PRELIMINARY DRAINAGE STUDY

FOR

Warner Ranch
(Tract No. 5508 rpl4)

Prepared By:

SHAPOURI & ASSOCIATES

PROJECT MANAGEMENT SERVICES

ENGINEERING • ARCHITECTURE • PLANNING

18029 Calle Ambiente, Suite 502, P.O. Box 676221, Rancho Santa Fe, California 92067
PHONE: (858) 756-8340 FAX: (858) 756-8344

M.H. Shapouri
RCE No. C52794
Expires 12/31/2014

February 28, 2013
July 23, 2013

PRELIMINARY DRAINAGE STUDY

FOR

Warner Ranch
(Tract No. 5508 rpl4)

Prepared By:

SHAPOURI & ASSOCIATES

PROJECT MANAGEMENT SERVICES

ENGINEERING • ARCHITECTURE • PLANNING

18029 Calle Ambiente, Suite 502, P.O. Box 676221, Rancho Santa Fe, California 92067
PHONE: (858) 756-8340 FAX: (858) 756-8344

M.H. Shapouri
RCE No. C52794
Expires 12/31/2014

February 28, 2013
July 23, 2013

Table of Contents

List of Text

TITLE	PAGE
Project Description	3
Methodology	5
Pre-Development Conditions	11
Post-Development Conditions	12
Post-Development Runoff Analysis	13
Conclusion	15
Declaration of Responsible Charge	17
Miscellaneous Design Charts	18
San Diego County Isopluvial Maps	22

List of Figures

TITLE	PAGE
Figure 1: Vicinity Map	10
Figures: Pre Hydrology Maps	11" x 17" Map (Attached)
*Gomez Creek Watershed Geographic Location & Physical Characteristics.	
*Gomez Creek Watershed Hydrologic Soils Groups.	
*Gomez Creek Watershed Hydrologic Ground Covers.	
Figures: Post Hydrology Maps	11" x 17" Map (Attached)
*Gomez Creek Watershed Geographic Location & Physical Characteristics.	
*Gomez Creek Watershed Hydrologic Soils Groups.	
*Gomez Creek Watershed Hydrologic Ground Covers.	
Figures: Post Hydrology Maps (3 Sheets)	36" x 45" Map (Attached)
Pre Hydrology Map (1 Sheet)	36" x 45" Map (Attached)

List of Attachments

TITLE	PAGE
100 yr. Pre Hydrology Study	Attached
100 yr. Post Hydrology Study	Attached
Table A: Comparison of Pre & Post Development Conditions	Attached
100 yr. Bio-retention Pond Calculations	Attached
Gomez Creek 100 yr. Hec-Ras Analysis.	Attached
Basin 103 100 yr. Hec-Ras Analysis	Attached

Shapouri & Associates
18029 Calle Ambiente, Suite 502
Rancho Santa Fe, California 92067

Project Description

This Drainage Study has been prepared pursuant to the San Diego County Grading Ordinance, Grading Plan Manual, Drainage Design Manual and all other applicable County, State and Federal Regulations. This study will discuss the existing, pre-development hydrologic conditions as well as examine the post-development hydrology as proposed on the Warner Ranch Preliminary Grading Plan Site Grading (Tract No. 5508 rpl4).

The proposed Warner Ranch Project is located in the unincorporated area in the northwestern portion of San Diego County, approximately five miles east of Interstate 15 on Pala Road (State Route (SR) 76). It is just west of Pala Temecula Road in the Pala Pauma Subregional Planning Area. It includes Assessor's Parcel Numbers (APNs) 110-021-09 and10; 110-090-01, -17, -18; 110-021-32; and 110-040-22.

The Project is intended to provide a range of workforce housing opportunities consistent with the Job/Housing Balance goals and policies of the San Diego County General Plan. The recently adopted General Plan and associated Pala/Pauma Community Plan provides for the implementation of this project by designating this 513.49-acre property as a Special Study Area (SSA). The SSA requires a focused land use planning analysis "to determine the most compatible and consistent land uses for the property". The designation has required additional planning studies intended to address the unique character of the site and surrounding area as well as address property constraints to allow for the creation of a "cohesive and comprehensive land use plan", the Warner Ranch Project proposes a General Plan Amendment, Specific Plan, Rezone Administrative Permit (for gated access) and Vesting Tentative Map to develop 513.49 acres with 780 residential units and associated public and private facilities and services. The following is a summary of the proposed project:

- The project area consists of 780 residential units (534 single family detached, with a minimum lot size of 3,000 sq ft and 246 multi-family and attached townhomes)

Shapouri & Associates
18029 Calle Ambiente, Suite 502
Rancho Santa Fe, California 92067

- 7.7 acres of private community parks, including a clubhouse
- 14.54 acres of landscaped areas
- 4.23 acres active public recreational park
- 359.05 acres of preserved open space
- A 10,000 sq ft fire on-site fire station

The project area would be accessed by a central entry road at its current intersection with SR 76, where a signalized intersection is required. The project would also make frontage improvements to the existing 120-foot wide Pala Road/SR 76 easement. These Improvements include widening of the existing 24-foot wide pavement to 52 feet, two 12-foot wide drive lanes, a 12-foot wide painted center median, and 8-foot wide shoulders that also include a painted bike lane in each direction. Additionally, a 350-foot long and 12-foot wide acceleration/deceleration lane is proposed adjacent to the project's main entry.

Earthwork quantities for on-site development are anticipated to consist of 2.3 million cubic yards of cut and 2.3 million cubic yards of fill material. The proposed grading will be balanced with no import or export of materials. .

The project would be implemented in phases major facilities such as the proposed fire station, water storage reservoir, forced sewer line, frontage improvements, drainage improvements, and Public Park, are intended to be constructed as a part of the initial phases of the project.

This Preliminary Drainage Study analyzes the pre and post-development hydrology per the latest project specifications and scope of work. The adequacy of the proposed drainage system will be determined in regards to the 100 year storm event.

Shapouri & Associates
18029 Calle Ambiente, Suite 502
Rancho Santa Fe, California 92067

Methodology

This study has been prepared consistent with all current County of San Diego's ordinances and procedures. All components of the study are designed to convey storm water based on a 100 year flood event. The anticipated storm runoff has been calculated based on the County of San Diego Rational Method for Computing Water Runoff of Small Watersheds.

The following references have been used in preparation of this report:

- *County of San Diego Hydrology Manual, June 2003.*
- *San Diego County Grading, Clearing and Watercourses Ordinance, dated April 23, 2004*
- San Diego County Drainage Design Manual, dated July 2005.
- San Diego County Hydrology Manual for NRCS (National Resources Conservation Service) Hydrologic Method calculations.
- Water Control Plan for the San Diego Basin (9) from the California Regional Water Quality Control Board San Diego Region, September 1994, (with amendments effective on April 25, 2007).
- *San Diego County Rational Hydrology Program – CIVILCADD/CIVILDESIGN Engineering Software, Version 7.5*
- *The San Diego Unit Hydrograph (SDUH) Peak Discharge Program.*
- *US Army Corps of Engineers, HEC-RAS Program, Version 4.0.0*
- *San Diego County Topographic Survey maps, photographs taken 1960 and 1985*
- *County of San Diego Hydrology Manual, Soils Hydrologic Group Map, 2007.*

Shapouri & Associates
18029 Calle Ambiente, Suite 502
Rancho Santa Fe, California 92067

Civil Design Hydrology Program

The Civil Design Hydrology Program is a computer-aided design program in which the user develops a node-link model of the watershed. The program has the capability of estimating culvert sizes and using culverts or open channels to convey designed storm discharges. Developing independent node-link models of each interior watershed and linking these sub models together at confluence points create the node-link model.

Rational Method

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures.

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (Tc), which is the time required for water to flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

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

Q = peak discharge, in cubic feet per second (cfs)
C = runoff coefficient, proportion of rainfall running off surface (no units)
I = average rainfall intensity for duration equal to the Tc for the area, in inches per hour
A = drainage area contributing to the design location, in acres

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

Runoff coefficients (C) based on land use and soil types were obtained from the San Diego County Hydrology Manual, Table 3-1. Soil types were determined from the Hydrology Soils Map provided in Appendix A as well as the US Department of Agriculture (USDA) Soil Survey program. This runoff coefficient was then multiplied by the percentage of total area (A) included in that class.

