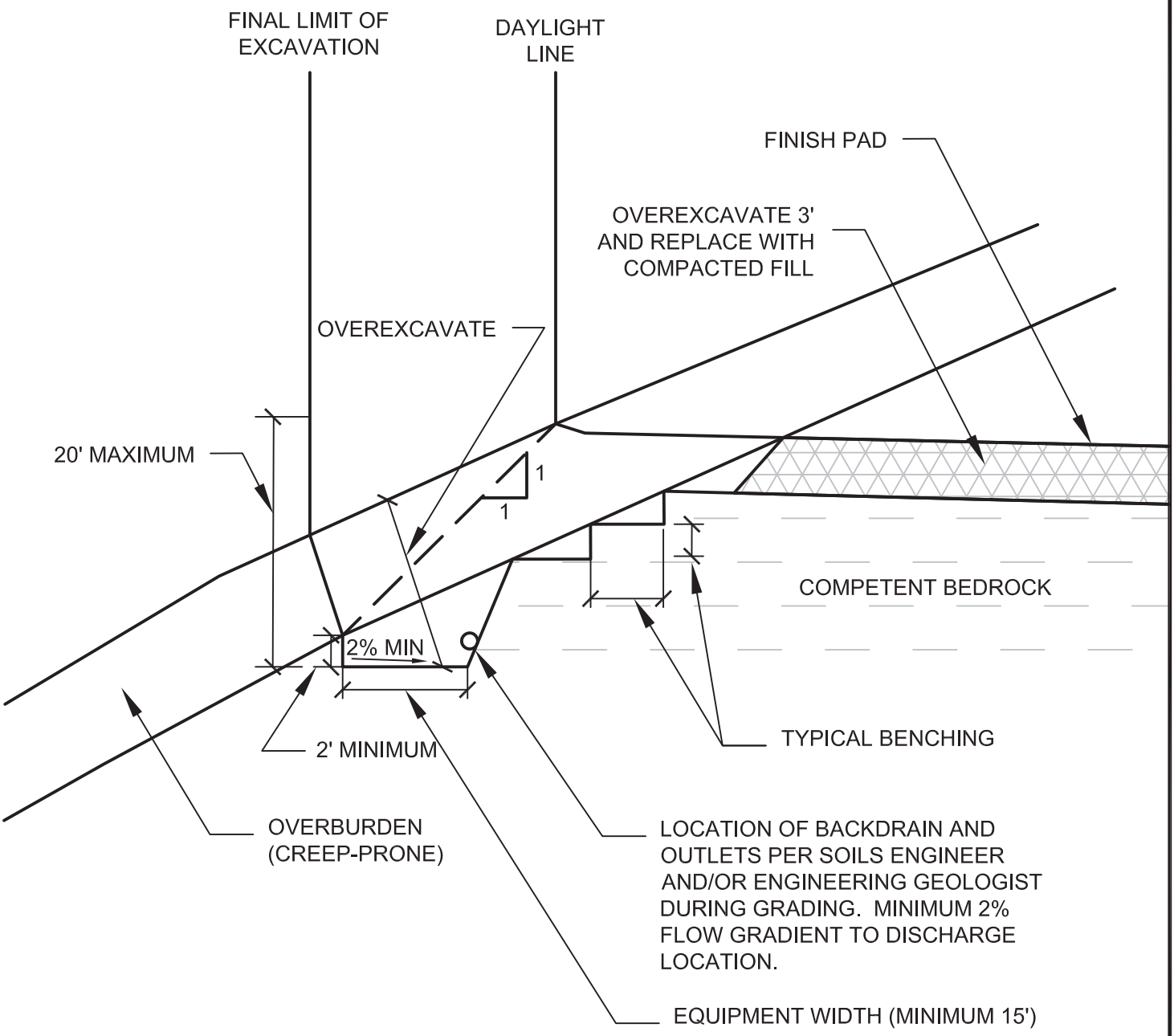
TYPICAL SLOPE STABILIZATION FILL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

