MEMO

Professional **E**ngineering **C**onsultants, P.A.
303 S. TOPEKA ▪ WICHITA, KANSAS 67202 ▪ 316-262-2691 ▪ FAX 316-262-3003
www.pecl.com ▪ designers@pecl.com

TO: Kansas Department of Agriculture
Division of Water Resources

ATTENTION: Mr. David Pope, Chief Engineer
FROM: Bryce L. Barkus, I.E.
REFERENCE: Hydraulic Computations for Stream Obstruction Permit Application

DATE: March 17, 2005
PROJECT NO.: 35-04485-0042
PROJECT: Fontana

COPIES TO:

Please advise immediately of any misconceptions or omissions you believe to be contained herein.

This memo, along with other supporting documentation, provides information we believe will be required to receive the following permits for the referenced project:

1. Because the project will "change the course, current or cross section" of an area recognized as a "stream," pursuant to the requirements set forth in the "Obstruction in Streams Act K.S.A. 82a-301 to 305a," an APPLICATION FOR PERMIT – DAMS, STREAM OBSTRUCTIONS AND CHANNEL CHANGES is submitted along with supporting documentation. For the proposed project, three detention ponds will be constructed that have a contributory drainage area greater than 240 acres; therefore, three permit applications are provided with this submittal.

2. Because the project includes the construction of detention ponds that will impound a water volume greater than 15 acre-feet, an "APPLICATION FOR PERMIT TO APPROPRIATE WATER FOR BENEFICIAL USE" is submitted along with supporting documentation.

The complete forms for each permit application are included with this memo behind the tab "Permit Applications."

PROJECT OVERVIEW

The proposed project includes development of a 137.5 acre, single family, residential site in the northwest portion of Sedgwick County. The present land use for the site consists primarily of cultivated farm land and is bisected by a tributary to Cadillac Lake. Note that this site is neither in a FEMA defined floodway nor floodplain. The proposed site will consist of streets, storm sewer and seven detention ponds.

Both as an aesthetic amenity, and for offsetting increases to peak discharge runoff rates caused by the development, seven detention ponds are planned to be constructed, in which only three have greater than 240 acres of contributory area. The total surface area of the three proposed ponds at the static water level is approximately 6.8 acres. The three detention ponds will be connected by three separate drainage structures and will slightly delay or detain drainage from nearly the entire 0.5 square mile drainage basin. The three detention ponds are interconnected by 3 - 36" RCP

equalizer pipes which allow the three ponds to essentially act as one large pond. A twenty-five foot reinforced concrete weir acts as the ultimate control structure at the lower end of the project.

To further clarify or illustrate the concepts included in the proposed project, the following attachments are included with this memo behind the tab "Figures":

Attachment #1: USGS map showing Section 31, Township 26 South, Range 1 West.

Attachment #2: Topographic Site Plan showing existing ground contours and other topographic features as well as the extents of the cross sections used for the existing conditions hydraulic analysis.

Attachment #3: Proposed Drainage Plan showing proposed basins, detention ponds and control structures with their respective 100-Yr water surface elevations.

Attachment #4: Pond #1 and #2 Grading Plan showing existing and proposed pond contours and the location of the control structures.

Attachment #5: Pond #3 Grading Plan showing existing and proposed pond contours and the location of the control structure.

Attachment #6: Pond #4 Grading Plan showing existing and proposed pond contours and the location of the control structure.

Attachment #7: SWS Line #1 Plan showing the control structure details for Pond #4.

Attachment #8: SWS Line #2 Plan showing the control structure details for Pond #3.

Attachment #9: R.C. Weir #1 Plan showing the control structure details for Pond #2.

HYDROLOGIC ANALYSIS

The contributing area to the three proposed ponds is 0.5 square miles. The land is primarily rural and used for agricultural purposes. The Rational method was selected to compute peak discharges and HEC-1 was used to combine the hydrographs for all of the drainage basins.

Under existing conditions, runoff from offsite drains to the north property line where it combines with Basin B (see Attachment #2). This water continues southeast where it combines with Basins C and D at the east property line of the site.

The results of the existing conditions hydrologic analysis are shown in Table 1.

Table 1 Existing Conditions Peak Discharges for Each Basin.

BASIN	AREA (acre)	100 YR STORM DISCHARGE (cfs)
OFFSITE	230.0	272.8
B	73.2	146.5
C	26.3	68.0
D	15.6	42.7

The existing conditions 100-Yr discharge leaving the development is 378 cfs. The Existing Conditions HEC-1 analysis and the individual basin calculations are included with this memo behind the "Exist. Conditions Hydrology" tab.

Attachment #3 clearly shows the proposed drainage pattern for the site. Runoff from offsite enters Pond #4 from the north where it combines with runoff from the west portion of the site. Water then continues to the southeast where it eventually exits the site via Pond #2.

The results of the Proposed Conditions hydrologic analysis are shown in Table 2.

Table 2 Proposed Conditions Peak Discharges for Each Basin.

BASIN	AREA (acre)	100 YR STORM DISCHARGE (cfs)
OFFSITE	230.0	272.8
2	15.9	31.5
3	15.2	32.7
4	12.5	22.1
5	14.9	32.1
6	4.9	11.8
7	35.3	60.8
8	17.3	39.6
10	13.7	27.1

Note that the proposed site may impact the adjacent property to the north with backwater from Pond # 4. The Proposed Conditions HEC-1 analysis shows a proposed 100-Yr water surface elevation in this pond of 168.71'.

The Proposed Conditions 100-Yr discharge leaving the development is 267 cfs. The HEC-1 analysis and the individual basin calculations for the Proposed Conditions are included with this memo behind the "Prop. Conditions Hydrology" tab.

HYDRAULIC ANALYSIS

The existing conditions hydraulic computations were performed using the U.S. Army Corps of Engineers River Analysis System (HEC-RAS). This program allowed us to determine the existing 100-Yr water surface elevation at the north property line of the development. Attachment #2 behind the "Figures" tab shows the location of the cross sections used for this analysis.

The results of the existing conditions hydraulic analysis are shown in Table 3.

Table 3 Summary of Existing Conditions Hydraulic Analysis.

Location	Return Period (years)	Existing Peak Discharge (cfs)	Existing Water Surface Elevation (ft)
10+00	100	378	167.77
14+95	100	378	168.24
23+41	100	378	168.50
30+29	100	347	168.57

Copies of the computer printouts for the hydraulic computations are included with this memo behind the tab "Hydraulics".

DISCUSSION

Based on the results of the Proposed Conditions HEC-1 analysis, the development will not adversely affect adjacent property owners located downstream of the project (i.e. the 100-year peak discharge will decrease by 111 cfs due to the proposed detention ponds). Since all other flood waters will be contained on the site, the main focus becomes the effect this development has on adjacent properties located upstream of the project. Comparing the 100-year water surface elevations from proposed Pond #4 with existing cross section 30+29, demonstrates that this development will result in a 0.14 ft rise to the flood profile.

THE STATE OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE
Adrian J. Polansky, Secretary of Agriculture

DIVISION OF WATER RESOURCES
David L. Pope, Chief Engineer

APPLICATION FOR PERMIT

DAMS, STREAM OBSTRUCTIONS and CHANNEL CHANGES
(K.S.A. 82a-301 - 305a)

WATER STRUCTURE NUMBER _____
(For Office Use Only)

ENVIRONMENTAL COORDINATION ACT NUMBER _____
(For Office Use Only)

Application is hereby made for written consent or permit of the Chief Engineer, Division of Water Resources, by (PLEASE TYPE OR PRINT CLEARLY):

1. **Owner:** SOCORA HOMES, INC.

   Agent: LARRY A. CHAMBERS

   Title: PRESIDENT

   Mailing Address: 727 N. WACO, SUITE 400
   WICHITA, KS 67203

   E-Mail Address: _____

   Telephone No.: (316) 263-3201 FAX No.: _____

2. **Designer:** PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

   Firm: (SAME AS DESIGNER)

   Contact Person: BRYCE L. BARKUS, I.E.

   Mailing Address: 303 S. TOPEKA
   WICHITA, KS 67202

   E-Mail Address: bryce.barkus@pecl.com

   Telephone No.: (316) 262-2691 FAX No.: (316) 262-3003

For Office Use Only: *Code* _____ *Fee $* _____ *TR #* _____ *Receipt Date* _____ *Check #* _____

Continue to Next Page

3. **Description of proposed construction:**

Site Name: FONTANA

Drainage area above project: 344 acres, 0.54 square miles (**Important:** required to calculate fees)

a. The project is (check all that apply):

Stream obstruction		Channel change	
____ dam	____ utility crossing	____ relocation	____ debris removal
____ bridge	____ jetty	____ widening	X reshaping
____ culvert	X intake or outfall	X excavation	X filling
____ other (describe):			

b. The project purpose is (check all that apply):

X	new construction	____	repair	____	water supply
____	maintenance	____	erosion control	____	modification
____	replacement	____	flood control	____	aggregate production

____ the beneficial use of water (see Appropriation of Water, File No. _____)

____ other (describe): _____

c. The project will (complete all that apply): be 2,029 feet long, _____ feet high, _____ feet deep; have ____:1 side slopes, _____ feet bottom width, _____ cubic yards of fill or cut; shorten the stream length from _____ feet to _____ feet; constrict the channel and floodplain by _____%; cause a hydraulic restriction or backwater of 0.14' feet.

Further description: PLEASE REFER TO SUPPORTING DOCUMENTATION FOR A MORE DETAILED DESCRIPTION OF THE PROJECT SCOPE AND LIMITS.

4. **Legal description of location** (use intersection of project centerline and stream centerline where applicable; otherwise, use geographical center or midpoint of the project):

- Quarter of the - Quarter of the SW Quarter of Section 31, Township 26 South, Range 1 East/West (circle one), SEDGWICK County, Kansas, across, along, or in (stream or watercourse name): CADILLAC LAKE TRIBUTARY

Additional description: PROPOSED R.C. WEIR APPROXIMATELY 2,575' EAST OF 119TH STREET WEST AND 1,000' NORTH OF 29TH STREET NORTH

Continue to Next Page

5. **Attach copies of Environmental Reviews, Assessments or Impact Statements, letters of comment and other pertinent information to the Water Projects Environmental Coordination Act, K.S.A. 82a-325 to 327, as amended. The following information should be provided in consultation with biologists, archaeologists, foresters or other professionals.**

a. The project will (check all that apply):

X	fill a channel	____	fill or drain deep pools
____	remove gravel, sand or silt bars	____	disturb or endanger historic sites or structures
____	fill or drain a wetland	____	inundate a stream
X	create deep pools	____	affect threatened and endangered species
X	relocate a channel	____	widen a channel
____	replace a bridge that is _____ years old		
____	remove streamside vegetation, including _____ acres of trees and _____ acres of vegetation		

b. Describe actions planned to minimize the project impact:

Describe any vegetative strip planned: TEMPORARY SEEDING WILL BE PLACED DURING CONSTRUCTION FOLLOWED BY PERMANENT SEEDING.

Describe erosion control measures to be used during construction: CONSTRUCTION WILL ADHERE TO "BEST MANAGEMENT PRACTICE" (BMP) STANDARD CURRENTLY USED BY THE CITY OF WICHITA.

Describe mitigation or replacement of environmental impacts or values: MITIGATION WILL CONFORM TO CONDITIONS SPECIFIED IN PROJECT PERMITS.

Project work will be halted and the Kansas State Historical Society contacted when historical sites or artifacts are encountered: X Yes ____ No

Describe other planned activities: _____

6. **The design, construction, operation, and maintenance of the stream obstruction or channel change must conform to the requirements of the rules and regulations adopted by the Chief Engineer. Applicable regulations are K.A.R. 5-40-1 through 5-43-5. Please visit our web site, www.accesskansas.org/kda/, or contact our office to obtain those rules and regulations.**

7. **Progress of construction (check the appropriate line and enter requested date):**

____ Construction was started or was completed on: ____/____/20____.

X Construction has not begun. Planned date to begin construction: 08 / 01 /20 05 .

Continue to Next Page

8. **By signing this application, I hereby certify that the information contained in this application is true, correct and complete, and that I am the owner or I am authorized by the owner to make this application.**

Signature of Owner or Agent: Bryce L Barlow

Date: 3/17/05 Title: DESIGN ENGINEER

INSTRUCTIONS

1. Incomplete applications will be returned to applicant. Make sure you have filled in all applicable blanks, signed the application, and included the required fee (see below). Plans and other materials listed in item 6 must accompany application for it to be complete.
2. If the owner is a governmental entity, please identify on the first page the governmental unit responsible for construction and maintenance.
3. Questions regarding environmental impacts may be referred to the following environmental review agencies:

Kansas Corporation Commission
Kansas Dept. Of Health & Environment
Kansas State Historical Society
Kansas Dept. Of Wildlife and Parks
Kansas Biological Survey
State Conservation Commission
Kansas Forest Service

FEE SCHEDULE

effective July 1, 2002

Applications for New Dams and Dam Modification Applications	
Pre-construction	Construction in Progress*
$200	$500

Applications for Stream Obstructions and Channel Changes		
Drainage Area	Pre-construction	Construction in Progress*
Drainage area < 5 sq. miles	$100	$200
Drainage area between 5 and 50 sq. miles	$200	$400
Drainage area > 50 sq. miles	$500	$1,000

*"Construction in progress" fees apply to projects where construction began before the project was approved by the Chief Engineer. These fees are in addition to any other penalties applicable under law.