The rainfall intensity (I) can be determined from the County of San Diego Intensity-Duration Design Chart. The 6-hour storm rainfall amount (P6) and 24-hour storm rainfall amount (P24), were determined from the isopluvial maps provided in Appendix B. Intensity can also be calculated using the following equation:

$$\mathbf{I = 7.44\ (P_6)\ (D^{-.645})}$$

I = Intensity (inches/hour)

P_6 = 6 Hour Precipitation (inches)

D = Duration in minutes (use Tc)

The Time of Concentration (Tc) is the time required for runoff to flow from the most remote part of the drainage area to the point of interest. The Tc is composed of two components: initial time of concentration (Ti) and travel time (Tt). The Ti is the time required for runoff to travel across the surface of the most remote subarea in the study, or "initial subarea." The Tt is the time required for the runoff to flow in a watercourse or series of watercourses from the initial subarea to the point of interest. For the RM, the Tc at any point within the drainage area is given by:

$$Tc = Ti + Tt$$

Shapouri & Associates
18029 Calle Ambiente, Suite 502
Rancho Santa Fe, California 92067

The San Diego Unit Hydrograph (SDUH) Peak Discharge Program

The SDUH Peak Discharge Program may be used only for determination of peak flow rate, and may not be used for detention basin design or other routing purposes for which a hydrograph is required.

NRCS METHOD

The NRCS hydrologic method should be used for study areas approximately 1 square mile and greater in size. The NRCS hydrologic method may be used for the entire study area, or the RM or MRM may be used for approximately 1 square mile of the study area and then transitioned to the NRCS hydrologic method.

The Soil Conservation Service (SCS) (now called the Natural Resources Conservation Service [NRCS]) hydrologic method (NRCS hydrologic method) requires basic data similar to the RM: drainage area, a "runoff curve number" (CN) describing the proportion of rainfall that runs off, time to peak (T_P), the elapsed time from the beginning of unit effective rainfall to the peak flow for the point of concentration, and total rainfall (P).

The NRCS method includes the following basic steps:

1. Delineation of the watershed on a map and determination of watershed physical characteristics including location of centroid, total length and length to centroid, soil type, and land use/land treatment.
2. Determination of time to peak, the elapsed time from the beginning of unit effective rainfall to the peak flow for the point of concentration, and/or lag time, the elapsed time from

the beginning of unit effective rainfall to the instant that the summation hydrograph for the point of concentration reaches 50% of ultimate discharge. Corps lag is an empirical expression of the physical characteristics of a drainage area in terms of time. Corps lag can be expressed by the empirical formula:

Corps Tl (hours) = 24 n ((L x Lc) / s0.5) m (Eq. 4-17)

Where: L = length to longest watercourse (miles)
Lc = length along longest watercourse, measured upstream to a point opposite the watershed centroid (miles)
s = overall slope of drainage area between the headwaters and the collection point (feet per mile)
m = a constant determined by regional flood reconstitution studies (0.38 for San Diego County)
n = the average of the Manning's n values of the watercourse and its tributaries (see Section 4.3.5)

3. Determination of frequency of design storm, and determination of total rainfall amount for the design storm and precipitation zone number (PZN) for the watershed location,
4. Preparation of incremental rainfall distribution,
5. Adjustment of incremental rainfall depths based on watershed area,
6. Determination of composite curve number (CN) for the watershed, which will represent different combinations of land use and soil type within the drainage area and describe the proportion of rainfall that runs off,
6. Adjustment of CN based on the PZN Condition,
7. Determination of excess rainfall amounts using the PZN adjusted composite CN for the watershed and the depth-area adjusted incremental rainfall distribution,
8. Using the dimensionless unit hydrograph approach, development of the hydrograph of direct runoff from the drainage area.

Shapouri & Associates
18029 Calle Ambiente, Suite 502
Rancho Santa Fe, California 92067

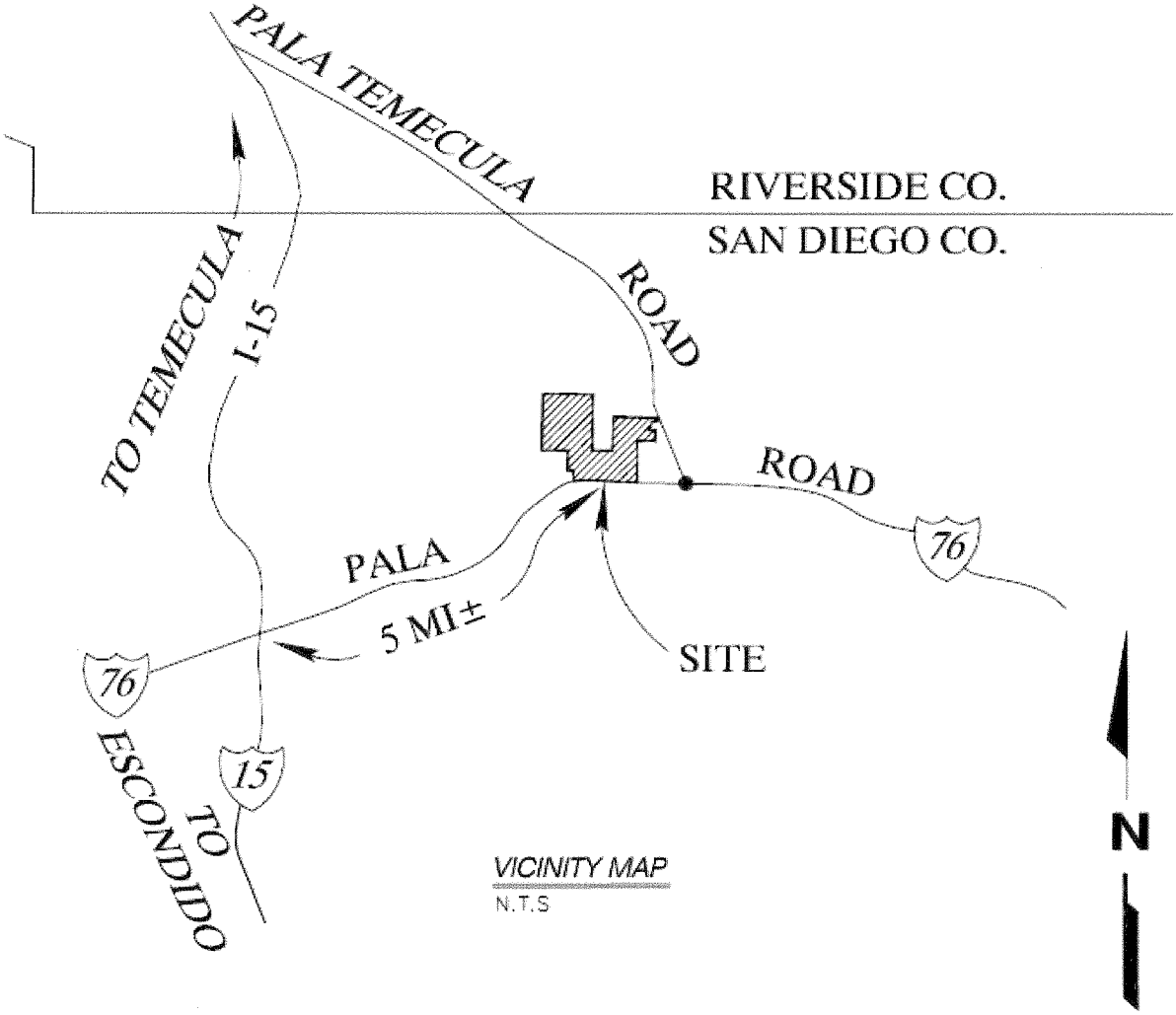


Figure 1 - Vicinity map

Shapouri & Associates
18029 Calle Ambiente, Suite 502
Rancho Santa Fe, California 92067

Pre-Development Conditions

The Project site is located in the northern portion of San Diego County. The location is approximately five miles east of northbound Interstate 15, approximately 40 miles north of the City of San Diego, in the northwest corner of the intersection of Pala Road (State Route 76) and Pala Temecula Road. The Pala Band of Mission Indians Reservation lies north, south and east of Specific Plan Area (SPA), with the Pala Casino Resort and Spa located directly southeast. Mostly agricultural areas are located along the Northern and Southern boundary of the site. Westerly of the site there is a San Diego gas & Electric power generation complex and existing agricultural industries. In addition there is a substantial acreage on the southwesterly portion of the site that is in process as a potential regional landfill site, i.e., Gregory Canyon Landfill. The project site consists of approximately 513 acres situated between two small bodies of intermittently flowing water on both sides. Gomez Creek runs through the western portion of the Project, and Pala Creek traverses through the eastern side.