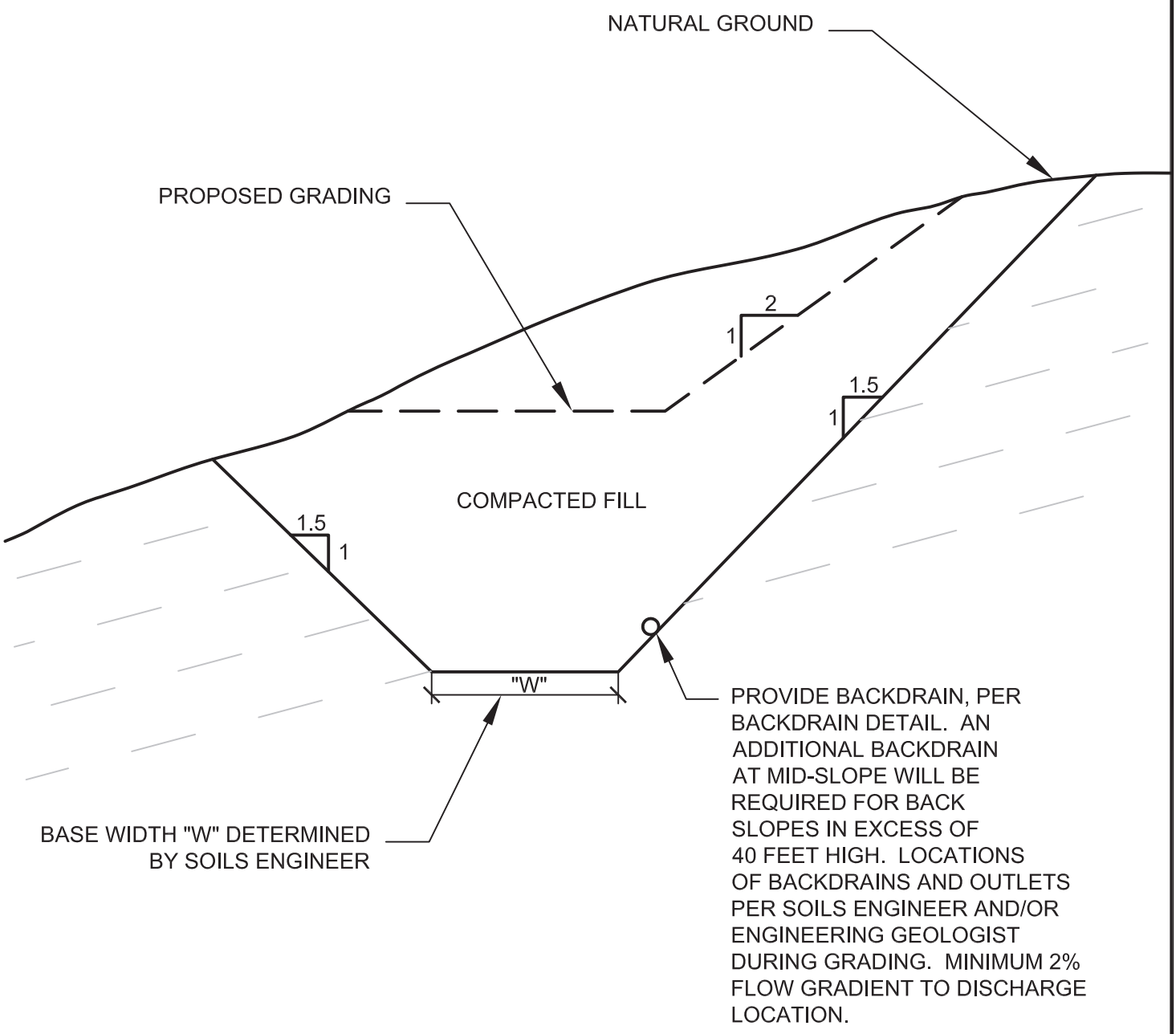
NOT TO SCALE

TYPICAL BUTTRESS FILL DETAIL



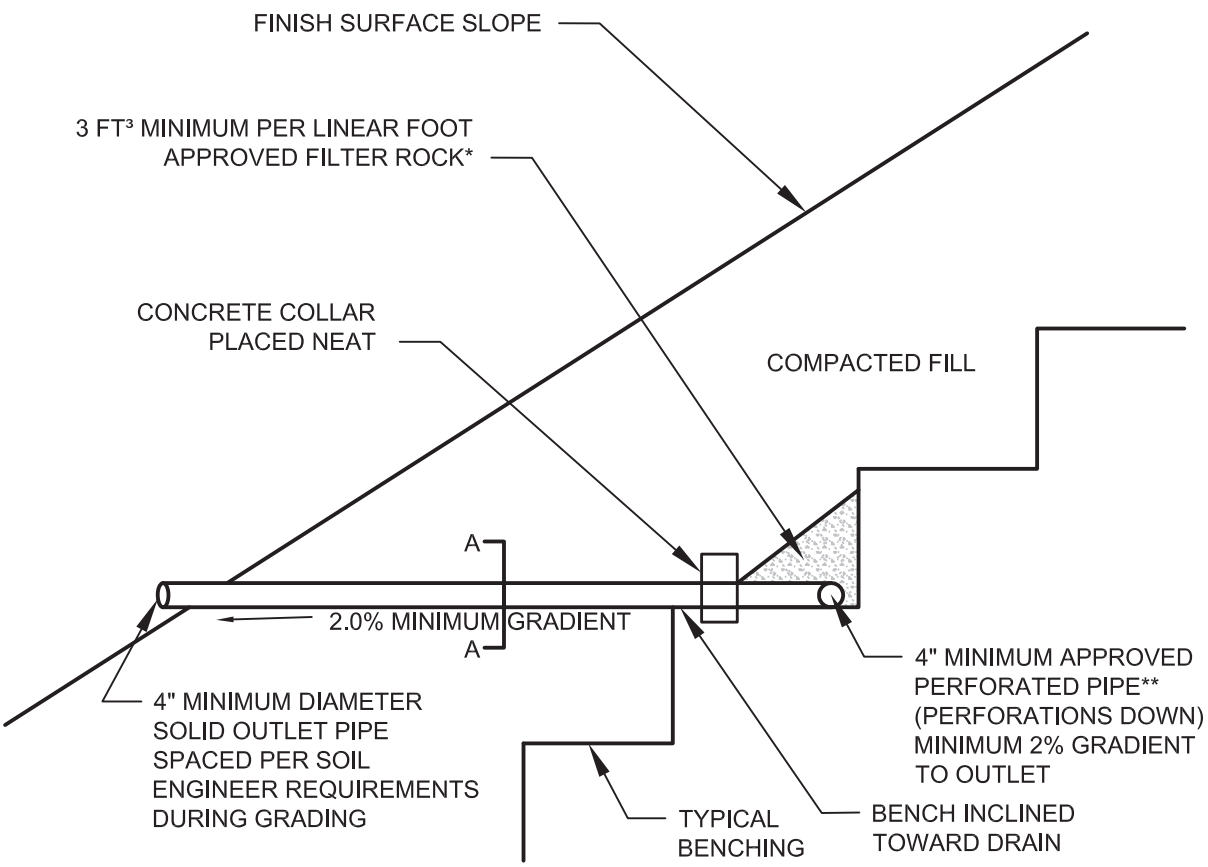
NOT TO SCALE

DAYLIGHT SHEAR KEY DETAIL

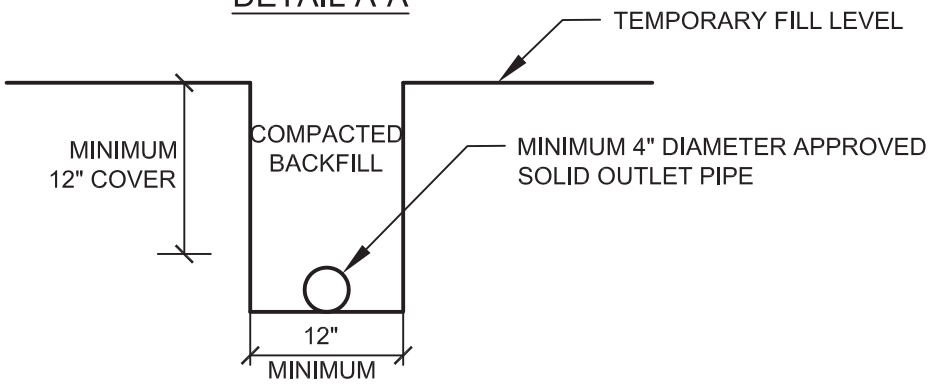