Make checks payable to the **Kansas Department of Agriculture**

Mail application, check, and all supporting documents to:

Kansas Department of Agriculture
Division of Water Resources
109 SW 9th Street 2nd Floor
Topeka KS 66612-1283
Telephone: (785) 296-2933 Fax: (785) 296-4835

THE STATE OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE
Adrian J. Polansky, Secretary of Agriculture

DIVISION OF WATER RESOURCES
David L. Pope, Chief Engineer

APPLICATION FOR PERMIT

DAMS, STREAM OBSTRUCTIONS and CHANNEL CHANGES
(K.S.A. 82a-301 - 305a)

WATER STRUCTURE NUMBER _____
(For Office Use Only)

ENVIRONMENTAL COORDINATION ACT NUMBER _____
(For Office Use Only)

Application is hereby made for written consent or permit of the Chief Engineer, Division of Water Resources, by (PLEASE TYPE OR PRINT CLEARLY):

1. **Owner:** SOCORA HOMES, INC.

   Agent: LARRY A. CHAMBERS

   Title: PRESIDENT

   Mailing Address: 727 N. WACO, SUITE 400
   WICHITA, KS 67203

   E-Mail Address: _____

   Telephone No.: (316) 263-3201 FAX No.: _____

2. **Designer:** PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

   Firm: (SAME AS DESIGNER)

   Contact Person: BRYCE L. BARKUS, I.E.

   Mailing Address: 303 S. TOPEKA
   WICHITA, KS 67202

   E-Mail Address: bryce.barkus@pecl.com

   Telephone No.: (316) 262-2691 FAX No.: (316) 262-3003

For Office Use Only: *Code* _____ *Fee $* _____ *TR #* _____ *Receipt Date* _____ *Check #* _____

Continue to Next Page

3. **Description of proposed construction:**

Site Name: FONTANA

Drainage area above project: 344 acres, 0.54 square miles (**Important:** required to calculate fees)

a. The project is (check all that apply):

Stream obstruction		Channel change	
____ dam	____ utility crossing	____ relocation	____ debris removal
____ bridge	____ jetty	____ widening	X reshaping
X culvert	____ intake or outfall	X excavation	X filling
____ other (describe):			

b. The project purpose is (check all that apply):

X new construction ____ repair ____ water supply

____ maintenance ____ erosion control ____ modification

____ replacement ____ flood control ____ aggregate production

____ the beneficial use of water (see Appropriation of Water, File No. _____)

____ other (describe): _____

c. The project will (complete all that apply): be 2,029 feet long, _____ feet high, _____ feet deep; have ____:1 side slopes, _____ feet bottom width, _____ cubic yards of fill or cut; shorten the stream length from _____ feet to _____ feet; constrict the channel and floodplain by _____%; cause a hydraulic restriction or backwater of 0.14' feet.

Further description: PLEASE REFER TO SUPPORTING DOCUMENTATION FOR A MORE DETAILED DESCRIPTION OF THE PROJECT SCOPE AND LIMITS.

4. **Legal description of location** (use intersection of project centerline and stream centerline where applicable; otherwise, use geographical center or midpoint of the project):

- Quarter of the - Quarter of the SW Quarter of Section 31, Township 26 South, Range 1 ~~East~~/West (circle one), SEDGWICK County, Kansas, across, along, or in (stream or watercourse name): CADILLAC LAKE TRIBUTARY

Additional description: PROPOSED CULVERT APPROXIMATELY 2,540' EAST OF 119TH STREET WEST AND 1,460' NORTH OF 29TH STREET NORTH.

Continue to Next Page

5. **Attach copies of Environmental Reviews, Assessments or Impact Statements, letters of comment and other pertinent information to the Water Projects Environmental Coordination Act, K.S.A. 82a-325 to 327, as amended. The following information should be provided in consultation with biologists, archaeologists, foresters or other professionals.**

a. The project will (check all that apply):

X	fill a channel	____	fill or drain deep pools
____	remove gravel, sand or silt bars	____	disturb or endanger historic sites or structures
____	fill or drain a wetland	____	inundate a stream
X	create deep pools	____	affect threatened and endangered species
X	relocate a channel	____	widen a channel
____	replace a bridge that is _____ years old		
____	remove streamside vegetation, including _____ acres of trees and _____ acres of vegetation		

b. Describe actions planned to minimize the project impact:

Describe any vegetative strip planned: TEMPORARY SEEDING WILL BE PLACED DURING CONSTRUCTION FOLLOWED BY PERMANENT SEEDING.

Describe erosion control measures to be used during construction: CONSTRUCTION WILL ADHERE TO "BEST MANAGEMENT PRACTICE" (BMP) STANDARD CURRENTLY USED BY THE CITY OF WICHITA.

Describe mitigation or replacement of environmental impacts or values: MITIGATION WILL CONFORM TO CONDITIONS SPECIFIED IN PROJECT PERMITS.

Project work will be halted and the Kansas State Historical Society contacted when historical sites or artifacts are encountered: X Yes ____ No

Describe other planned activities: _____

6. **The design, construction, operation, and maintenance of the stream obstruction or channel change must conform to the requirements of the rules and regulations adopted by the Chief Engineer. Applicable regulations are K.A.R. 5-40-1 through 5-43-5. Please visit our web site, www.accesskansas.org/kda/, or contact our office to obtain those rules and regulations.**

7. **Progress of construction (check the appropriate line and enter requested date):**

_____ Construction was started or was completed on: _____/_____/20____.

X Construction has not begun. Planned date to begin construction: 08 / 01 /20 05 .

Continue to Next Page

8. **By signing this application, I hereby certify that the information contained in this application is true, correct and complete, and that I am the owner or I am authorized by the owner to make this application.**

Signature of Owner or Agent: Bryce L Barlow

Date: 3/17/06 Title: DESIGN ENGINEER

INSTRUCTIONS

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Kansas Dept. Of Health & Environment
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FEE SCHEDULE
effective July 1, 2002

Applications for New Dams and Dam Modification Applications	
Pre-construction	Construction in Progress*
$200	$500

Applications for Stream Obstructions and Channel Changes		
Drainage Area	Pre-construction	Construction in Progress*
Drainage area < 5 sq. miles	$100	$200
Drainage area between 5 and 50 sq. miles	$200	$400
Drainage area > 50 sq. miles	$500	$1,000

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Make checks payable to the **Kansas Department of Agriculture**

Mail application, check, and all supporting documents to:

Kansas Department of Agriculture
Division of Water Resources
109 SW 9th Street 2nd Floor
Topeka KS 66612-1283
Telephone: (785) 296-2933 Fax: (785) 296-4835

THE STATE OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE
Adrian J. Polansky, Secretary of Agriculture

DIVISION OF WATER RESOURCES
David L. Pope, Chief Engineer

APPLICATION FOR PERMIT

DAMS, STREAM OBSTRUCTIONS and CHANNEL CHANGES
(K.S.A. 82a-301 - 305a)

WATER STRUCTURE NUMBER _____
(For Office Use Only)

ENVIRONMENTAL COORDINATION ACT NUMBER _____
(For Office Use Only)

Application is hereby made for written consent or permit of the Chief Engineer, Division of Water Resources, by (PLEASE TYPE OR PRINT CLEARLY):

1. **Owner:** SOCORA HOMES, INC.

   Agent: LARRY A. CHAMBERS

   Title: PRESIDENT

   Mailing Address: 727 N. WACO, SUITE 400
   WICHITA, KS 67203

   E-Mail Address: _____

   Telephone No.: (316) 263-3201 FAX No.: _____

2. **Designer:** PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

   Firm: (SAME AS DESIGNER)

   Contact Person: BRYCE L. BARKUS, I.E.

   Mailing Address: 303 S. TOPEKA
   WICHITA, KS 67202

   E-Mail Address: bryce.barkus@pecl.com

   Telephone No.: (316) 262-2691 FAX No.: (316) 262-3003

For Office Use Only: *Code* _____ *Fee $* _____ *TR #* _____ *Receipt Date* _____ *Check #* _____

Continue to Next Page

3. **Description of proposed construction:**

Site Name: FONTANA

Drainage area above project: 344 acres, 0.54 square miles (**Important:** required to calculate fees)

a. The project is (check all that apply):

Stream obstruction		Channel change	
____ dam	____ utility crossing	____ relocation	____ debris removal
____ bridge	____ jetty	____ widening	X reshaping
X culvert	____ intake or outfall	X excavation	X filling
____ other (describe):			

b. The project purpose is (check all that apply):

X new construction ____ repair ____ water supply

____ maintenance ____ erosion control ____ modification

____ replacement ____ flood control ____ aggregate production

____ the beneficial use of water (see Appropriation of Water, File No. _____)

____ other (describe): _____

c. The project will (complete all that apply): be 2,029 feet long, _____ feet high, _____ feet deep; have ____:1 side slopes, _____ feet bottom width, _____ cubic yards of fill or cut; shorten the stream length from _____ feet to _____ feet; constrict the channel and floodplain by _____%; cause a hydraulic restriction or backwater of 0.14' feet.

Further description: PLEASE REFER TO SUPPORTING DOCUMENTATION FOR A MORE DETAILED DESCRIPTION OF THE PROJECT SCOPE AND LIMITS.

4. **Legal description of location** (use intersection of project centerline and stream centerline where applicable; otherwise, use geographical center or midpoint of the project):

- Quarter of the - Quarter of the SW Quarter of Section 31, Township 26 South, Range 1 ~~East~~/West (circle one), SEDGWICK County, Kansas, across, along, or in (stream or watercourse name): CADILLAC LAKE TRIBUTARY

Additional description: PROPOSED ROAD CULVERT APPROXIMATELY 1,875' EAST OF 119TH STREET WEST AND 1,900' NORTH OF 29TH STREET NORTH.

Continue to Next Page

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a. The project will (check all that apply):

X	fill a channel	____	fill or drain deep pools
____	remove gravel, sand or silt bars	____	disturb or endanger historic sites or structures
____	fill or drain a wetland	____	inundate a stream
X	create deep pools	____	affect threatened and endangered species
X	relocate a channel	____	widen a channel
____	replace a bridge that is _____ years old		
____	remove streamside vegetation, including _____ acres of trees and _____ acres of vegetation		

b. Describe actions planned to minimize the project impact:

Describe any vegetative strip planned: TEMPORARY SEEDING WILL BE PLACED DURING CONSTRUCTION FOLLOWED BY PERMANENT SEEDING.

Describe erosion control measures to be used during construction: CONSTRUCTION WILL ADHERE TO "BEST MANAGEMENT PRACTICE" (BMP) STANDARD CURRENTLY USED BY THE CITY OF WICHITA.

Describe mitigation or replacement of environmental impacts or values: MITIGATION WILL CONFORM TO CONDITIONS SPECIFIED IN PROJECT PERMITS.

Project work will be halted and the Kansas State Historical Society contacted when historical sites or artifacts are encountered: X Yes ____ No

Describe other planned activities: _____

6. **The design, construction, operation, and maintenance of the stream obstruction or channel change must conform to the requirements of the rules and regulations adopted by the Chief Engineer. Applicable regulations are K.A.R. 5-40-1 through 5-43-5. Please visit our web site, www.accesskansas.org/kda/, or contact our office to obtain those rules and regulations.**

7. **Progress of construction (check the appropriate line and enter requested date):**

____ Construction was started or was completed on: ____/____/20____.

X Construction has not begun. Planned date to begin construction: 08 / 01 /20 05 .

Continue to Next Page

8. **By signing this application, I hereby certify that the information contained in this application is true, correct and complete, and that I am the owner or I am authorized by the owner to make this application.**

Signature of Owner or Agent: Bryce L Barbee

Date: 3/17/05 Title: DESIGN ENGINEER

INSTRUCTIONS

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FEE SCHEDULE
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Applications for New Dams and Dam Modification Applications	
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Applications for Stream Obstructions and Channel Changes		
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Drainage area > 50 sq. miles	$500	$1,000

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Mail application, check, and all supporting documents to:

Kansas Department of Agriculture
Division of Water Resources
109 SW 9th Street 2nd Floor
Topeka KS 66612-1283
Telephone: (785) 296-2933 Fax: (785) 296-4835

THE STATE OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE
Jamie Clover Adams, Secretary of Agriculture

DIVISION OF WATER RESOURCES
David L. Pope, Chief Engineer

File Number _____
This item to be completed by the Division of Water Resources.