The Site is characterized by diverse topography with elevation ranging 350 feet to 1,000 feet above mean sea level; the entire Gomez Creek (Design Point 1) basin study reaches a high elevation of 1,950'. The northern portion of the site within Gomez Creek drainage basin is generally depicted as moderate to steep slopes. The area contains a variety of vegetation types, including Chaparral and Coastal Sage Scrub. The Southern portion of the site is relatively flat and presently contains orchards, as well as a network of unimproved roads for the Gomez Creek basin area.

The total drainage study area for the Gomez creek basin is approximately ± 6.4 square miles, flowing southerly along the western side of the proposed project and eventually converges with the San Luis Rey River further south after crossing the existing Gomez Creek Bridge, serving the State Route 76, Pala Road. The drainage basin is mostly within soil group "C" and "D", there is a small percentage of soil groups "A" and "B" on the Southern part of the property on the proposed development site.

Shapouri & Associates
18029 Calle Ambiente, Suite 502
Rancho Santa Fe, California 92067

Post-Development Conditions

As specified in the project description the project site is approximately 513 acres in size from which 359 acres are being designated as preserved open space, another large portion is designated as landscape areas and parks. Post development conditions also propose storm drain systems that route through open swales and infiltration/detention basins to clean and contain hydrological flow during storm events. The post-hydrological area consists of one watershed; Gomez Creek Basin designated as: Design Point 1

The Gomez Creek basin was broken down into appropriate sub-basins, labeled 1 thru 113.

The project site within Gomez Creek sub-basins, will be graded for 780 residential units (534 single family detached, and 246 multi-family and attached town homes), including private community parks, landscaped areas, preserved open space, on-site fire station and a public recreational park, as Illustrated on the Post-development hydrology map. Various BMP areas are proposed within this Watershed, after which, all drainage flows are conveyed to the same design point (1). Bioretention/detention facilities areas intended to clean and contain hydrological flows during storm events and are labeled 1 thru 8, vegetated swale areas are labeled 1 thru 3.

Post-Development Runoff Analysis

The project has been designed so all surface runoff within the project site will follow the existing natural landforms, utilize natural drainage structures, and retain the existing flow path. All drainage facilities have been designed using the 100-year flood event. The Runoff coefficient (C) based on Post development conditions (0.30 - 0.90) for this project was derived from a specific coefficient set for different soils group, land use designation and the ultimate improvement of the site. These calculations have been made with aid from the appendices provided in the San Diego County Hydrology Manual. The Soils Group Coefficient (A/B, C/D), according to Table 3-1 of the County of San Diego's Hydrology Manual, has been set between 0.30 and 0.90 and is based on the existing and proposed density land use found within soil groups "(A, B, C, D)". The Intensity (I) has been computed by using the formula on Figure 3-2 and is represented by the following:

$$I := 7.44(P6)(D)^{-.645}$$

For sub-basin areas smaller than 1 square mile the Time of Concentration (Tc) is calculated for two cases: 1) Existing Conditions (Natural Undisturbed Watersheds) and 2) Urban Conditions (The Developed Project). The first, for existing (pre-development) condition is calculated using the formula in Figure 3-1 of the County of San Diego Hydrology Manual as follows:

$$Tc := \left[\frac{11.9(L)^3}{H}\right]^{.385}$$ where:

L = Length of watershed basin

H = Difference in elevation along effective slope line

The urban condition is calculated using the formula in Section 3.1.4 of the County of San Diego Hydrology Manual. In the developed condition, Time of Concentration is computed from the sum of Inlet Time (Ti) and Travel Time (Tt)

Tc = Ti + Tt

From Figure 3-3 (Urban Areas Overland Time of Flow Nomograph formula from the San Diego County Hydrology Manual.)

$$T := \frac{1.8(1.1 - C)\,D^{.5}}{\sqrt[3]{S}}$$

T = Overland Flow Time (Ti)
C = Runoff Coefficient (C)
D = Watercourse Distance or Length of Flow (L) as in the other formulas here presented.
S = Effective Slope (S)

This formula gives the Initial Time of Concentration (Ti) which together with the Travel Time (Tt) will yield the Duration (D). In other words, Duration and Time of Concentration (Tc) are the same. The (D) factor and the Adjusted (P6) are constants of the Intensity formula on Figure 3-2 of the County of San Diego Hydrology Manual.

This produces the Intensity (I) constant of the formula Q = C I A. The last factor in distinguishing the drainage basin flow is the Area (A) or acreage of the drainage basin.

For sub-basin areas larger than 1 square the NRCS hydrologic method was used, refer to NRCS methodology describe above.

Conclusion

As designed, the development will not alter the natural drainage path or divert any drainage from the existing natural conditions or drainage boundaries. This CEQA Drainage Study has analyzed the hydrological flow and calculations for the proposed improvements and Preliminary Grading Plans (Tract No. 5508rpl4). All drainage facilities are designed using the peak discharge of a 100-year storm event. The runoff coefficient for the project is based on soil groups "A/B, C/D" and the Medium-Density Residential land use designation. This Drainage Study contains 1 Design Point, located at the Existing Gomez Creek Bridge crossing at State Route 76, Pala Road, and labeled as: "Design Point 1". The following discussion is a summary of the Drainage patterns for Design Point 1, as shown on the "Post Hydrology Maps" for Preliminary Grading Plan (Tract No. 5508rpl4) (dated 02/28/2013):

Design Point 1 consists of two drainage basins; Gomez Creek and the Project Development Basin, which have an overall drainage flow of 5,402 cubic feet per second (cfs). (Please refer to Post development study report and Post Hydrology Map attached) Gomez Creek basin, consists of Nodes 113.1 to 113.2, this basin contributes a majority of the drainage flow of approximately 5,066 cfs at the peak of the 100-year storm event. The second basin is the project development area, which contributes approximately, 375 cfs of the total flow, however, when combined with the Gomez Creek basin the flow is approximately 5,402 cfs. The second basin covers the majority of the project development area as well as the undeveloped lands situated to the north and northeast of the project at an elevation of 1,621 feet (Node 103.1). The drainage of this undisturbed area continue it's route through the project's storm drain system and converge into Dry-Detention Ponds 1 and 4, Bio-Retention Ponds 6 and ends at "Swale No.1" located at the south-west of the project boundary, Node 110. Drainage flows from Dry-Detention Pond No. 2 next to Public Park located at the southeast corner of the project boundary, Bio-Retention Ponds 3 and 8 all converge into Swale No. 2, which is located at southeast of the project boundary along SR76 and flows directly to Swale No. 1. Drainage flows from Bio-Retention No. 7 coincide with Swale No.1 as well. Drainage flows from Dry-Detention Pond No. 5 located at the

west corner converges into Swale No.3 and confluence with water from Swale No.1. Swale No.3 it's located near to the Gomez Creek Bridge.

As shown on the Preliminary Grading Plans and Post-Development hydrology map, the private drainage system is proposed to consist of:

- Five (5) Bio-Retention Ponds
- Four (4) Dry-Detention Ponds
- Four (4) Swales
- Drainage System that consist of majority of 24"RCP along with 30", 36", 42" 48" 54", and 66" RCP'S (Please refer to Post Hydrology Map for Pipe Sizing)
- One (1) 20' wide Box culvert, 2' height with 4 spans, each 5' wide, per San Diego Regional Standard Drawing D-77D.

The proposed drainage facilities have been designed to adequately convey the 100-year flood conditions, and are sufficient to protect the proposed site development as shown on the attached "Post Hydrology Map".

Overall, the project results in a minor decrease of drainage flow (See attached Comparison Pre & Post Table A) from pre-development conditions and thus will not contribute to the existing water stream under Gomez Creek Bridge crossing (Design Point 1). All proposed grading and associated drainage/stormwater management for the project has been designed to comply with all County Regulations, including the San Diego County Watershed Protection and Stormwater Management and Discharge Control Ordinance.