NOT TO SCALE

TYPICAL SHEAR KEY DETAIL



DETAIL A-A



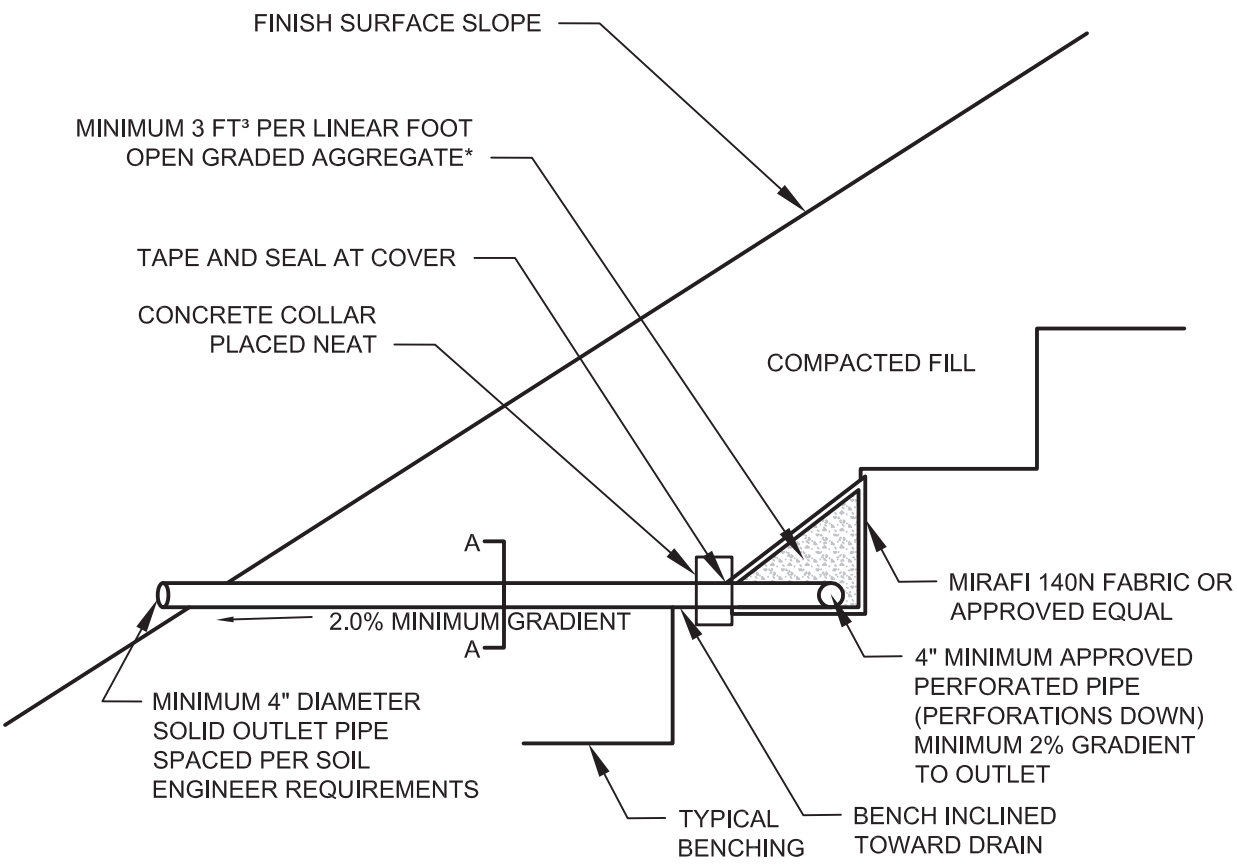
**APPROVED PIPE TYPE:
SCHEDULE 40 POLYVINYL CHLORIDE
(P.V.C.) OR APPROVED EQUAL.