APPLICATION FOR PERMIT TO APPROPRIATE WATER FOR BENEFICIAL USE

Filing Fee Must Accompany the Application
(Please refer to Fee Schedule attached to this application form.)

To the Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture, 109 SW 9th Street, Second Floor, Topeka, KS 66612-1283:

1. Name of Applicant (Please Print): SOCORA HOMES, INC.

   Address: 727 N. WACO, SUITE 400

   City: WICHITA State KS Zip Code 67203

   Telephone Number: (316) 263-3201

2. The source of water is: G surface water in CADILLAC LAKE TRIBUTARY (stream)

   OR G groundwater in _____ (drainage basin)

   Certain streams in Kansas have minimum target flows established by law or may be subject to administration when water is released from storage for use by water assurance district members. If your application is subject to these regulations on the date we receive your application, you will be sent the appropriate form to complete and return to the Division of Water Resources.

3. The maximum quantity of water desired is 64.2 acre-feet OR _____ gallons per calendar year, to be diverted at a maximum rate of _____ gallons per minute OR NATURAL FLOWS cubic feet per second.

   Once your application has been assigned a priority, the requested maximum rate of diversion and maximum requested quantity of water under that priority number can **NOT** be increased. Please be certain your requested maximum rate of diversion and maximum quantity of water are appropriate and reasonable for your proposed project and are in agreement with the Division of Water Resources' requirements.

4. The water is intended to be appropriated for **(Check use intended)**:

   (a) G Artificial Recharge (c) G Irrigation Use (e) G Recreational Use (g) G Water Power use

   (b) G Industrial Use (d) G Municipal Use (f) G Stockwatering Use

YOU **MUST** COMPLETE AND ATTACH ADDITIONAL DIVISION OF WATER RESOURCES FORM(S) PROVIDING INFORMATION TO SUBSTANTIATE YOUR REQUEST FOR THE AMOUNT OF WATER FOR THE INTENDED USE REFERENCED ABOVE.

For Office Use Only: Code REG Fee $_____ **TR #**_____ **Receipt Date**_____ **Check #**_____

File No. _____

5. The location of the proposed wells, pump sites or other works for diversion of water is:

   Note: For the application to be accepted, the point of diversion location must be described to at least a 10 acre tract, unless you specifically request 60 days in which to locate the site within a quarter section tract. Any request for an extension of time in which to locate the point of diversion shall include a contract with a well driller or a contractor for the necessary test holes.

   SEE ATTACHED 8½ X 11 SHEET FOR LOCATIONS

   (A) One in the _____ quarter of the _____ quarter of the _____ quarter of Section _____, more particularly described as being near a point _____ feet North and _____ feet West of the Southeast corner of said section, in Township _____ South, Range ____ East/West (circle one), _____ County, Kansas.

   (B) One in the _____ quarter of the _____ quarter of the _____ quarter of Section _____, more particularly described as being near a point _____ feet North and _____ feet West of the Southeast corner of said section, in Township _____ South, Range ____ East/West (circle one), _____ County, Kansas.

   (C) One in the _____ quarter of the _____ quarter of the _____ quarter of Section _____, more particularly described as being near a point _____ feet North and _____ feet West of the Southeast corner of said section, in Township _____ South, Range ____ East/West (circle one), _____ County, Kansas.

   (D) One in the _____ quarter of the _____ quarter of the _____ quarter of Section _____, more particularly described as being near a point _____ feet North and _____ feet West of the Southeast corner of said section, in Township _____ South, Range ____ East/West (circle one), _____ County, Kansas.

   If the source of supply is groundwater, a separate application shall be filed for each proposed well or battery of wells, except that a single application may include up to four wells within a circle with a quarter (¼) mile radius in the same local source of supply which do not exceed a maximum diversion rate of 20 gallons per minute per well and which are operated by means of submersible pumps.

   A battery of wells is defined as two or more wells connected to a common pump by a manifold; or not more than four wells in the same local source of supply within a 300 foot radius circle which are being operated by pumps not to exceed a total maximum diversion rate of 800 gallons per minute and which supply water to a common distribution system.

6. The proposed project for diversion of water will consist of SEVEN DAMS (SEE ATTACHED MAP)
   (number of wells, pumps or dams, etc.)

   and (~~was~~)(will be) completed (by) 03/01/06.
   (Month/Day/Year - each was or will be completed)

7. The first actual application of water for the proposed beneficial use was or is estimated to be 08/01/05.
   (Mo/Day/Year)

8. Will pesticide, fertilizer, or other foreign substance be injected into the water pumped from the diversion works?

   ~~Yes~~ (No G) If "yes", a check valve shall be required.

   All chemigation safety requirements must be met including a chemigation permit and reporting requirements.

File No. _____

9. If you are planning to impound water, please contact the Division of Water Resources for assistance, prior to submitting the application. Please attach a reservoir area capacity table and inform us of the total acres of surface drainage area above the reservoir.

   Have you also made an application for a permit for construction of this dam and reservoir with the Division of Water Resources? (G Yes) ~~G No~~

   ! If yes, show the Water Structures permit number here PENDING

   ! If no, explain here why a Water Structures permit is not required DWR IS REVIEWING STREAM OBSTRUCTION PERMIT APPLICATION CONCURRENTLY.

10. The application must be supplemented by a U.S.G.S. topographic map, aerial photograph or a detailed plat showing the following information. On the topographic map, aerial photograph, or plat, identify the center of the section, the section lines or the section corners and show the appropriate section, township and range numbers. Also, please show the following information: SEE ATTACHMENT #1

   (a) The location of the proposed point(s) of diversion (wells, stream-bank installations, dams, or other diversion works) should be plotted as described in Paragraph No. 5 of the application, showing the North-South distance and the East-West distance from a section line or southeast corner of section.
   SEE 11X17 DRAWING ATTACHED TO THIS APPLICATION.

   (b) If the application is for groundwater, please show the location of any existing water wells of any kind within ½ mile of the proposed well or wells. Identify each existing well as to its use and furnish the name and mailing address of the property owner or owners. If there are no wells within ½ mile, please advise us.

   (c) If the application is for surface water, the names and addresses of the landowner(s) ½ mile downstream and ½ mile upstream from your property lines must be shown. DUE TO THE NUMBERS OF ADJACENT PROPERTY OWNERS, WE REQUEST THAT A PUBLIC NOTICE BE PUBLISHED IN THE WICHITA EAGLE.

   (d) The location of the proposed place of use should be shown by crosshatching on the topographic map, aerial photograph or plat.
   SEE ATTACHEMENT #1

   (e) Show the location of the pipelines, canals, reservoirs or other facilities for conveying water from the point of diversion to the place of use.

   A 7.5 minute U.S.G.S. topographic map may be obtained by providing the section, township and range numbers to: Kansas Geological Survey, 1930 Constant, Campus West, University of Kansas, Lawrence, Kansas 66047.

11. List any application, appropriation of water, water right, or vested right file number that covers the same diversion points or any of the same place of use described in this application. Also list any other recent modifications made to existing permits or water rights in conjunction with the filing of this application.

PLEASE NOTE THAT THIS PERMIT APPLICATION IS BEING SUBMITTED CONCURRENTLY WITH THREE STREAM OBSTRUCTION PERMIT APPLICATIONS.

File No. _____

12. Furnish the following well information if the proposed appropriation is for the use of groundwater. If the well has not been completed, give information obtained from test holes, if available.

Information below is from: Test holes G Well as completed G Drillers log attached G

Well location as shown in paragraph No.	(A)	(B)	(C)	(D)
Date Drilled				
Total depth of well				
Depth to water bearing formation				
Depth to static water level				
Depth to bottom of pump intake pipe				

13. The relationship of the applicant to the proposed place where the water will be used is that of MUNICIPALITY.
(owner, tenant, agent or otherwise)

14. The owner(s) of the property where the water is used, if other than the applicant, is (please print):
SOCORA HOMES, INC., LARRY A. CHAMBERS, PRESIDENT
(name, address and telephone number)
727 N. WACO, SUITE 400; WICHITA, KS 67203 (316) 263-3201
(name, address and telephone number)

15. The undersigned states that the information set forth above is true to the best of his/her knowledge and that this application is submitted in good faith.

Dated at Wichita, Kansas, this 17 day of March (month), 2005 (year).

Socora Homes, Inc.
(Applicant Signature)

APPLICANT(S) SOCIAL SECURITY IDENTIFICATION NUMBER(S)

By Larry A. Chambers
(Agent or Officer Signature)
Bryce L. Barkus

BRYCE L. BARKUS, I.E.
(Agent or Officer - Please Print)

52-2393020
and/or
APPLICANT(S) TAXPAYER I.D. NO.(S)

Assisted by _____ _____ Date: _____
(office/title)

FEE SCHEDULE
Effective July 1, 2002

1. The fee for an application for a permit to appropriate water for beneficial use, except for domestic use, shall be (see paragraph No. 2 below if requesting storage):

ACRE-FEET	FEE
0-100	$200.00
101-320	$300.00
More than 320	$300.00 plus $20.00 for each additional 100 acre-feet or any part thereof.

2. The fee for an application in which storage is requested, except for domestic use, shall be:

ACRE-FEET	FEE
0-250	$200.00
More than 250	$200.00 plus $20.00 for each additional 250 acre-feet of storage or any part thereof.

Note: If an application requests both direct use *and* storage, the fee charged shall be as determined under No. 1 or No. 2 above, whichever is greater, but not both fees.

3. The fee for an application for a permit to appropriate water for water power purposes shall be $100.00 plus $200.00 for each 100 cubic feet per second, or part thereof, of the diversion rate requested.

   Note: The applicant shall notify the Chief Engineer and pay the statutorily required field inspection fee of $400.00 when construction of the works for diversion has been completed.

MAKE CHECKS PAYABLE TO THE KANSAS DEPARTMENT OF AGRICULTURE

ATTENTION

A Water Conservation Plan may be required per K.S.A. 82a-733. A statement that your application for permit to appropriate water may be subject to the minimum desirable streamflow requirements per K.S.A. 82a-703a, b, and c may also be required from you. After the Division of Water Resources has had the opportunity to review your application, you will be notified whether or not you will need to submit a Water Conservation Plan. You also may be required to install a water flow meter or water stage measuring device on your diversion works prior to diverting water. There may be other special conditions or Groundwater Management District regulations that you will need to comply with if this application is approved.

CONVERSION FACTORS

1 acre-foot equals 325,851 gallons

1 million gallons equal 3.07 acre-feet

Revised 06/24/02

RECREATIONAL USE
SUPPLEMENTAL SHEET

File No. _____

Name of Applicant (Please Print): CITY OF WICHITA

1. Please indicate type of recreational use (boating, fishing, swimming, etc.): AESTHETIC AMENITY TO RESIDENTIAL DEVELOPMENT; STORMWATER DETENTION STORAGE.

2. Please summarize how the water will be used and justify the quantity of water requested: WATER WILL BE HELD AT A STATIC POOL LEVEL, THEREFORE THE ONLY WATER USE FROM THE SITE WILL BE FROM EVAPORATION.

3. Please complete the following table showing estimated future water requirements:

ESTIMATED FUTURE WATER DIVERTED/STORED

NEXT 5 YEARS	WATER TO BE DIVERTED (ACRE-FEET OR GALLONS)
Year 1	21.4 ACRE - FEET
Year 2	21.4 ACRE - FEET
Year 3	21.4 ACRE - FEET
Year 4	21.4 ACRE - FEET
Year 5	21.4 ACRE - FEET

Please attach any additional information, tables, or curves showing past, present and estimated future water requirements to substantiate the amount of water requested.

4. Please designate the legal description of the location where the water is to be used. Show in the space provided below the Section (S), Township (T), and Range (R), and the number of acres in each forty acre tract or fractional portion thereof.

S	T	R	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
31	26S	1W	0	0	0	0	0	0	0	0	4.8	3.9	3.2	2.4	0	0	0	0	14.3

You may attach any additional information you believe will assist in informing the Division of the need for your request.

5. The location of the proposed water diversion structures is:

(A) One in the NW quarter of the SW quarter of the SW quarter of Section 31, more particularly described as being near a point 1,015 feet North and 800 feet East of the Southwest corner of said section, in Township 26 South, Range 1 West, Sedgwick County, Kansas.

(B) One in the SE quarter of the NE quarter of the SW quarter of Section 31, more particularly described as being near a point 1,600 feet North and 800 feet East of the Southwest corner of said section, in Township 26 South, Range 1 West, Sedgwick County, Kansas.

(C) One in the NW quarter of the NE quarter of the SW quarter of Section 31, more particularly described as being near a point 2,550 feet North and 1,400 feet East of the Southwest corner of said section, in Township 26 South, Range 1 West, Sedgwick County, Kansas.