Declaration of Responsible Charge

I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with the current standards.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

Name: M.H. Shapouri

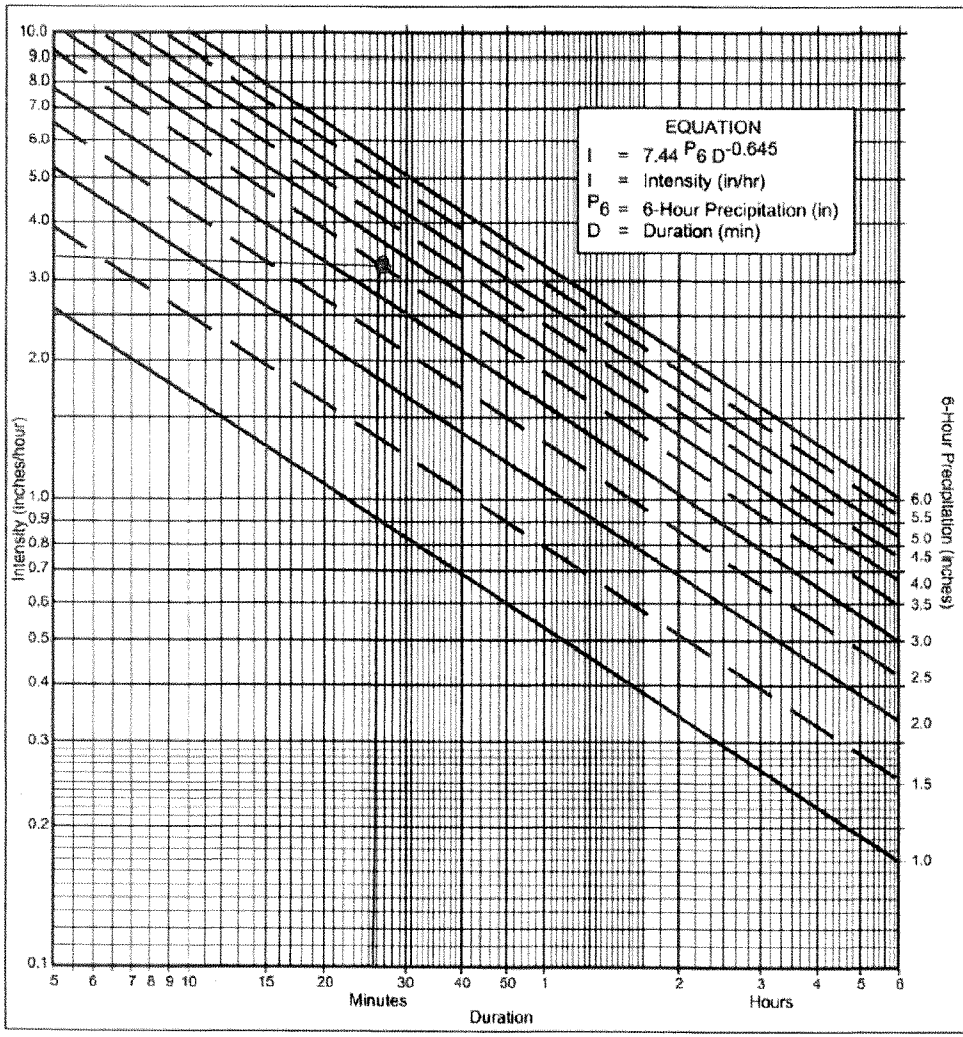
Address: 18029 Calle Ambiente Suite 502, Rancho Santa Fe, CA 92067

Telephone No: (858) 756-8340

REGISTERED PROFESSIONAL ENGINEER
M.H. SHAPOURI
C 52794
EXP. 12/31/2014
CIVIL
STATE OF CALIFORNIA

By: _____ Date: July 23, 2013
M.H. Shapouri

R.C.E. No: C52794 Expires: 12/31/2014



Directions for Application:

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

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

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

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

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

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.5 in., P_{24} = 6.0 $\frac{P_6}{P_{24}}$ = 58.3 %(2)

(c) Adjusted P_6(2) = 3.5 in.

(d) t_x = 25 min.

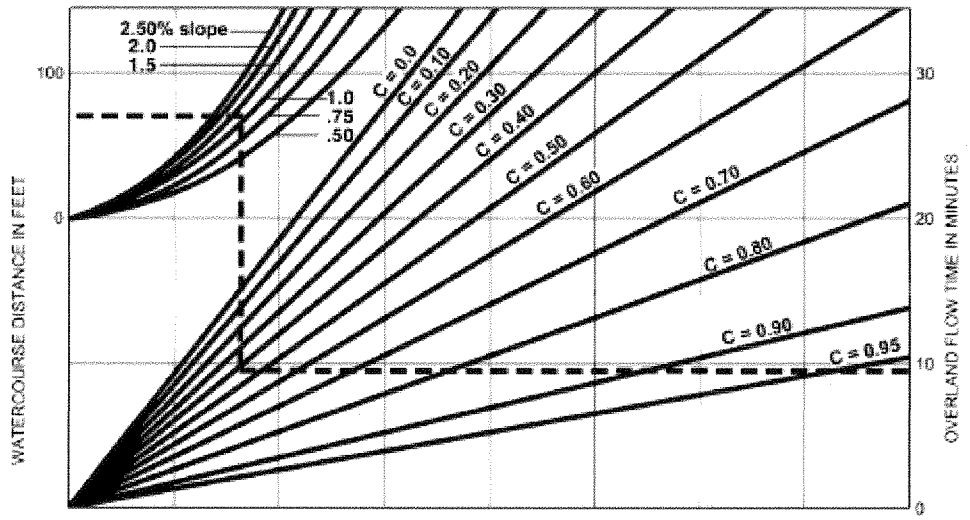
(e) I = 3.2 in./hr.

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

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

Intensity-Duration Design Chart - Template

FIGURE
3-1



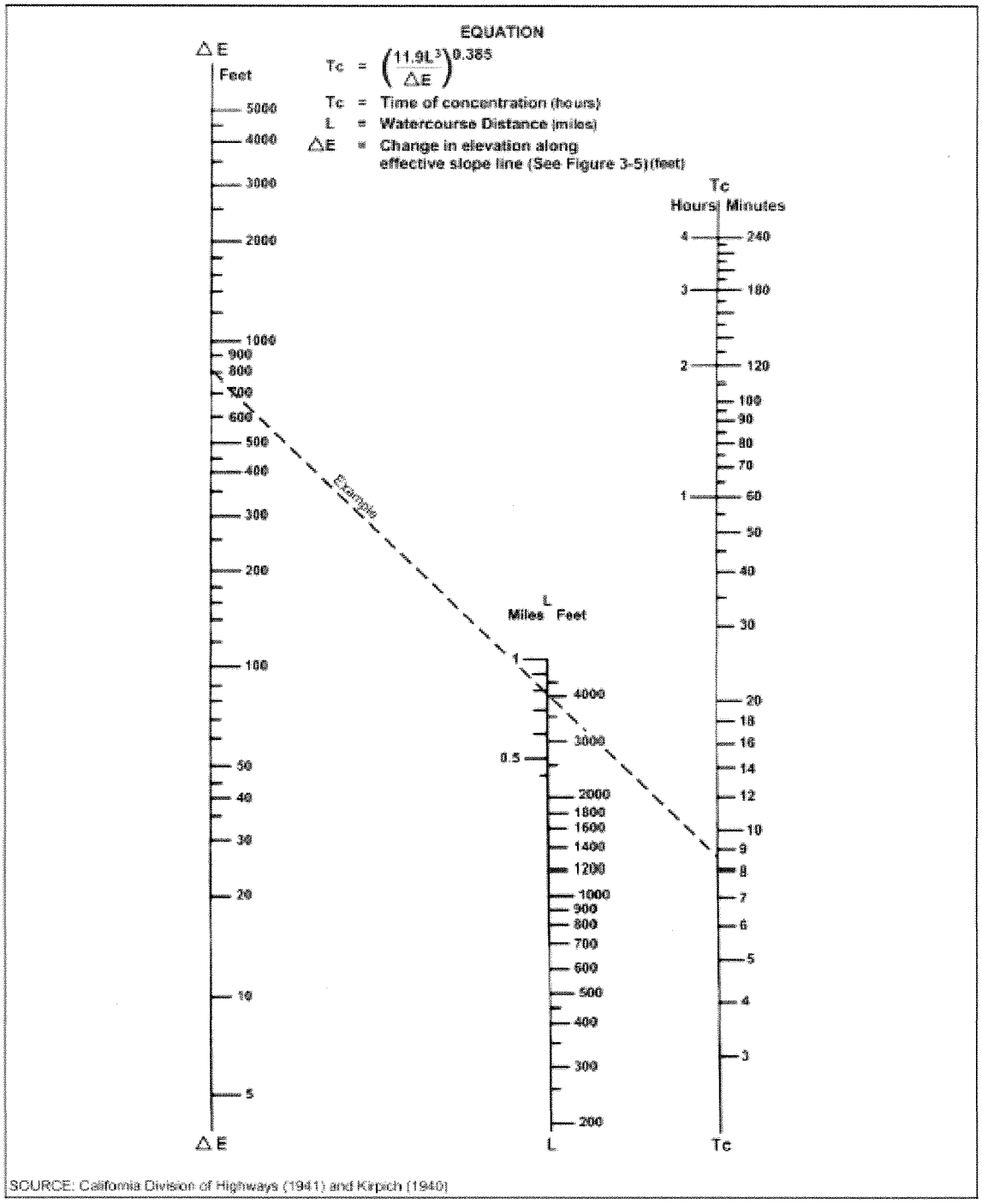
EXAMPLE:
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