MINIMUM CRUSH STRENGTH 1000 PSI

*FILTER ROCK TO MEET FOLLOWING
SPECIFICATIONS OR APPROVED EQUAL:

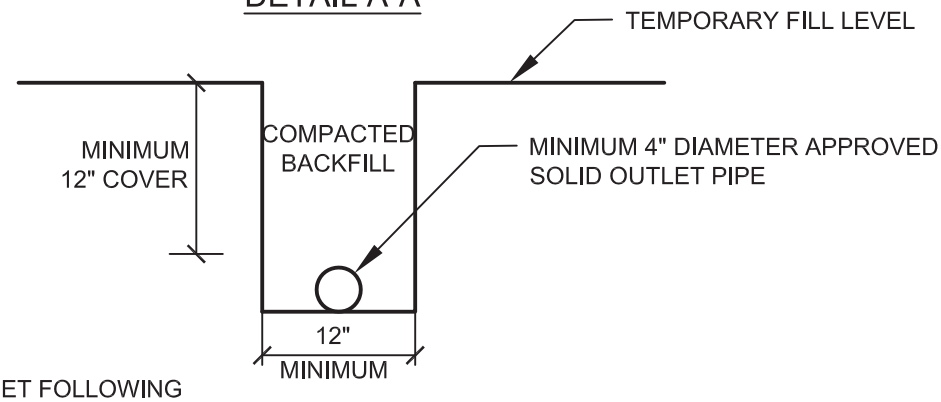
SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOT TO SCALE