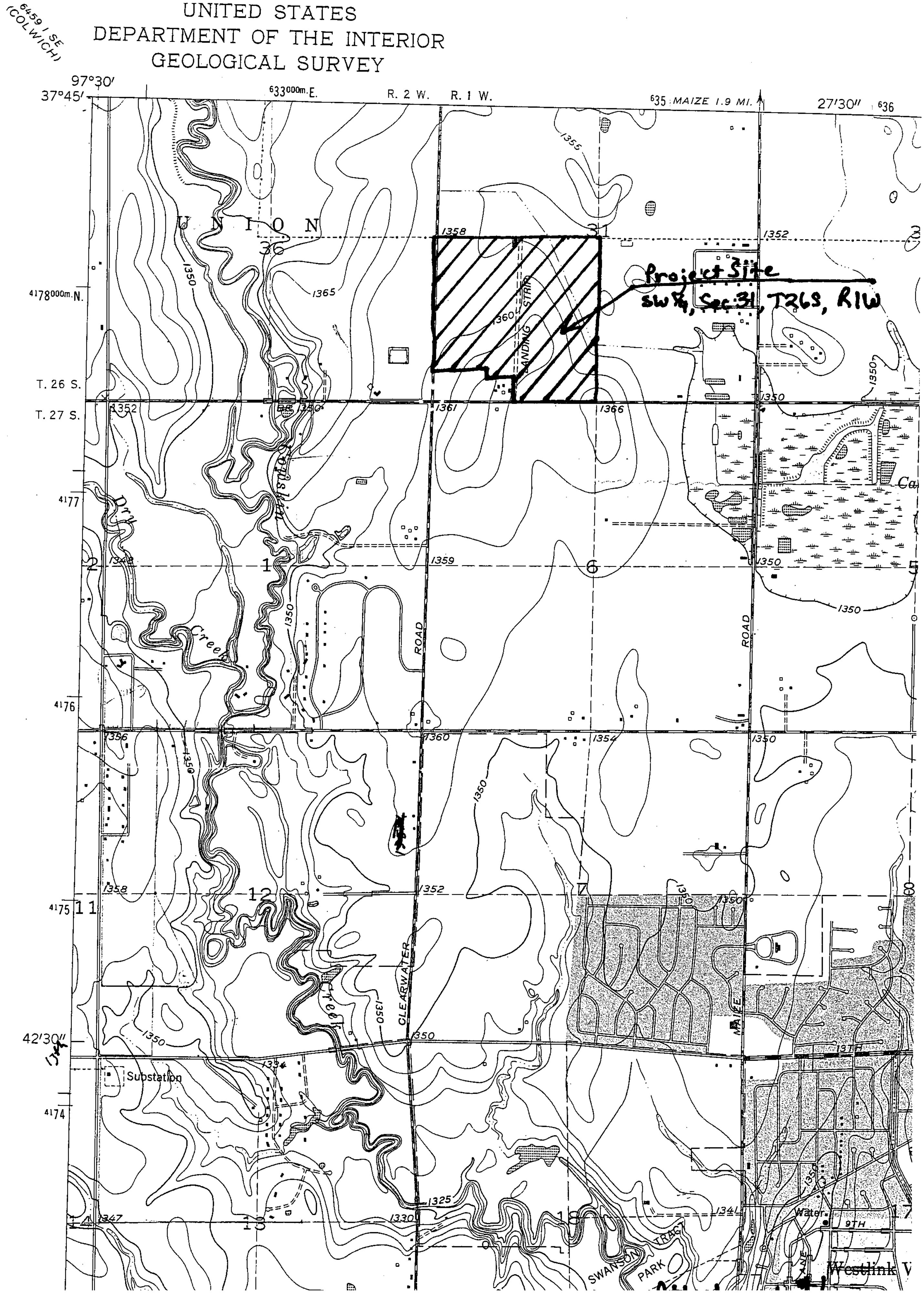
(D) One in the SW quarter of the NE quarter of the SW quarter of Section 31, more particularly described as being near a point 1,900 feet North and 1,875 feet East of the Southwest corner of said section, in Township 26 South, Range 1 West, Sedgwick County, Kansas.

(E) One in the SE quarter of the NE quarter of the SW quarter of Section 31, more particularly described as being near a point 1,460 feet North and 2,540 feet East of the Southwest corner of said section, in Township 26 South, Range 1 West, Sedgwick County, Kansas.

(F) One in the NE quarter of the SE quarter of the SW quarter of Section 31, more particularly described as being near a point 1,035 feet North and 2,090 feet East of the Southwest corner of said section, in Township 26 South, Range 1 West, Sedgwick County, Kansas.

(G) One in the NE quarter of the SE quarter of the SW quarter of Section 31, more particularly described as being near a point 1,000 feet North and 2,575 feet East of the Southwest corner of said section, in Township 26 South, Range 1 West, Sedgwick County, Kansas.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

OFFSITE

Total Area 230.00 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	40%	20%	40%	100%
Acres	0.00	92.00	46.00	92.00	230.00

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Existing	0%	0%	0%	0%	10%	90%
Acres	0.00	0.00	0.00	0.00	23.00	207.00

	Existing	
Length of Flow	6500	ft
Slope	0.22	%
Waterflow Desc	bare / short grass	
Avg Velocity	0.55	ft/sec
Tc	3.28	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Existing Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.54	0.72	230.00	88.76
5	0.56	0.97	230.00	124.49
10	0.61	1.13	230.00	158.80
25	0.64	1.32	230.00	194.91
50	0.67	1.51	230.00	233.73
100	0.71	1.68	230.00	272.80

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin B

Total Area 73.15 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	20%	60%	20%	100%
Acres	0.00	14.63	43.89	14.63	73.15

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Existing	0%	0%	0%	0%	0%	100%
Acres	0.00	0.00	0.00	0.00	0.00	73.15

	Existing	
Length of Flow	3000	ft
Slope	0.50	%
Waterflow Desc	bare / short grass	
Avg Velocity	0.55	ft/sec
Tc	1.52	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Existing Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.54	1.23	73.15	48.59
5	0.56	1.65	73.15	67.59
10	0.61	1.92	73.15	85.67
25	0.64	2.24	73.15	104.87
50	0.67	2.57	73.15	125.96
100	0.70	2.86	73.15	146.45

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin C

Total Area 26.26 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	70%	0%	30%	100%
Acres	0.00	18.38	0.00	7.88	26.26

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Existing	0%	0%	0%	0%	0%	100%
Acres	0.00	0.00	0.00	0.00	0.00	26.26

	Existing	
Length of Flow	2000	ft
Slope	0.70	%
Waterflow Desc	bare / short grass	
Avg Velocity	0.55	ft/sec
Tc	1.01	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Existing Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.54	1.67	26.26	23.68
5	0.56	2.13	26.26	31.32
10	0.61	2.51	26.26	40.21
25	0.64	2.95	26.26	49.58
50	0.67	3.34	26.26	58.76
100	0.70	3.70	26.26	68.01

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin D

Total Area 15.57 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	40%	0%	60%	100%
Acres	0.00	6.23	0.00	9.34	15.57

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Existing	0%	0%	0%	0%	0%	100%
Acres	0.00	0.00	0.00	0.00	0.00	15.57

	Existing	
Length of Flow	1800	ft
Slope	0.39	%
Waterflow Desc	bare / short grass	
Avg Velocity	0.55	ft/sec
Tc	0.91	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Existing Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.54	1.81	15.57	15.22
5	0.56	2.27	15.57	19.79
10	0.61	2.67	15.57	25.36
25	0.64	3.14	15.57	31.29
50	0.67	3.55	15.57	37.03
100	0.70	3.92	15.57	42.72

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1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   08MAR05  TIME  16:46:11  *
*                                      *
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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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
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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


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         LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

           1           ID      FONTANA
           2           ID      EXISTING CONDITIONS
           3           ID      BY BLB    DATE 03-08-05
*** LIST ***
*** FREE ***
                       *DIAGRAM
           4           IT      15 01JAN04    1200       0 02JAN04    2000
           5           IN      15 01JAN04    1200
           6           IO       0       5
           7           JR    PREC     7.8
                       *
                       *
                       *

           8           KK   OFFST
           9           KO       5
          10           BA   0.359
          11           PB    1.00
          12           PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
          13           PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
          14           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
          15           PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
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16          PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
17          PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
18          PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
19          PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
20          PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
21          PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
22          LS       0      70      10
23          UD   1.575
            *
            *

24          KK    BSNB
25          KO       5
26          BA   0.114
27          PB    1.00
28          PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
29          PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
30          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
31          PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
32          PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
33          PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
34          PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
35          PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
36          PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
37          PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
38          LS       0      70      10
39          UD   0.700
            *
            *
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LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

40          KK    OFFB
41          KO       5
42          HC       2       0
            *
            *

43          KK     RTE
44          KO       5
45          RT       0       0       1
            *
            *

46          KK    BSNC
47          KO       5
48          BA   0.041
49          PB    1.00
50          PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
51          PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
52          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
53          PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
54          PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
55          PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
56          PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
57          PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
58          PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
59          PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
```

```
     60          LS      0      70      10
     61          UD   0.460
                 *
                 *

     62          KK    BSND
     63          KO       5
     64          BA   0.024
     65          PB    1.00
     66          PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
     67          PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
     68          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
     69          PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
     70          PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
     71          PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
     72          PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
     73          PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
     74          PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
     75          PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
     76          LS      0      70      10
     77          UD   0.420
                 *
                 *
```



```
    LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

     78          KK    OBCD
     79          KO       5
     80          HC       3       0
                 *
                 *
                 *
                 *
     81          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

     8       OFFST
               .
               .
    24          .        BSNB
                .          .
                .          .
    40        OFFB.............
                V
                V
    43         RTE
                .
                .
    46          .        BSNC
                .          .
                .          .
    62          .          .        BSND
                .          .          .
```

78 OBCD.....

**) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   08MAR05  TIME  16:46:11   *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104          *
*                                   *
*************************************
```

FONTANA
EXISTING CONDITIONS
BY BLB DATE 03-08-05

6 IO OUTPUT CONTROL VARIABLES

IPRNT	0	PRINT CONTROL
IPLOT	5	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	15	MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN 4	STARTING DATE
ITIME	1200	STARTING TIME
NQ	129	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2JAN 4	ENDING DATE
NDTIME	2000	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .25 HOURS
TOTAL TIME BASE 32.00 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

JP MULTI-PLAN OPTION

NPLAN	1	NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
7.80

*** ***

```
          **************
          *            *
  8 KK    *     OFFST  *
          *            *
          **************

  9 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  24 KK   *      BSNB  *
          *            *
          **************

  25 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


* *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  40 KK   *      OFFB  *
          *            *
          **************

  41 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  43 KK   *       RTE  *
          *            *
          **************

  44 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
```

*** ***

```
          **************
          *            *
 46 KK    *      BSNC  *
          *            *
          **************

 47 KO         OUTPUT CONTROL VARIABLES
                    IPRNT            5  PRINT CONTROL
                    IPLOT            5  PLOT CONTROL
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
```

*** ***

```
          **************
          *            *
 62 KK    *      BSND  *
          *            *
          **************

 63 KO         OUTPUT CONTROL VARIABLES
                    IPRNT            5  PRINT CONTROL
                    IPLOT            5  PLOT CONTROL
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
```

*** ***

```
          **************
          *            *
 78 KK    *      OBCD  *
          *            *
          **************

 79 KO         OUTPUT CONTROL VARIABLES
                    IPRNT            5  PRINT CONTROL
                    IPLOT            5  PLOT CONTROL
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
```

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

ERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 7.80
HYDROGRAPH AT					
+	OFFST	.36	1	FLOW	273.
				TIME	13.50

HYDROGRAPH AT					
+	BSNB	.11	1	FLOW	147.
				TIME	12.50
2 COMBINED AT					
+	OFFB	.47	1	FLOW	347.
				TIME	13.00
ROUTED TO					
+	RTE	.47	1	FLOW	347.
				TIME	13.25
HYDROGRAPH AT					
+	BSNC	.04	1	FLOW	68.
				TIME	12.25
HYDROGRAPH AT					
+	BSND	.02	1	FLOW	43.
				TIME	12.25
3 COMBINED AT					
+	OBCD	.54	1	FLOW	378.
				TIME	13.25

*** NORMAL END OF HEC-1 ***

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

OFFSITE

Total Area 230.00 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	40%	20%	40%	100%
Acres	0.00	92.00	46.00	92.00	230.00

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	10%	90%
Acres	0.00	0.00	0.00	0.00	23.00	207.00