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

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

Rational Formula - Overland Time of Flow Nomograph

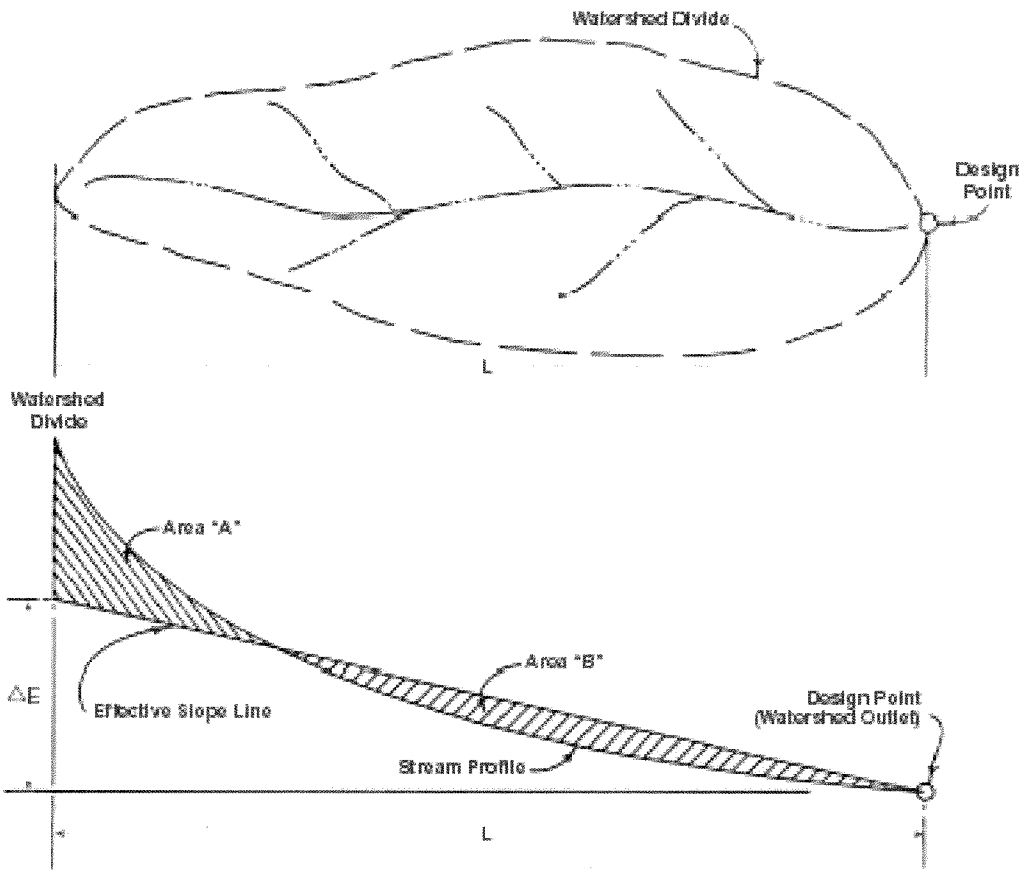
FIGURE
3-3



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

FIGURE 3-4

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



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

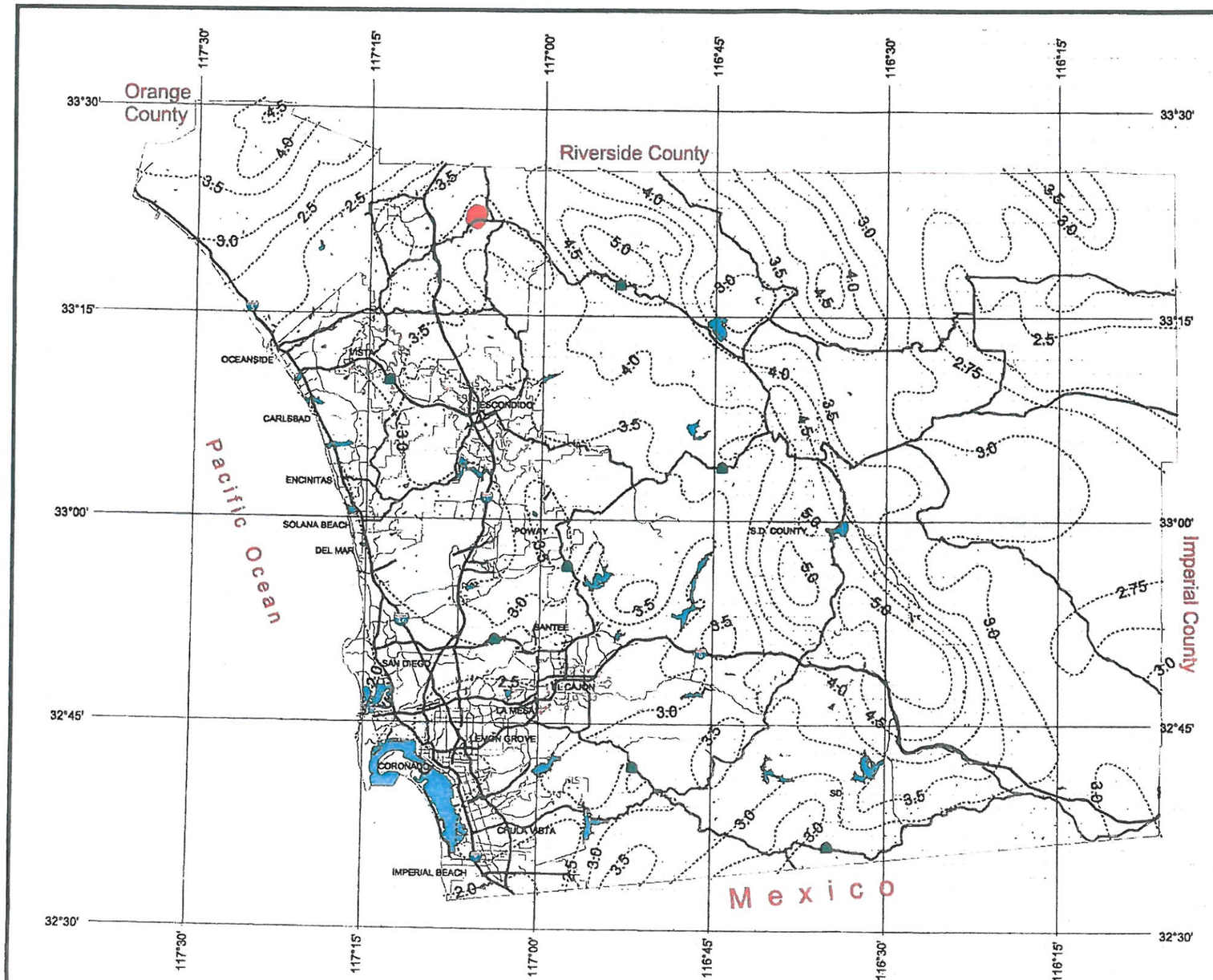
FIGURE

Computation of Effective Slope for Natural Watersheds

3-5

Rainfall Isopluvial Maps

100 Year Rainfall Event



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

PROJECT LOCATION
LONG: 33° 21' 60"
LAT: 117° 5' 36"

DPW GIS

SanGIS
We Have San Diego Covered!