TYPICAL BACKDRAIN DETAIL



DETAIL A-A

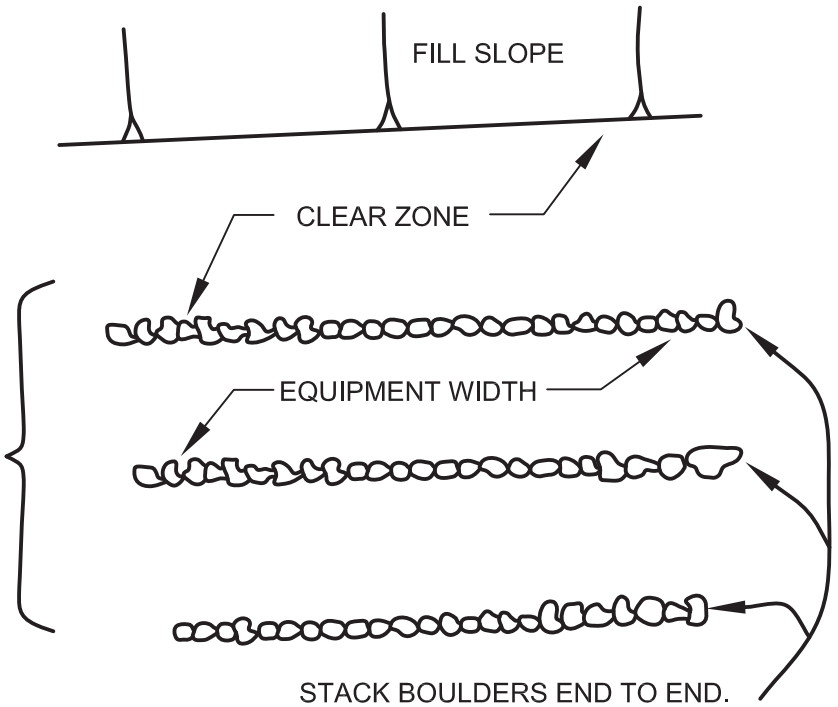


*NOTE: AGGREGATE TO MEET FOLLOWING SPECIFICATIONS OR APPROVED EQUAL:

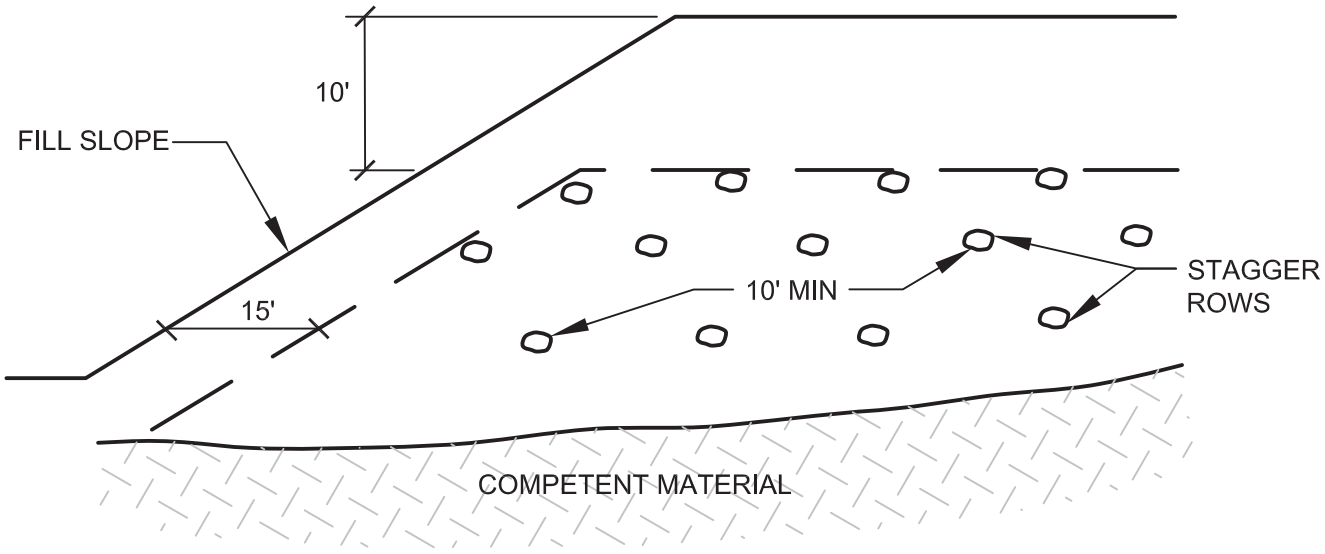
SIEVE SIZE	PERCENTAGE PASSING
1 ½"	100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