	Future	
Length of Flow	6500	ft
Slope	0.22	%
Waterflow Desc	bare / short grass	
Avg Velocity	0.55	ft/sec
Tc	3.28	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.54	0.72	230.00	88.76
5	0.56	0.97	230.00	124.49
10	0.61	1.13	230.00	158.80
25	0.64	1.32	230.00	194.91
50	0.67	1.51	230.00	233.73
100	0.71	1.68	230.00	272.80

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin 2

Total Area 15.88 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	100%	0%	0%	100%
Acres	0.00	15.88	0.00	0.00	15.88

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	80%	20%
Acres	0.00	0.00	0.00	0.00	12.70	3.18

	Future	
Length of Flow	1450	ft
Slope	0.83	%
Waterflow Desc	lawns / short grass	
Avg Velocity	0.24	ft/sec
Tc	1.68	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.51	1.13	15.88	9.12
5	0.54	1.52	15.88	13.13
10	0.62	1.77	15.88	17.37
25	0.66	2.07	15.88	21.56
50	0.69	2.39	15.88	26.34
100	0.75	2.65	15.88	31.48

Project: **Fontana**
Date: 3/4/2004
Prep. By: BLB

Manual Input

Basin 3

Total Area 15.18 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	60%	0%	40%	100%
Acres	0.00	9.11	0.00	6.07	15.18

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	80%	20%
Acres	0.00	0.00	0.00	0.00	12.14	3.04

	Future	
Length of Flow	1300	ft
Slope	1.15	%
Waterflow Desc	lawns / short grass	
Avg Velocity	0.24	ft/sec
Tc	1.50	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.51	1.24	15.18	9.56
5	0.54	1.66	15.18	13.71
10	0.62	1.93	15.18	18.11
25	0.66	2.26	15.18	22.51
50	0.69	2.59	15.18	27.29
100	0.75	2.88	15.18	32.70

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin 4

Total Area 12.52 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	80%	10%	10%	100%
Acres	0.00	10.02	1.25	1.25	12.52

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	80%	20%
Acres	0.00	0.00	0.00	0.00	10.02	2.50

	Future	
Length of Flow	1675	ft
Slope	0.90	%
Waterflow Desc	lawns / short grass	
Avg Velocity	0.24	ft/sec
Tc	1.94	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.51	1.02	12.52	6.49
5	0.54	1.36	12.52	9.26
10	0.62	1.59	12.52	12.30
25	0.66	1.86	12.52	15.28
50	0.69	2.12	12.52	18.42
100	0.75	2.36	12.52	22.10

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin 5

Total Area 14.88 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	10%	10%	80%	100%
Acres	0.00	1.49	1.49	11.90	14.88

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	80%	20%
Acres	0.00	0.00	0.00	0.00	11.90	2.98

	Future	
Length of Flow	1300	ft
Slope	0.35	%
Waterflow Desc	lawns / short grass	
Avg Velocity	0.24	ft/sec
Tc	1.50	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.51	1.24	14.88	9.37
5	0.54	1.66	14.88	13.44
10	0.62	1.93	14.88	17.75
25	0.66	2.26	14.88	22.06
50	0.69	2.59	14.88	26.75
100	0.75	2.88	14.88	32.06

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin 6

Total Area 4.85 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	0%	100%	0%	100%
Acres	0.00	0.00	4.85	0.00	4.85

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	80%	20%
Acres	0.00	0.00	0.00	0.00	3.88	0.97

	Future	
Length of Flow	1100	ft
Slope	0.38	%
Waterflow Desc	lawns / short grass	
Avg Velocity	0.24	ft/sec
Tc	1.27	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.51	1.41	4.85	3.47
5	0.54	1.85	4.85	4.88
10	0.62	2.19	4.85	6.56
25	0.66	2.58	4.85	8.21
50	0.69	2.93	4.85	9.86
100	0.75	3.26	4.85	11.83

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin 7

Total Area 35.33 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	50%	50%	0%	100%
Acres	0.00	17.67	17.67	0.00	35.33

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	80%	20%
Acres	0.00	0.00	0.00	0.00	28.26	7.07

	Future	
Length of Flow	1875	ft
Slope	0.21	%
Waterflow Desc	lawns / short grass	
Avg Velocity	0.24	ft/sec
Tc	2.17	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.51	0.99	35.33	17.77
5	0.54	1.33	35.33	25.56
10	0.62	1.55	35.33	33.84
25	0.66	1.81	35.33	41.95
50	0.69	2.07	35.33	50.75
100	0.75	2.30	35.33	60.78

Project: **Fontana**
Date: 3/1/2004
Prep. By: BLB

Manual Input

Basin 8

Total Area 17.25 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	50%	0%	50%	100%
Acres	0.00	8.63	0.00	8.63	17.25

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	80%	20%
Acres	0.00	0.00	0.00	0.00	13.80	3.45

	Future	
Length of Flow	1200	ft
Slope	0.80	%
Waterflow Desc	lawns / short grass	
Avg Velocity	0.24	ft/sec
Tc	1.39	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.51	1.32	17.25	11.57
5	0.54	1.74	17.25	16.33
10	0.62	2.06	17.25	21.96
25	0.66	2.41	17.25	27.27
50	0.69	2.76	17.25	33.04
100	0.75	3.07	17.25	39.61

Project: **Fontana**
Date: 3/4/2004
Prep. By: BLB

Manual Input

Basin 10

Total Area 13.69 Acres

Soil Group	**A** (% of Total Area)	**B** (% of Total Area)	**C** (% of Total Area)	**D** (% of Total Area)	**Total**
	0%	60%	0%	40%	100%
Acres	0.00	8.21	0.00	5.48	13.69

Land Use	**Commercial** (% of Total Area)	**Industrial** (% of Total Area)	**Multi-Family** (% of Total Area)	**Public** (% of Total Area)	**Single Family** (% of Total Area)	**Vacant/Agriculture** (% of Total Area)
Future	0%	0%	0%	0%	80%	20%
Acres	0.00	0.00	0.00	0.00	10.95	2.74

	Future	
Length of Flow	1450	ft
Slope	0.97	%
Waterflow Desc	lawns / short grass	
Avg Velocity	0.24	ft/sec
Tc	1.68	hours

15 min <= Tc <= 24 hrs

Runoff Coefficients * Used Soil Group D To Be Conservative

Return Period (Years)	Commercial	Industrial	Multi-Family	Public	Single Family	Vacant/Agriculture
2	0.68	0.68	0.70	0.49	0.50	0.54
5	0.69	0.69	0.73	0.51	0.54	0.56
10	0.73	0.73	0.79	0.56	0.62	0.61
25	0.75	0.75	0.81	0.59	0.66	0.64
50	0.77	0.77	0.83	0.62	0.70	0.67
100	0.80	0.80	0.86	0.66	0.76	0.70

Future Conditions

Return Period (Years)	Runoff Coefficient *	Rainfall Intensity (in/hr)	Area (Acres)	Runoff (cfs)
2	0.51	1.13	13.69	7.86
5	0.54	1.52	13.69	11.32
10	0.62	1.77	13.69	14.97
25	0.66	2.07	13.69	18.59
50	0.69	2.39	13.69	22.71
100	0.75	2.65	13.69	27.14

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   09MAR05  TIME  08:51:41  *
*                                      *
****************************************
```


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


```
         LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

           1           ID      FONTANA
           2           ID      DEVELOPED CONDITIONS
           3           ID      BY BLB    DATE 03-09-05
*** LIST ***
*** FREE ***
                       *DIAGRAM
           4           IT      15 01JAN04    1200       0 02JAN04    2000
           5           IN      15 01JAN04    1200
           6           IO       0        5
           7           JR    PREC     7.8
                       *
                       *
                       *

           8           KK    BSN5
           9           KO       5
          10           BA   0.023
          11           PB    1.00
          12           PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
          13           PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
          14           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
          15           PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
```

```
16        PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
17        PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
18        PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
19        PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
20        PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
21        PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
22        LS       0      68      10
23        UD   0.600
          *
          *

24        KK   POND7
25        KO       5
26        RS       1   ELEV   162.0
27        SA    2.55    2.71    2.88    3.06
28        SE   171.0   172.0   173.0   174.0
29        SQ       0     3.2     6.4     9.6    12.8    16.0    19.2    22.4    25.6    28.8
30        SQ    32.0
31        SE   171.0  171.35  171.56  171.73  171.88  172.02  172.16  172.28  172.40  172.52
32        SE   172.6
          *
          *

33        KK    BSN4
34        KO       5
35        BA   0.020
36        PB    1.00
37        PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
38        PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
39        PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
40        PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
41        PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
42        PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

43        PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
44        PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
45        PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
46        PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
47        LS       0      68      10
48        UD   0.850
          *
          *

49        KK   PD7&4
50        KO       5
51        HC       2       0
          *
          *

52        KK   POND6
53        KO       5
54        RS       1   ELEV   162.0
55        SA    1.85    1.99    2.14    2.29
56        SE   170.0   171.0   172.0   173.0
57        SQ       0     2.2     4.4     6.6     8.8    11.0    13.2    15.4    17.6    19.8
58        SQ    22.0
59        SE   170.0  170.72  171.11  171.42  171.77  172.21  172.75  173.40  174.14  174.98
```

```
 60          SE   175.9
             *
             *

 61          KK    BSN7
 62          KO       5
 63          BA   0.055
 64          PB    1.00
 65          PC   0.000  0.003  0.006  0.008  0.011  0.014  0.017  0.019  0.022  0.025
 66          PC   0.029  0.032  0.035  0.038  0.042  0.045  0.048  0.052  0.056  0.060
 67          PC   0.064  0.068  0.072  0.076  0.080  0.085  0.090  0.095  0.100  0.105
 68          PC   0.110  0.115  0.120  0.127  0.134  0.140  0.147  0.155  0.163  0.172
 69          PC   0.181  0.193  0.204  0.220  0.235  0.259  0.283  0.387  0.663  0.699
 70          PC   0.735  0.754  0.772  0.786  0.799  0.810  0.820  0.828  0.835  0.843
 71          PC   0.850  0.858  0.865  0.873  0.880  0.885  0.889  0.894  0.898  0.903
 72          PC   0.907  0.912  0.916  0.921  0.925  0.929  0.934  0.938  0.943  0.947
 73          PC   0.952  0.955  0.958  0.961  0.964  0.967  0.970  0.973  0.976  0.979
 74          PC   0.982  0.985  0.988  0.991  0.994  0.997  1.000
 75          LS       0     68     10
 76          UD   0.840
             *
             *

 77          KK    7PD6
 78          KO       5
 79          HC       2      0
             *
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 80          KK   POND5
 81          KO       5
 82          RS       1   ELEV  159.0
 83          SA    2.67   2.84   3.01   3.19
 84          SE   167.0  168.0  169.0  170.0
 85          SQ       0    6.3   12.6   18.9   25.2   31.5   37.8   44.1   50.4   56.7
 86          SQ    63.0
 87          SE   167.0 167.55 167.87 168.14 168.39 168.61 168.82 169.01 169.20 169.38
 88          SE   169.6
             *
             *

 89          KK    BSN6
 90          KO       5
 91          BA   0.008
 92          PB    1.00
 93          PC   0.000  0.003  0.006  0.008  0.011  0.014  0.017  0.019  0.022  0.025
 94          PC   0.029  0.032  0.035  0.038  0.042  0.045  0.048  0.052  0.056  0.060
 95          PC   0.064  0.068  0.072  0.076  0.080  0.085  0.090  0.095  0.100  0.105
 96          PC   0.110  0.115  0.120  0.127  0.134  0.140  0.147  0.155  0.163  0.172
 97          PC   0.181  0.193  0.204  0.220  0.235  0.259  0.283  0.387  0.663  0.699
 98          PC   0.735  0.754  0.772  0.786  0.799  0.810  0.820  0.828  0.835  0.843
 99          PC   0.850  0.858  0.865  0.873  0.880  0.885  0.889  0.894  0.898  0.903
100          PC   0.907  0.912  0.916  0.921  0.925  0.929  0.934  0.938  0.943  0.947
101          PC   0.952  0.955  0.958  0.961  0.964  0.967  0.970  0.973  0.976  0.979
102          PC   0.982  0.985  0.988  0.991  0.994  0.997  1.000
103          LS       0     68     10
```

```
104          UD   0.530
             *
             *

105          KK    RTE6
106          KO       5
107          RT       0       0       3
             *
             *

108          KK   OFFST
109          KO       5
110          BA   0.359
111          PB    1.00
112          PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
113          PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
114          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
115          PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
116          PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
117          PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
118          PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
119          PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
120          PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
121          PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
122          LS       0      70      10
123          UD   1.575
             *
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

124          KK    BSN8
125          KO       5
126          BA   0.027
127          PB    1.00
128          PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
129          PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
130          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
131          PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
132          PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
133          PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
134          PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
135          PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
136          PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
137          PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
138          LS       0      68      10
139          UD   0.490
             *
             *