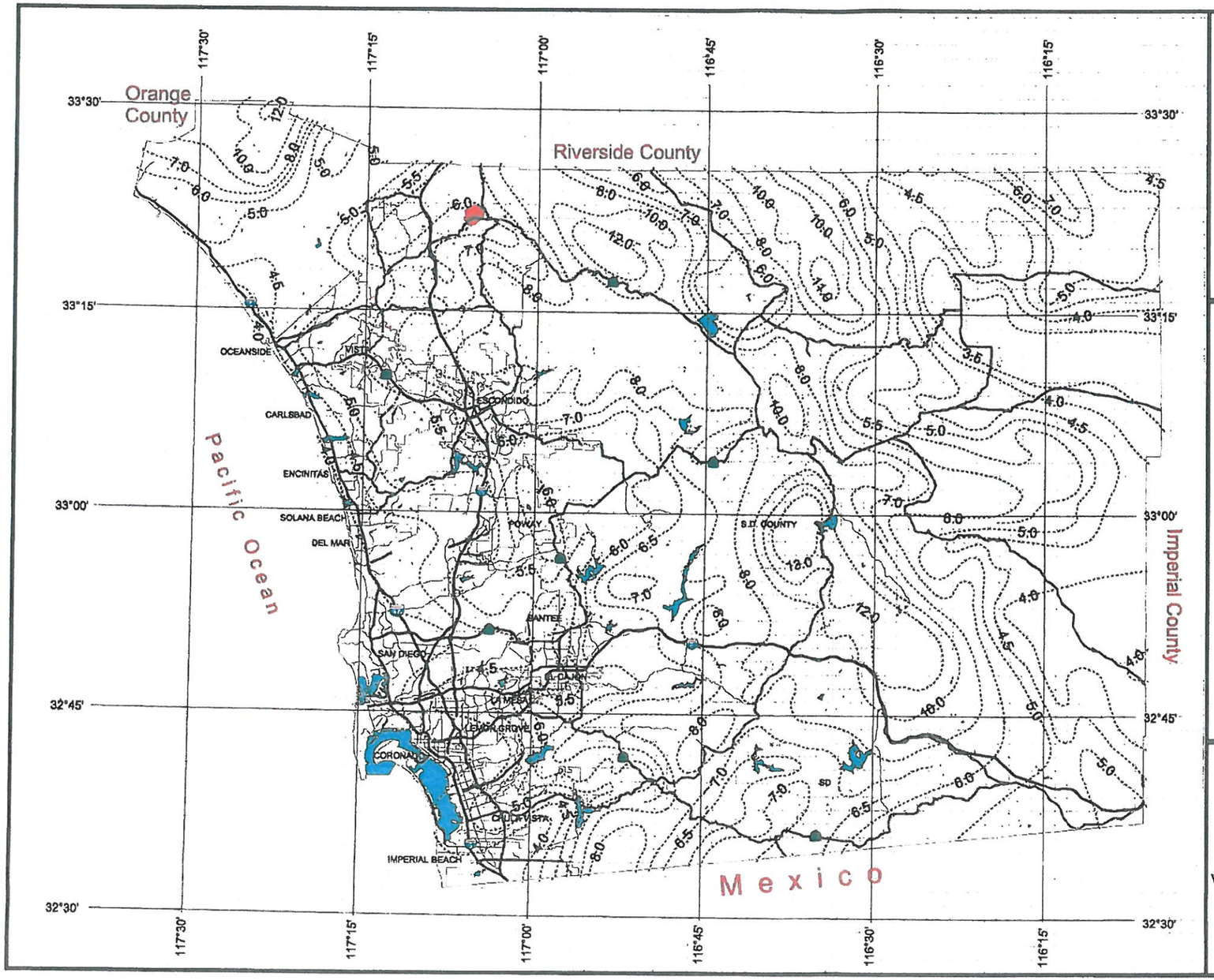
THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

PROJECT LOCATION
LONG: 33° 21' 60"
LAT: 117° 5' 36"

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps

N W E S

3 0 3 Miles

Pre Development Hydrology
Calculations Design Point 1

Pre Development Condition Hydrology Calculations

Design Point 1

100-year Pre Development Conditions

WARNER RANCH-GOMEZ CREEK BASIN 1

100-YEAR STORM EVENT

PRE DEVELOPMENT HYDROLOGY

NRCS HYDROLOGIC METHOD

WORKSHEET 4-2 WARNER RANCH (name of project) **Curve Number Worksheet**

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN_2:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field inspection)	SOIL GROUP	CN_2 From Hydrology Manual, Table 4-2	FRACTION OF AREA A_i/A	PARTIAL CN_2 $CN_2 \times A_i/A$
BC - BROADLEAF CHAPARRAL	GOOD	A	31	0.68	0.21
		B	57	3.61	2.06
BC - BROADLEAF CHAPARRAL	GOOD	C	71	32.49	23.07
		D	78	40.46	31.56
FS - FARMSTEADS	GOOD	A	59	0.37	0.22
		B	74	0.76	0.56
FS - FARMSTEADS	GOOD	C	82	0.26	0.21
		D	86	1.67	1.44
ME - MEADOW	GOOD	A	36	0.01	0.00
		B	58	0.36	0.21
ME - MEADOW	GOOD	C	72	0.33	0.24
		D	78	0.62	0.48
VY - VINEYARDS	GOOD	A	38	0.31	0.12
		B	61	0.81	0.49
		C	74	3.87	2.87
		D	80	9.25	7.40
WO - WOODLAND	GOOD	A	28	0.06	0.02
		B	55	0.06	0.03
WO - WOODLAND	GOOD	C	70	0.93	0.65
		D	77	3.09	2.38
			Sums =	1.000	74.21

For entire basin CN_2 = 74

WORKSHEET 4-3 WARNER RANCH (name of project) **Peak Discharge Computation**

*****For use with NRCS Hydrologic Method Computations*****

Items in boxes are required input parameters for the SDUH Peak Discharge Program.

Computed by: SHAPOURI & ASSOCIATES Date: 11-14-2011

Project Identification (Drainage Area Name): GOMEZ CREEK BASIN 1

Geographic location of center of drainage area: Long: 33° 21' 60" Lat: 117° 5' 36"

Drainage Area: 6.43 – square miles

Storm Frequency (Section 2.3): 100 – year

6-Hour Storm Duration Precipitation (Appendix B): 3.5 – inches

24-Hour Storm Duration Precipitation (Appendix B): 6 – inches

Precipitation Zone Number (PZN): (Section 4.1.2.4 and Appendix C) PZN = 1.0 ____ 2.0 1.95 3.0 ____ 4.0

PZN Ajustment Factor for 5-year to 35-year storm frequency (interpolate): (Section 4.1.2.4 and Table 4-6) 1.5 ____ 2.5 ____ 2.0 ____ 1.5

PZN Ajustment Factor for 35-year to 150-year storm frequency (interpolate): (Section 4.1.2.4 and Table 4-6) 2.0 ____ 3.0 2.95 3.0 ____ 2.0

PZN Adjusted Runoff Curve Number (interpolate between nearest whole number PZN conditions): (Sections 4.1.2.4 and 4.2.4, Tables 4-6 and 4-10) $CN_{1.0 \text{ or } 2.0}$ 74 CN_X 78 $CN_{2.0 \text{ or } 3.0}$ 88