NOT TO SCALE

BACKDRAIN DETAIL (GEOFRABIC)

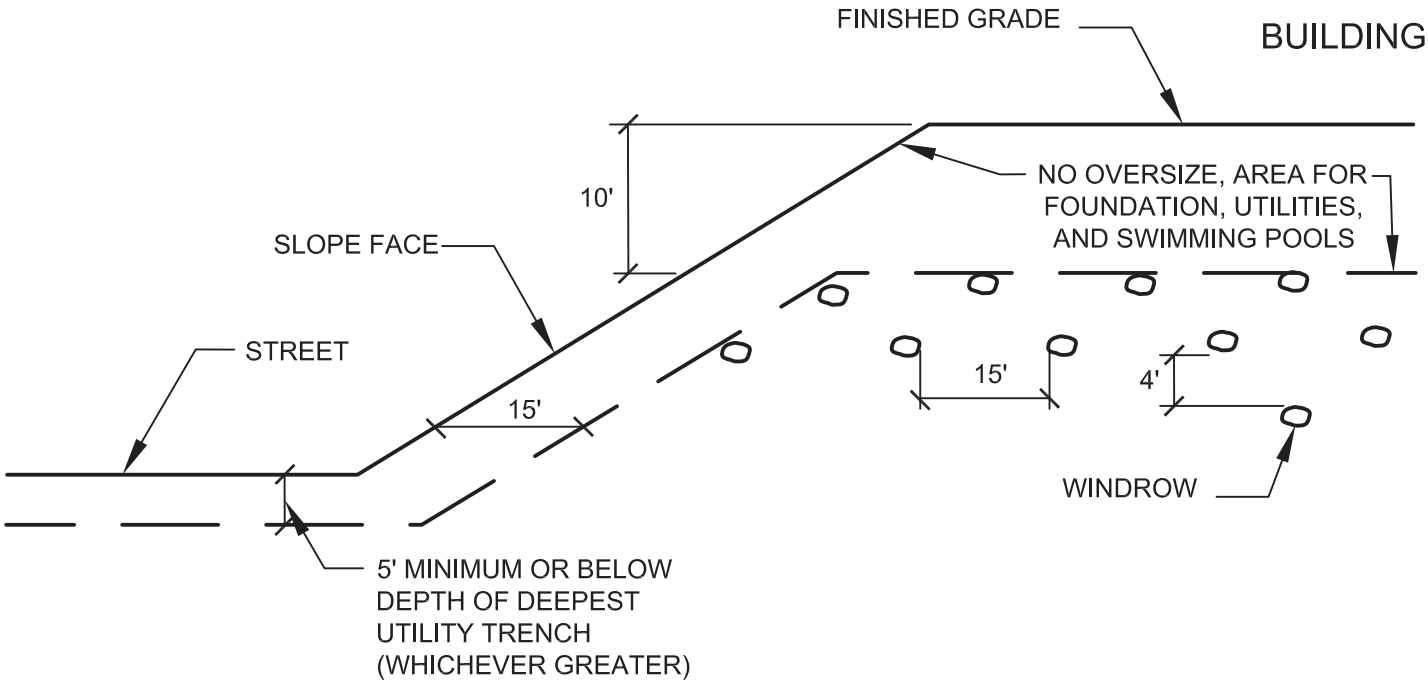


SOIL SHALL BE PUSHED OVER ROCKS AND FLOODED INTO VOIDS. COMPACT AROUND AND OVER EACH WINDROW.