140          KK   608P5
141          KO       5
142          HC       4       0
             *
             *

143          KK   POND4
144          KO       5
```

```
145          RS      1    ELEV   158.0
146          SA   3.06    3.24    3.42    3.61
147          SE  166.0   167.0   168.0   169.0
148          SL  158.0   14.73     0.6     0.5
149          SS  167.0    0.00     3.0     1.5
             *
             *

150          KK  BSN10
151          KO      5
152          BA  0.021
153          PB   1.00
154          PC  0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
155          PC  0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
156          PC  0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
157          PC  0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
158          PC  0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
159          PC  0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
160          PC  0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
161          PC  0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
162          PC  0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
163          PC  0.982   0.985   0.988   0.991   0.994   0.997   1.000
164          LS      0      68      10
165          UD  0.670
             *
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

166          KK  10PD4
167          KO      5
168          HC      2       0
             *
             *

169          KK  POND3
170          KO      5
171          RS      1    ELEV   162.0
172          SA   1.70    1.83    1.98    2.12
173          SE  166.0   167.0   168.0   169.0
174          SL  158.5   14.73     0.6     0.5
175          SS  168.0    0.00     3.0     1.5
             *
             *

176          KK   BSN3
177          KO      5
178          BA  0.024
179          PB   1.00
180          PC  0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
181          PC  0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
182          PC  0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
183          PC  0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
184          PC  0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
185          PC  0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
186          PC  0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
187          PC  0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
188          PC  0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
```

```
189          PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
190          LS       0      68      10
191          UD   0.580
             *
             *

192          KK    BSN2
193          KO       5
194          BA   0.025
195          PB    1.00
196          PC   0.000   0.003   0.006   0.008   0.011   0.014   0.017   0.019   0.022   0.025
197          PC   0.029   0.032   0.035   0.038   0.042   0.045   0.048   0.052   0.056   0.060
198          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
199          PC   0.110   0.115   0.120   0.127   0.134   0.140   0.147   0.155   0.163   0.172
200          PC   0.181   0.193   0.204   0.220   0.235   0.259   0.283   0.387   0.663   0.699
201          PC   0.735   0.754   0.772   0.786   0.799   0.810   0.820   0.828   0.835   0.843
202          PC   0.850   0.858   0.865   0.873   0.880   0.885   0.889   0.894   0.898   0.903
203          PC   0.907   0.912   0.916   0.921   0.925   0.929   0.934   0.938   0.943   0.947
204          PC   0.952   0.955   0.958   0.961   0.964   0.967   0.970   0.973   0.976   0.979
205          PC   0.982   0.985   0.988   0.991   0.994   0.997   1.000
206          LS       0      68      10
207          UD   0.670
             *
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

208          KK    POND1
209          KO       5
210          RS       1    ELEV   162.0
211          SA    0.36    0.43    0.49    0.57
212          SE   170.0   171.0   172.0   173.0
213          SQ       0     3.2     6.4     9.6    12.8    16.0    19.2    22.4    25.6    28.8
214          SQ    32.0
215          SE   170.0  170.17  170.27  170.35  170.42  170.49  170.56  170.62  170.67  170.73
216          SE   170.8
             *
             *

217          KK  3PD1&3
218          KO       5
219          HC       3       0
             *
             *

220          KK    POND2
221          KO       5
222          RS       1    ELEV   158.0
223          SA    2.08    2.23    2.38    2.54
224          SE   166.0   167.0   168.0   169.0
225          SQ       0    26.9    53.8    80.7   107.6   134.5   161.4   188.3   215.2   242.1
226          SQ   269.0
227          SE   166.0  166.50  166.79  167.03  167.25  167.45  167.63  167.81  167.98  168.14
228          SE   168.3
             *
             *
             *
             *
```

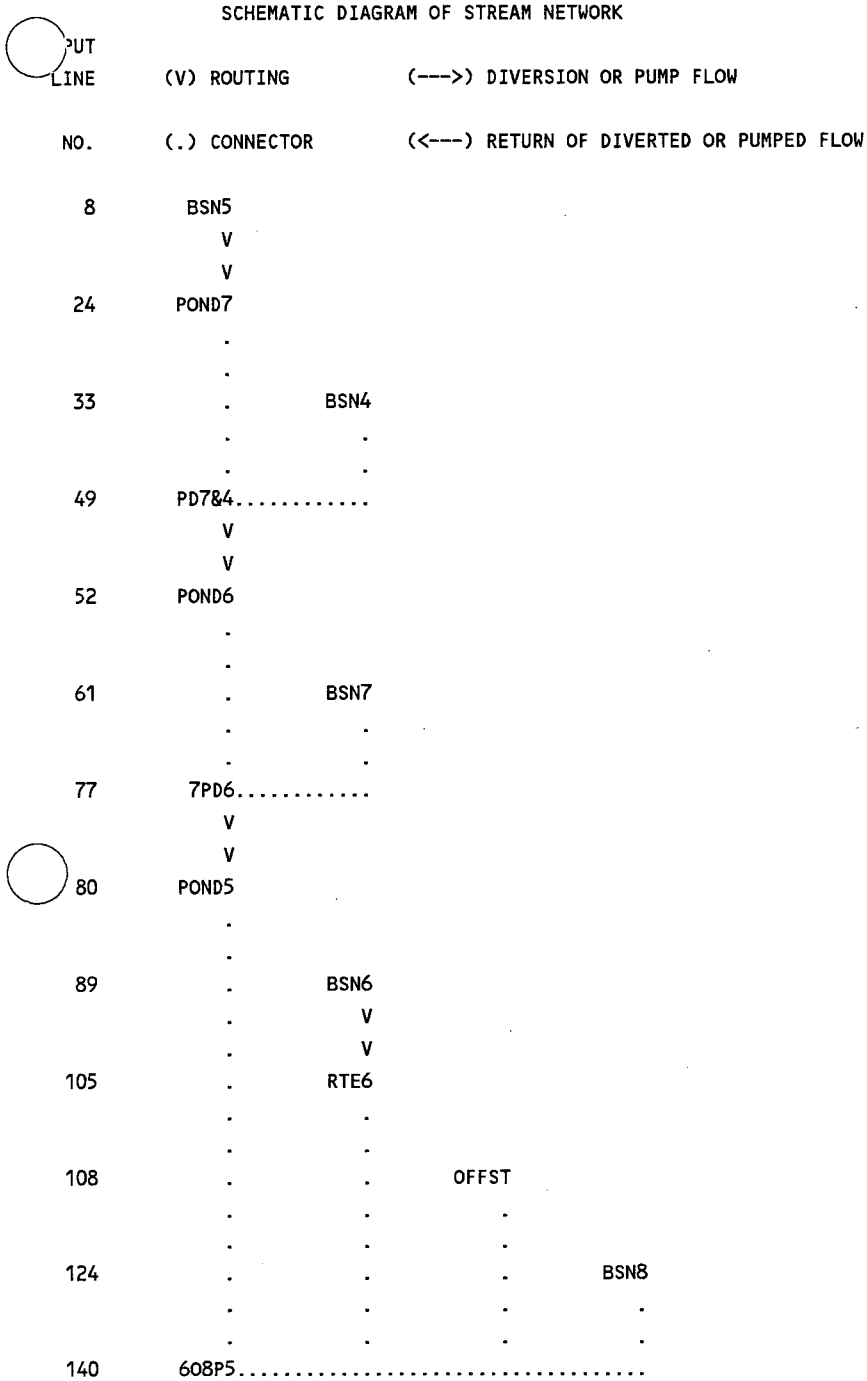
229 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

PUT
LINE (V) ROUTING (---->) DIVERSION OR PUMP FLOW

NO. (.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW



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                .          .
                .          .
  192           .          .        BSN2
                .          .          V
                .          .          V
  208           .          .        POND1
                .          .          .
                .          .          .
  217      3PD1&3.........................
                V
                V
  220       POND2

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   09MAR05  TIME  08:51:41   *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104          *
*                                   *
*************************************
```

```
                        FONTANA
                        DEVELOPED CONDITIONS
                        BY BLB    DATE 03-09-05

    6 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          0  PRINT CONTROL
                       IPLOT          5  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                        NMIN         15  MINUTES IN COMPUTATION INTERVAL
                       IDATE     1JAN 4  STARTING DATE
                       ITIME       1200  STARTING TIME
                          NQ        129  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     2JAN 4  ENDING DATE
                      NDTIME       2000  ENDING TIME
                       ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL      .25 HOURS
                      TOTAL TIME BASE    32.00 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

      JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS
```

```
   JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                  7.80


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 8 KK     *      BSN5  *
          *            *
          **************

 9 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          5  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
24 KK     *     POND7  *
          *            *
          **************

25 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          5  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
33 KK     *      BSN4  *
          *            *
          **************

34 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          5  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


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

```
 49 KK     *     PD7&4  *
           *            *
           ***************

 50 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           5  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           ***************
           *            *
 52 KK     *     POND6  *
           *            *
           ***************

 53 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           5  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           ***************
           *            *
 61 KK     *      BSN7  *
           *            *
           ***************

 62 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           5  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           ***************
           *            *
 77 KK     *      7PD6  *
           *            *
           ***************

 78 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           5  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE


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

```
          **************
          *            *
 80 KK    *     POND5  *
          *            *
          **************

 81 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          5  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 89 KK    *      BSN6  *
          *            *
          **************

 90 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          5  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
105 KK    *      RTE6  *
          *            *
          **************

106 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          5  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
108 KK    *     OFFST  *
          *            *
          **************

109 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          5  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
```

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

          **************
          *            *
124 KK    *      BSN8  *
          *            *
          **************

125 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           5  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
140 KK    *     608P5  *
          *            *
          **************

141 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           5  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
143 KK    *     POND4  *
          *            *
          **************

144 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           5  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
150 KK    *     BSN10  *
          *            *
          **************
```

```
151 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
166 KK    *     10PD4  *
          *            *
          **************

167 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
169 KK    *     POND3  *
          *            *
          **************

170 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
176 KK    *      BSN3  *
          *            *
          **************

177 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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

```
192 KK     *      BSN2  *
           *            *
           **************

193 KO           OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
208 KK     *     POND1  *
           *            *
           **************

209 KO           OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
217 KK     *    3PD1&3  *
           *            *
           **************

218 KO           OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
220 KK     *     POND2  *
           *            *
           **************

221 KO           OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           5  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
1

          PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                          FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
```