Watershed Length (L) (Section 4.3.1): 5.26 – miles

Length to Centroid (L_c) (Section 4.3.1): 2.88 – miles

Slope (s) (Section 4.3.1): 305 – feet/mile

Basin $\bar{n}$ Factor (Section 4.3.5): 0.035

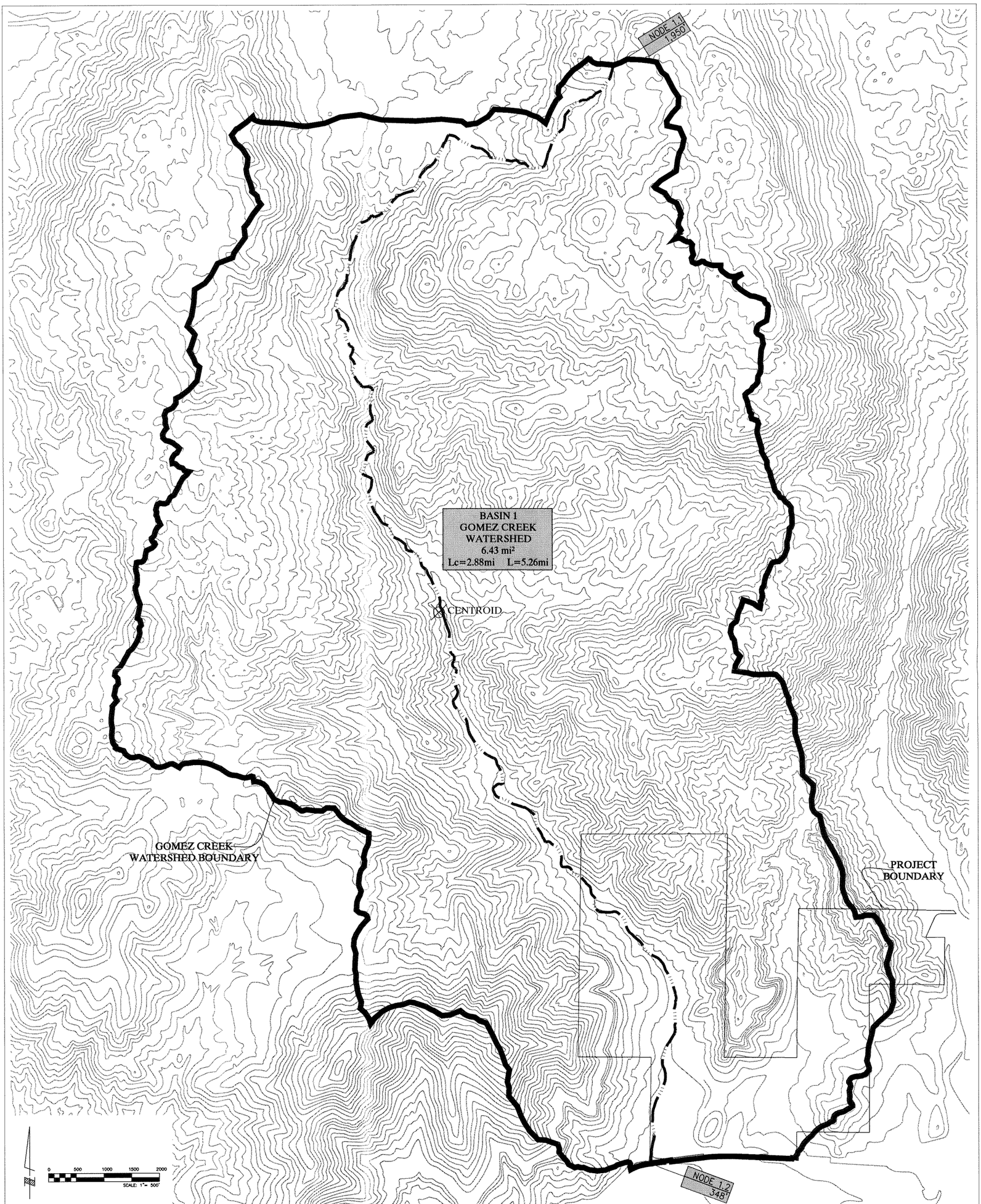
Corps lag (T_L) = 24 $\bar{n}$ $((L \times L_c)/s^{0.5})^m$ (Section 4.3.1.1)
OR
Corps lag (T_L) = 0.8 T_c (Section 4.3.1.2)

Lag Time: 0.80 – hours

Time to Peak = 0.862 x Corps lag (Section 4.1.5.5):

Time to Peak : 0.69 – hours

```
*************************************************************************
*******
  * The San Diego Unit Hydrograph (SDUH) Peak Discharge Program uses the       *
  * procedures described in Section 4 of the San Diego County Hydrology        *
  * Manual for NRCS Hydrologic Method calculations.  The SDUH Peak Discharge   *
  * Program may be used only for determination of peak flow rate, and may not  *
  * be used for detention basin design or other routing purposes for which a   *
  * hydrograph is required.  To generate a hydrograph, the calculation method  *
  * described in Section 4 of the San Diego County Hydrology Manual may be     *
  * used, or a computer program that includes good documentation of the        *
  * calculations (see Section 1.7 of the San Diego County Hydrology manual).   *
  * Note: the RATHYDRO computer program is not based on the calculation method *
  * described in Section 4 of the San Diego County Hydrology Manual and may    *
  * not be used to generate a hydrograph based on the SDUH Peak Discharge      *
  * Program output.                                                            *

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

   Project Identification: WARNER RANCH, GOMEZ CREEK BASIN 1
   Storm Frequency (years) =  100
   Drainage Area (square miles) =    6.43
   6-Hour Rainfall (inches) =     3.50
   6-Hour Depth-Area Factor =    0.984
   24-Hour Rainfall (inches) =     6.00
   24-Hour Depth-Area Factor =    0.989
   Adjusted Curve Number = 78
   Unit Interval (minutes) =  5
   Watershed Lag Time (hours) =    0.800
   Peak Flow Rate (cfs) =     5,697.9
```



SOURCE: SANDAG GIS DATABASES

all ideas, designs and plans represented by this drawing are the exclusive property of shapouri and associates, and shall not be reproduced in whole or in part without the express prior written permission of said engineers, any unauthorized reuse of these plans other than for the project and location shown is prohibited.

SHEET TITLE: Pre-Development

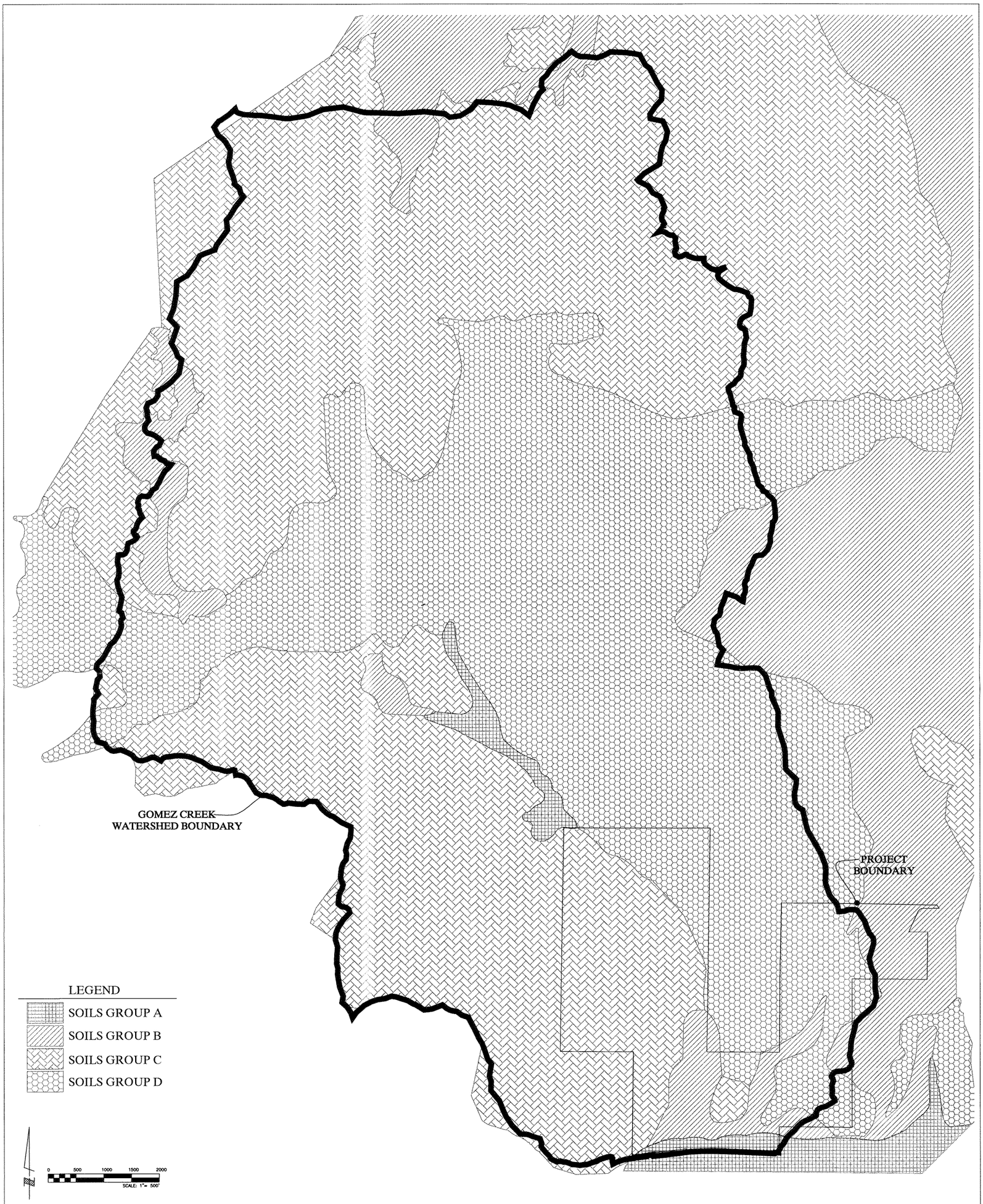
WATERSHED GEOGRAPHIC LOCATION AND PHYSICAL CHARACTERISTICS

SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING · ARCHITECTURE · PLANNING
GELO VILLAGE, 18029 CALLE AMMINTE, SUITE 502
P. O. BOX 676221, RANCHO SANTA FE, CALIF. 92067
PHONE (858)756-8340 FAX (858)756-8344

WARNER RANCH

Pre-Development Hydrology Map

JOB NO.:
DRAWN:
SUBMITTALS:
REVISIONS:



SOURCE: GIS ANALYSIS OF SAN DIEGO SOIL SURVEY

all ideas, designs and plans represented by this drawing are the exclusive property of shapouri and associates, and shall not be reproduced in whole or in part without the express prior written permission of said engineers, any unauthorized reuse of these plans other than for the project and location shown is prohibited.