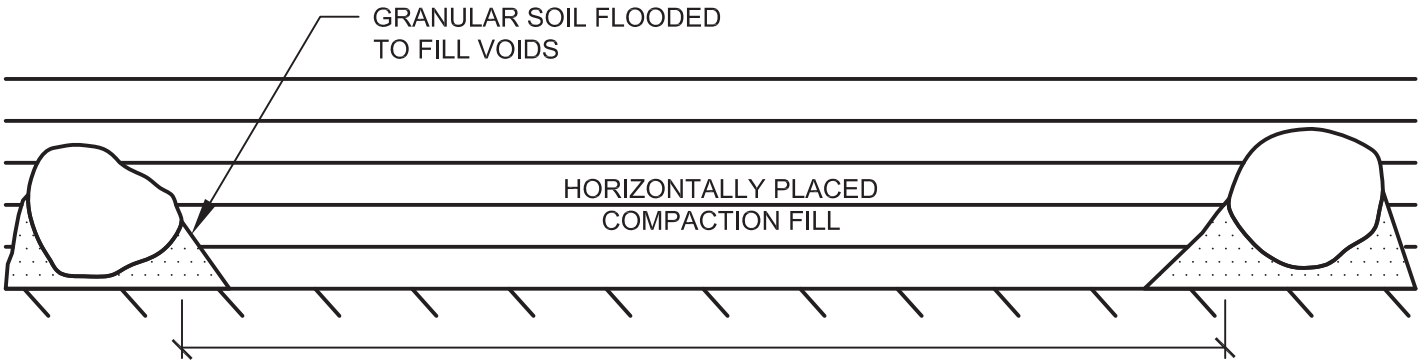


NOT TO SCALE

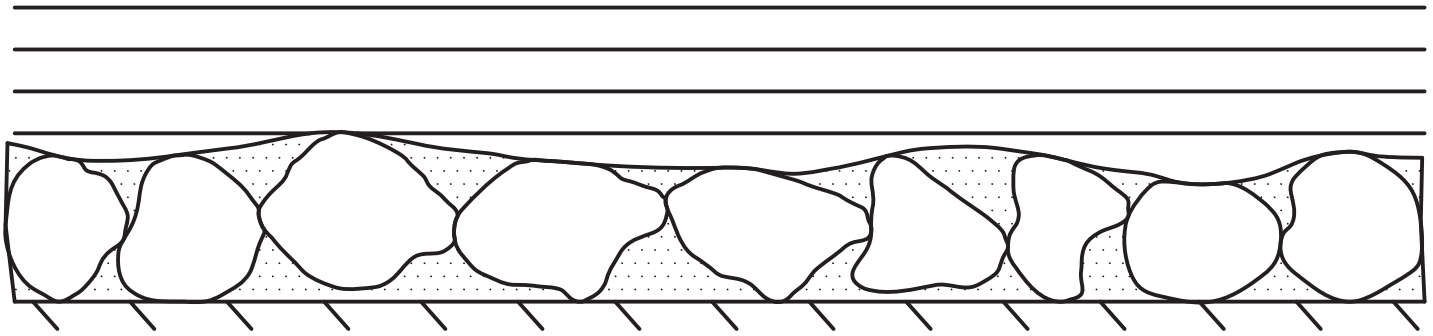
ROCK DISPOSAL DETAIL



TYPICAL WINDROW DETAIL (EDGE VIEW)