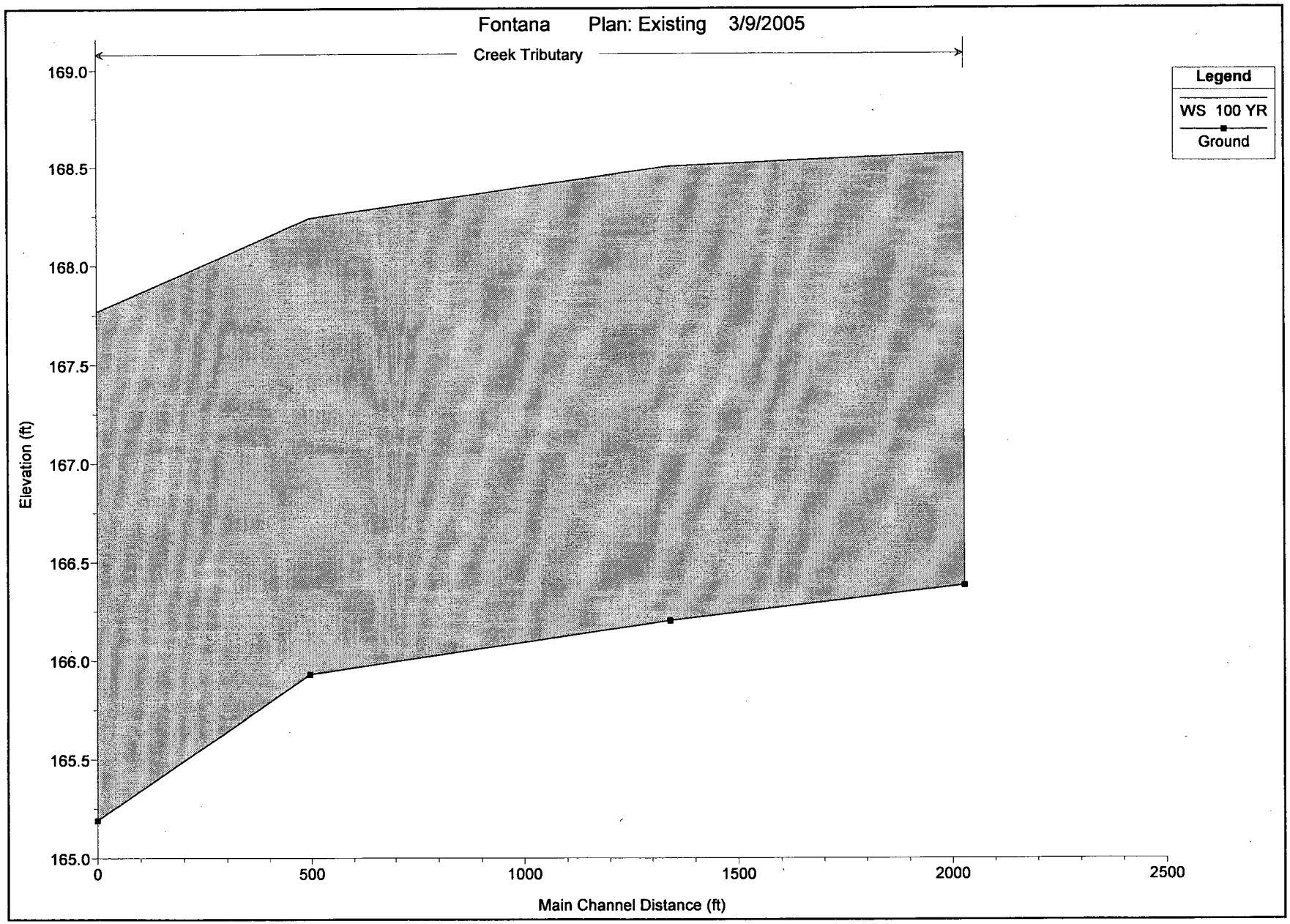
TIME TO PEAK IN HOURS

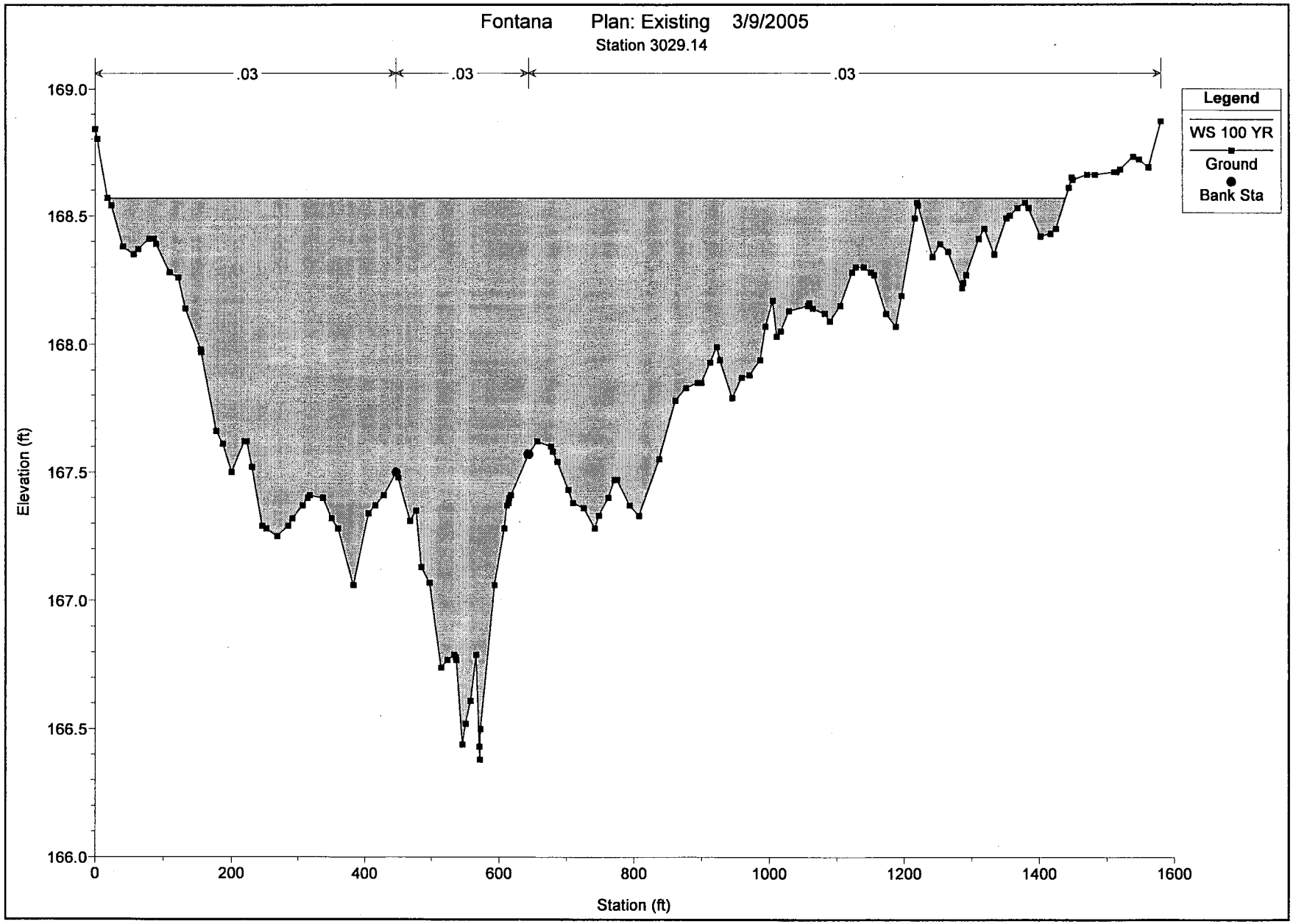
OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1
					7.80
HYDROGRAPH AT					
+	BSN5	.02	1	FLOW	32.
				TIME	12.50
ROUTED TO					
+	POND7	.02	1	FLOW	12.
				TIME	13.50
			** PEAK STAGES IN FEET **		
			1	STAGE	171.83
				TIME	13.50
HYDROGRAPH AT					
+	BSN4	.02	1	FLOW	22.
				TIME	12.75
2 COMBINED AT					
+	PD7&4	.04	1	FLOW	31.
				TIME	13.00
ROUTED TO					
	POND6	.04	1	FLOW	10.
				TIME	15.50
			** PEAK STAGES IN FEET **		
			1	STAGE	172.05
				TIME	15.50
HYDROGRAPH AT					
+	BSN7	.05	1	FLOW	61.
				TIME	12.75
2 COMBINED AT					
+	7PD6	.10	1	FLOW	64.
				TIME	12.75
ROUTED TO					
+	POND5	.10	1	FLOW	35.
				TIME	13.75
			** PEAK STAGES IN FEET **		
			1	STAGE	168.73
				TIME	13.75
HYDROGRAPH AT					
+	BSN6	.01	1	FLOW	12.
				TIME	12.50
ROUTED TO					
+	RTE6	.01	1	FLOW	12.
				TIME	13.25
HYDROGRAPH AT					

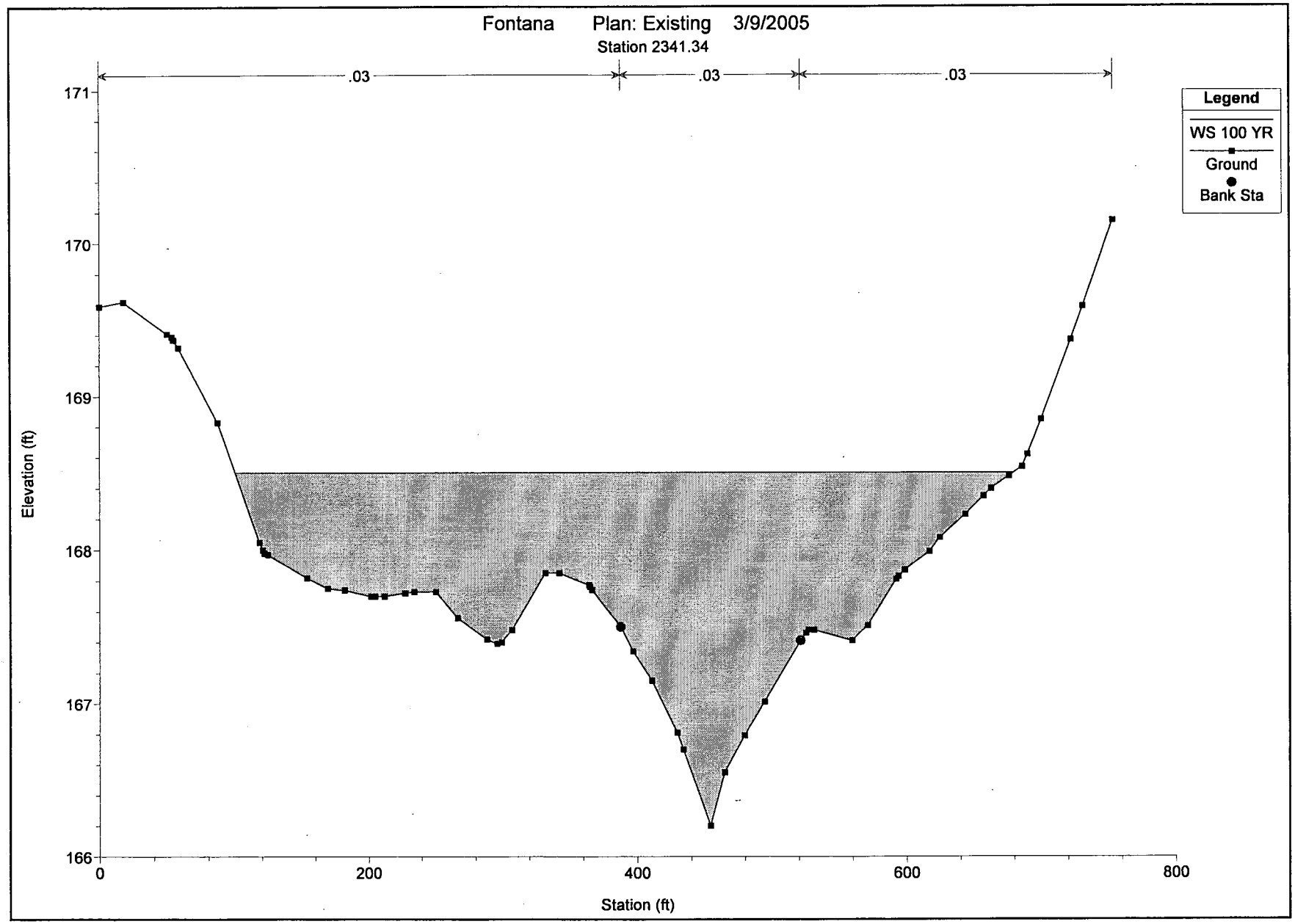
```
+                  OFFST       .36     1   FLOW        273.
                                           TIME        13.50

   DROGRAPH AT
                    BSN8       .03     1   FLOW         40.
                                           TIME        12.25

  4 COMBINED AT
+                  608P5       .49     1   FLOW        326.
                                           TIME        13.50

 ROUTED TO
+                  POND4       .49     1   FLOW        232.
                                           TIME        14.50

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE      168.71
                                           TIME        14.50

 HYDROGRAPH AT
+                  BSN10       .02     1   FLOW         27.
                                           TIME        12.50

  2 COMBINED AT
+                  10PD4       .51     1   FLOW        236.
                                           TIME        14.50

 ROUTED TO
                   POND3       .51     1   FLOW        224.
                                           TIME        15.50

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE      168.52
                                           TIME        15.50

 HYDROGRAPH AT
+                   BSN3       .02     1   FLOW         33.
                                           TIME        12.50

 HYDROGRAPH AT
+                   BSN2       .03     1   FLOW         32.
                                           TIME        12.50

 ROUTED TO
+                  POND1       .03     1   FLOW         31.
                                           TIME        12.75

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE      170.78
                                           TIME        12.75

  3 COMBINED AT
+                3PD1&3        .56     1   FLOW        270.
                                           TIME        12.50

    UTED TO
+                  POND2       .56     1   FLOW        267.
                                           TIME        12.75

                                       ** PEAK STAGES IN FEET **
```