PROFILE VIEW

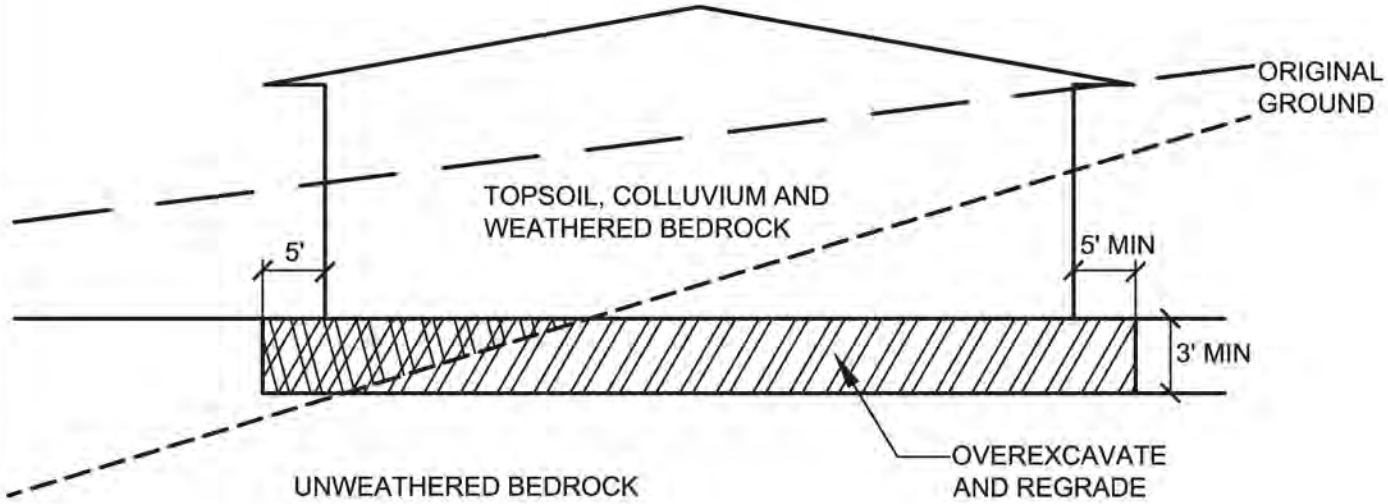


NOT TO SCALE

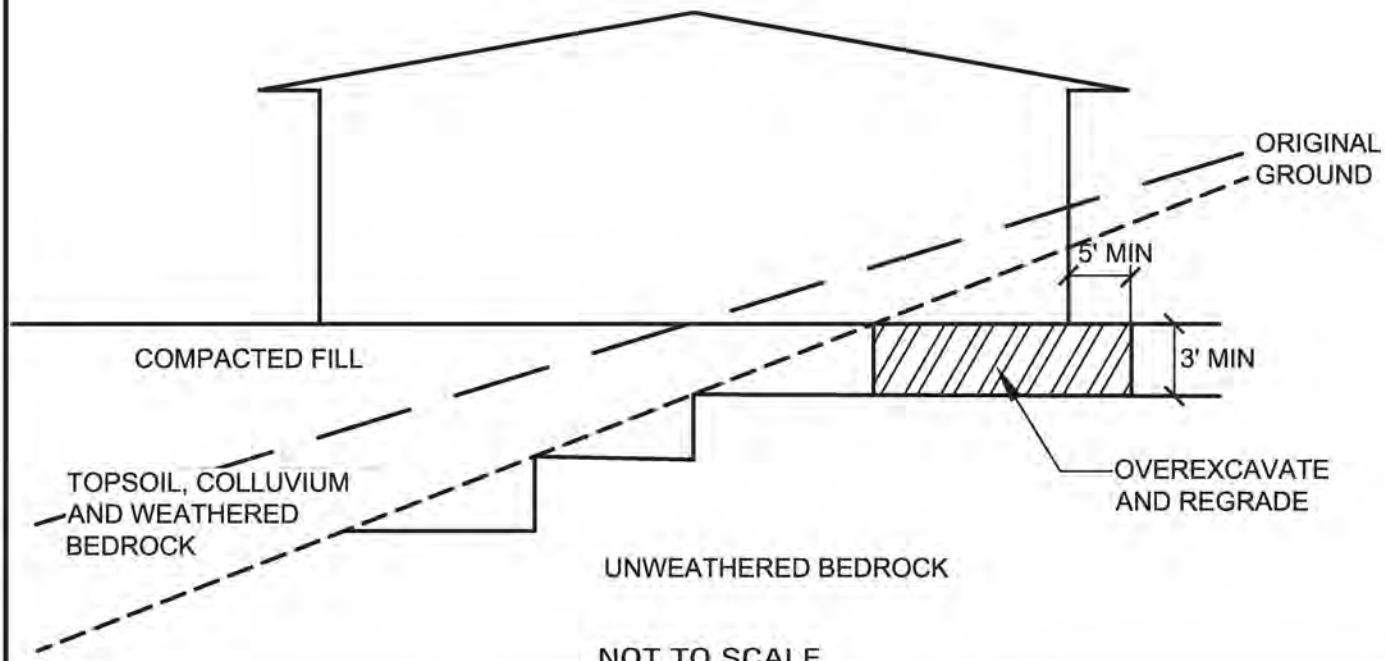
ROCK DISPOSAL DETAIL

GENERAL GRADING RECOMMENDATIONS

CUT LOT



CUT/FILL LOT (TRANSITION)



NOT TO SCALE

TRANSITION LOT DETAIL

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