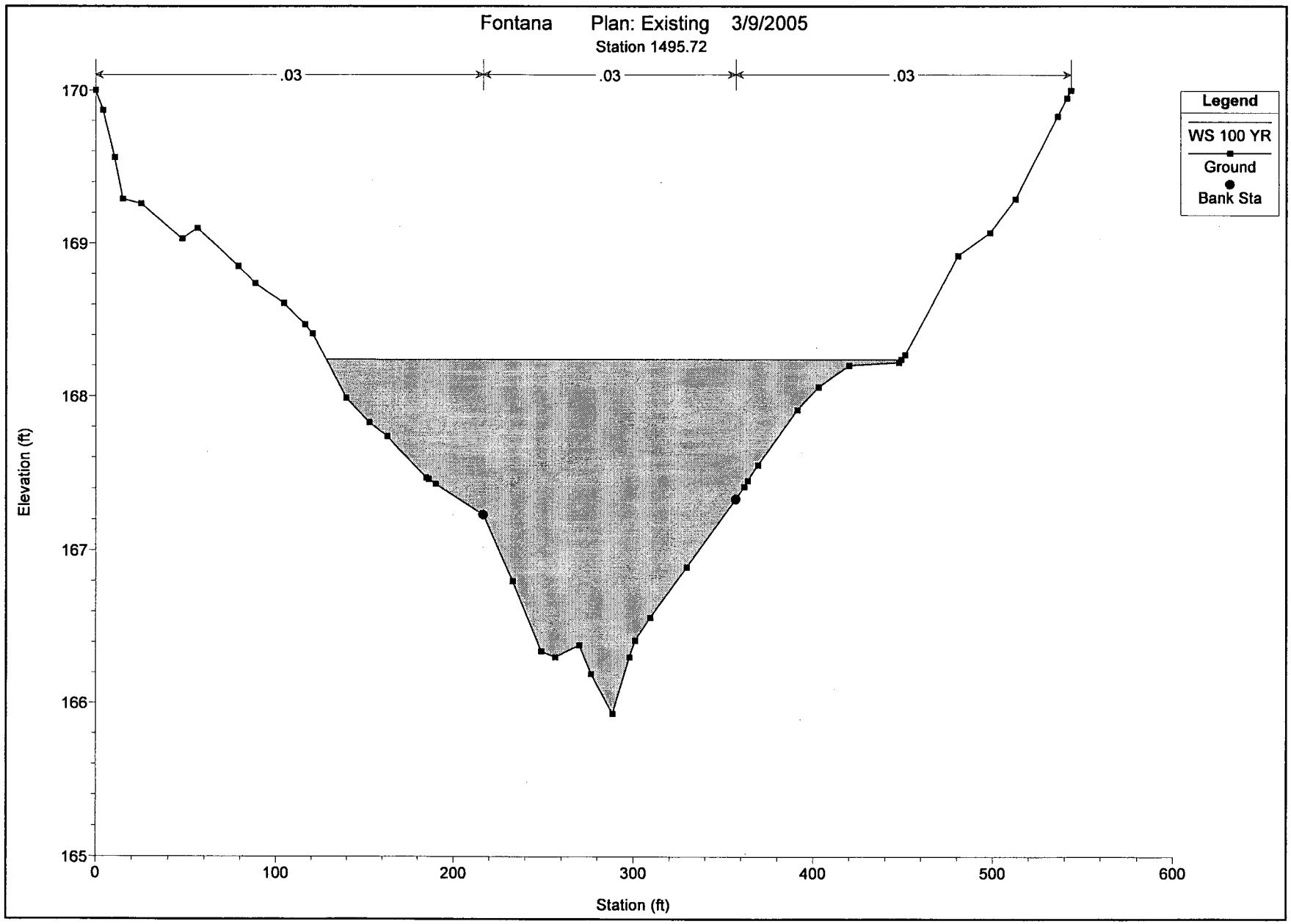
1	STAGE	168.29
	TIME	12.75

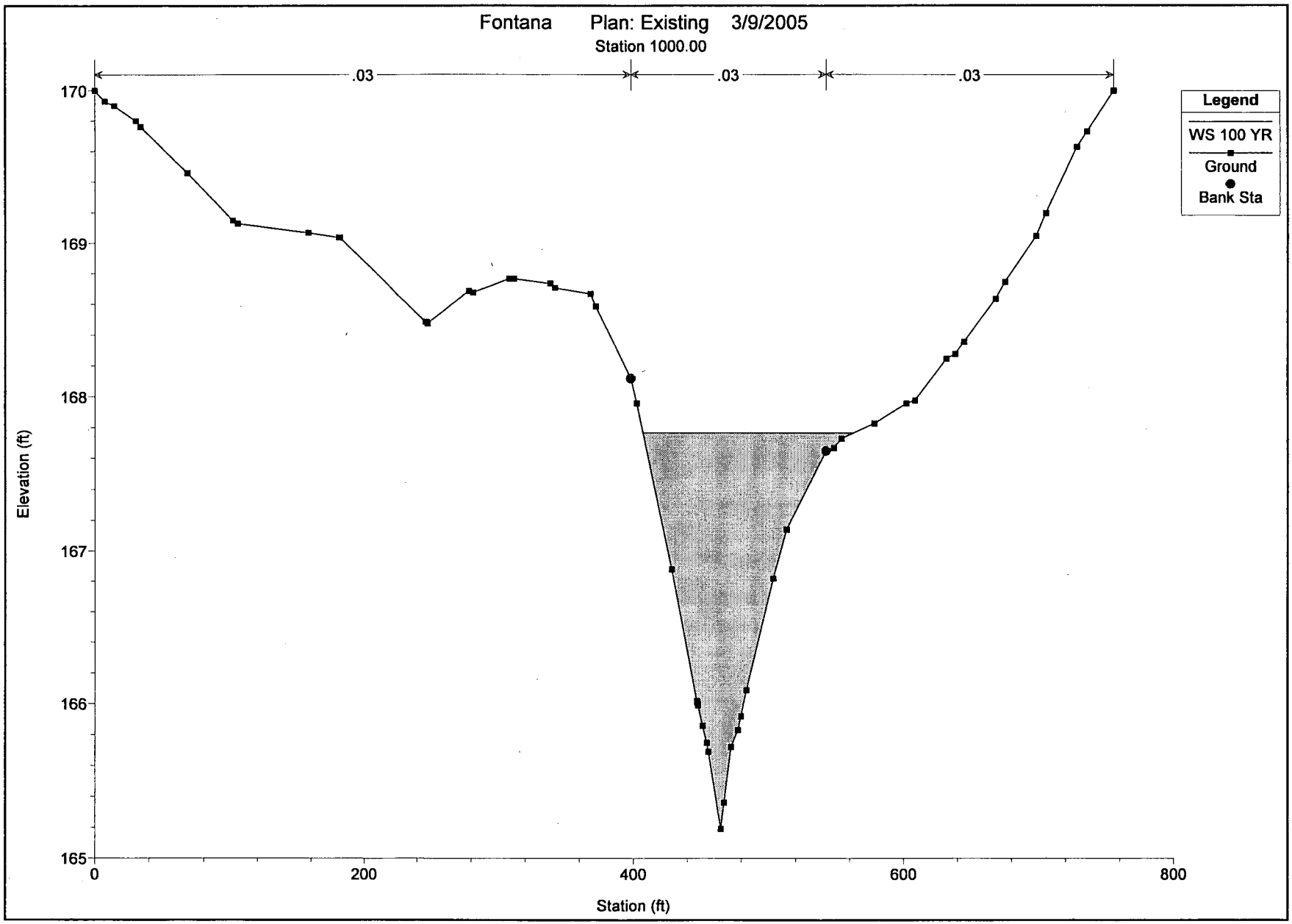
*** NORMAL END OF HEC-1 ***


Fontana Plan: Existing 3/9/2005
Creek Tributary
Legend
WS 100 YR
Ground
169.0
168.5
168.0
167.5
167.0
166.5
166.0
165.5
165.0
Elevation (ft)
0
500
1000
1500
2000
2500
Main Channel Distance (ft)


Fontana Plan: Existing 3/9/2005
Station 3029.14
.03
.03
.03
Legend
WS 100 YR
Ground
Bank Sta
169.0
168.5
168.0
167.5
167.0
166.5
166.0
Elevation (ft)
0
200
400
600
800
1000
1200
1400
1600
Station (ft)


Fontana Plan: Existing 3/9/2005
Station 2341.34
.03
.03
.03
Legend
WS 100 YR
Ground
Bank Sta
171
170
169
168
167
166
Elevation (ft)
0
200
400
600
800
Station (ft)


Fontana Plan: Existing 3/9/2005
Station 1495.72
.03
.03
.03
Legend
WS 100 YR
Ground
Bank Sta
170
169
168
167
166
165
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Fontana Plan: Existing 3/9/2005
Station 1000.00
.03
.03
.03
Legend
WS 100 YR
Ground
Bank Sta
170
169
168
167
166
165
Elevation (ft)
0
200
400
600
800
Station (ft)

Plan: EXISTING Creek Tributary RS: 3029.14 Profile: 100 YR

E.G. Elev (ft)	168.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	168.57	Reach Len. (ft)	687.80	687.80	687.80
Crit W.S. (ft)		Flow Area (sq ft)	375.85	299.93	449.76
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	375.85	299.93	449.76
Q Total (cfs)	347.00	Flow (cfs)	113.55	131.67	101.77
Top Width (ft)	1420.43	Top Width (ft)	430.23	195.96	794.24
Vel Total (ft/s)	0.31	Avg. Vel. (ft/s)	0.30	0.44	0.23
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)	0.87	1.53	0.57
Conv. Total (cfs)	51986.2	Conv. (cfs)	17012.1	19726.7	15247.4
Length Wtd. (ft)	687.80	Wetted Per. (ft)	430.24	196.01	794.26
Min Ch El (ft)	166.38	Shear (lb/sq ft)	0.00	0.00	0.00
Alpha	1.24	Stream Power (lb/ft s)	0.00	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	7.63	10.51	5.71
C & E Loss (ft)	0.00	Cum SA (acres)	9.82	6.83	10.58

Plan: EXISTING Creek Tributary RS: 2341.34 Profile: 100 YR

E.G. Elev (ft)	168.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	168.50	Reach Len. (ft)	845.62	845.62	845.62
Crit W.S. (ft)		Flow Area (sq ft)	218.77	213.16	99.17
E.G. Slope (ft/ft)	0.000195	Area (sq ft)	218.77	213.16	99.17
Q Total (cfs)	378.00	Flow (cfs)	126.12	201.55	50.32
Top Width (ft)	579.39	Top Width (ft)	287.87	133.52	158.00
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.58	0.95	0.51
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)	0.76	1.60	0.63
Conv. Total (cfs)	27044.1	Conv. (cfs)	9023.4	14420.2	3600.5
Length Wtd. (ft)	845.62	Wetted Per. (ft)	287.88	133.55	158.00
Min Ch El (ft)	166.20	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.23	Stream Power (lb/ft s)	0.01	0.02	0.00
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	2.93	6.46	1.38
C & E Loss (ft)	0.00	Cum SA (acres)	4.16	4.23	3.06

Plan: EXISTING Creek Tributary RS: 1495.72 Profile: 100 YR

E.G. Elev (ft)	168.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	168.24	Reach Len. (ft)	495.72	495.72	495.72
Crit W.S. (ft)		Flow Area (sq ft)	52.70	227.86	26.65
E.G. Slope (ft/ft)	0.000441	Area (sq ft)	52.70	227.86	26.65
Q Total (cfs)	378.00	Flow (cfs)	38.80	327.05	12.15
Top Width (ft)	320.67	Top Width (ft)	88.43	140.42	91.82
Vel Total (ft/s)	1.23	Avg. Vel. (ft/s)	0.74	1.44	0.46
Max Chl Dpth (ft)	2.31	Hydr. Depth (ft)	0.60	1.62	0.29
Conv. Total (cfs)	18009.4	Conv. (cfs)	1848.7	15582.0	578.7
Length Wtd. (ft)	495.72	Wetted Per. (ft)	88.44	140.46	91.82
Min Ch El (ft)	165.93	Shear (lb/sq ft)	0.02	0.04	0.01
Alpha	1.22	Stream Power (lb/ft s)	0.01	0.06	0.00
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	0.30	2.18	0.16
C & E Loss (ft)	0.01	Cum SA (acres)	0.50	1.57	0.64

Plan: EXISTING Creek Tributary RS: 1000 Profile: 100 YR

E.G. Elev (ft)	167.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.030	0.030
W.S. Elev (ft)	167.77	Reach Len. (ft)			
Crit W.S. (ft)	167.01	Flow Area (sq ft)		155.60	1.15
E.G. Slope (ft/ft)	0.002002	Area (sq ft)		155.60	1.15
Q Total (cfs)	378.00	Flow (cfs)		377.62	0.38
Top Width (ft)	156.03	Top Width (ft)		135.69	20.34
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)		2.43	0.33
Max Chl Dpth (ft)	2.58	Hydr. Depth (ft)		1.15	0.06
Conv. Total (cfs)	8447.5	Conv. (cfs)		8439.1	8.4
Length Wtd. (ft)		Wetted Per. (ft)		135.79	20.35
Min Ch El (ft)	165.19	Shear (lb/sq ft)		0.14	0.01
Alpha	1.01	Stream Power (lb/ft s)		0.35	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

HEC-RAS Plan: EXISTING River: Creek Reach: Tributary Profile: 100 YR

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Tributary	1000	100 YR	378.00	165.19	167.77	167.01	167.86	0.002002	2.43	156.75	156.03	0.40
Tributary	1495.72	100 YR	378.00	165.93	168.24		168.27	0.000441	1.44	307.21	320.67	0.20
Tributary	2341.34	100 YR	378.00	166.20	168.50		168.51	0.000195	0.95	531.10	579.39	0.13
Tributary	3029.14	100 YR	347.00	166.38	168.57		168.57	0.000045	0.44	1125.54	1420.43	0.06