SHEET TITLE: Pre-Hydrology

WATERSHED
HYDROLOGIC
SOILS GROUPS

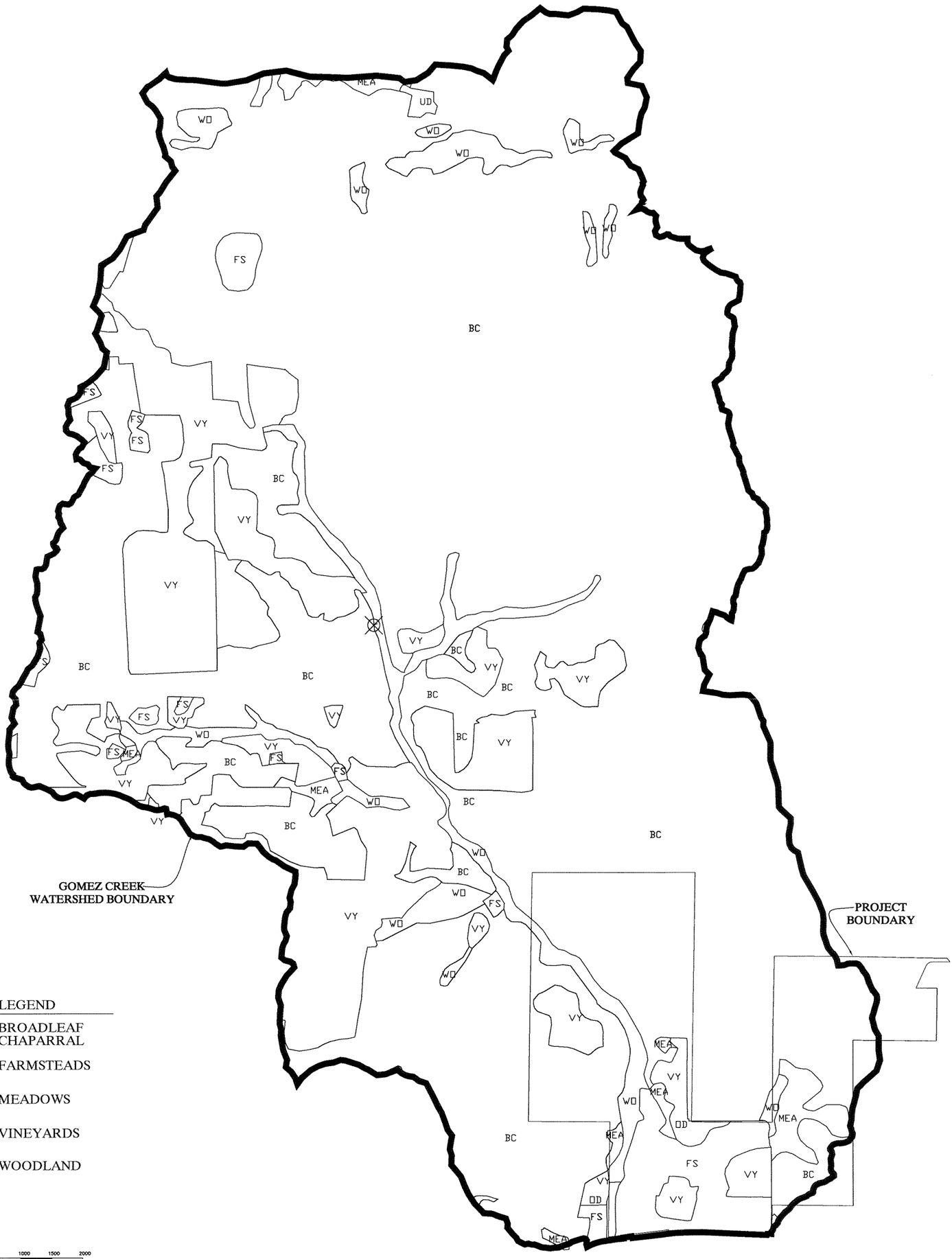
SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING • ARCHITECTURE • PLANNING
CIELO VILLAGE, 18020 CALLE AMBIENTE, SUITE 302
P. O. BOX 676221, RANCHO SANTA FE, CALIF. 92067
PHONE (858)756-8540 FAX (858)756-8544

WARNER RANCH

Pre-Development Hydrology Map

REVISIONS: A

JOB NO.: 02-WR-SUBMITTALS



SOURCE: SANDAG GIS DATABASES

all ideas, designs and plans represented by this drawing are the exclusive property of shapouri and associates, and shall not be reproduced in whole or in part without the express prior written permission of said engineers, any unauthorized reuse of these plans either than for the project and location shown is prohibited.

SHEET TITLE: Pre-Development

WATERSHED HYDROLOGIC GROUND COVER

SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING - ARCHITECTURE - PLANNING
CIELO VILLAGE, 18020 CALLE AMIENTE, SUITE 302
P. O. BOX 676221, RANCHO SANTA FE, CALIF. 92067
PHONE (858)756-6140 FAX (858)756-8044

WARNER RANCH

Pre-Development Hydrology Map

REVISIONS

JOB NO.
DATE

Post Development Hydrology Calculations Design Point

Design Point 1

100-year Development Conditions

WARNER RANCH-GOMEZ CREEK BASIN 113

100-YEAR STORM EVENT

POST DEVELOPMENT HYDROLOGY

NRCS HYDROLOGIC METHOD

WORKSHEET 4-2 WARNER RANCH (name of project) **Curve Number Worksheet**

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN_2:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in-spection)	SOIL GROUP	CN_2 From Hydrology Manual, Table 4-2	FRACTION OF AREA A_i/A	PARTIAL CN_2 $CN_2 \times A_i/A$
BC- BROADLEAF CHAPARRAL	GOOD	A	31	0.86	0.27
		B	57	3.68	2.10
BC- BROADLEAF CHAPARRAL	GOOD	C	71	26.24	18.63
		D	78	46.52	36.29
FS- FARMSTEADS	GOOD	A	59	0.01	0.00
		B	74	0.08	0.06
FS- FARMSTEADS	GOOD	C	82	0.09	0.07
		D	86	1.46	1.26
ME- MEADOW	GOOD	A	30	0.00	0.00
		B	58	0.11	0.06
		D	78	0.70	0.55
VY- VINEYARDS	GOOD	A	38	0.34	0.13
		B	61	0.30	0.18
VY VINEYARDS	GOOD	C	74	4.35	3.22
		D	80	10.59	8.48
WO- WOODLANDS	GOOD	A	28	0.07	0.02
		B	55	0.04	0.02
WO- WOODLANDS	GOOD	C	70	0.99	0.69
		D	77	3.57	2.75
			Sums =	1.000	74.77

For entire basin CN_2 = 75

WORKSHEET 4-3 WARNER RANCH (name of project) **Peak Discharge Computation**

*****For use with NRCS Hydrologic Method Computations*****

Items in boxes are required input parameters for the SDUH Peak Discharge Program.

Computed by: SHAPOURI & ASSOCIATES Date: 11-28-2012

Project Identification (Drainage Area Name): GOMEZ CREEK BASIN 113

Geographic location of center of drainage area: Long: 33° 21' 60" Lat: 117° 5' 36"

Drainage Area: 5.57 – square miles

Storm Frequency (Section 2.3): 100 – year

6-Hour Storm Duration Precipitation (Appendix B): 3.5 – inches

24-Hour Storm Duration Precipitation (Appendix B): 6 – inches

Precipitation Zone Number (PZN): (Section 4.1.2.4 and Appendix C) PZN = 1.0 _____ 2.0 1.95 3.0 _____ 4.0

PZN Ajustment Factor for 5-year to 35-year storm frequency (interpolate): (Section 4.1.2.4 and Table 4-6) 1.5 _____ 2.5 _____ 2.0 _____ 1.5

PZN Ajustment Factor for 35-year to 150-year storm frequency (interpolate): (Section 4.1.2.4 and Table 4-6) 2.0 _____ 3.0 2.95 3.0 _____ 2.0

PZN Adjusted Runoff Curve Number (interpolate between nearest whole number PZN conditions): (Sections 4.1.2.4 and 4.2.4, Tables 4-6 and 4-10) $CN_{1.0 \text{ or } 2.0}$ 75 CN_X 79 $CN_{2.0 \text{ or } 3.0}$ 88

Watershed Length (L) (Section 4.3.1): 5.26 – miles

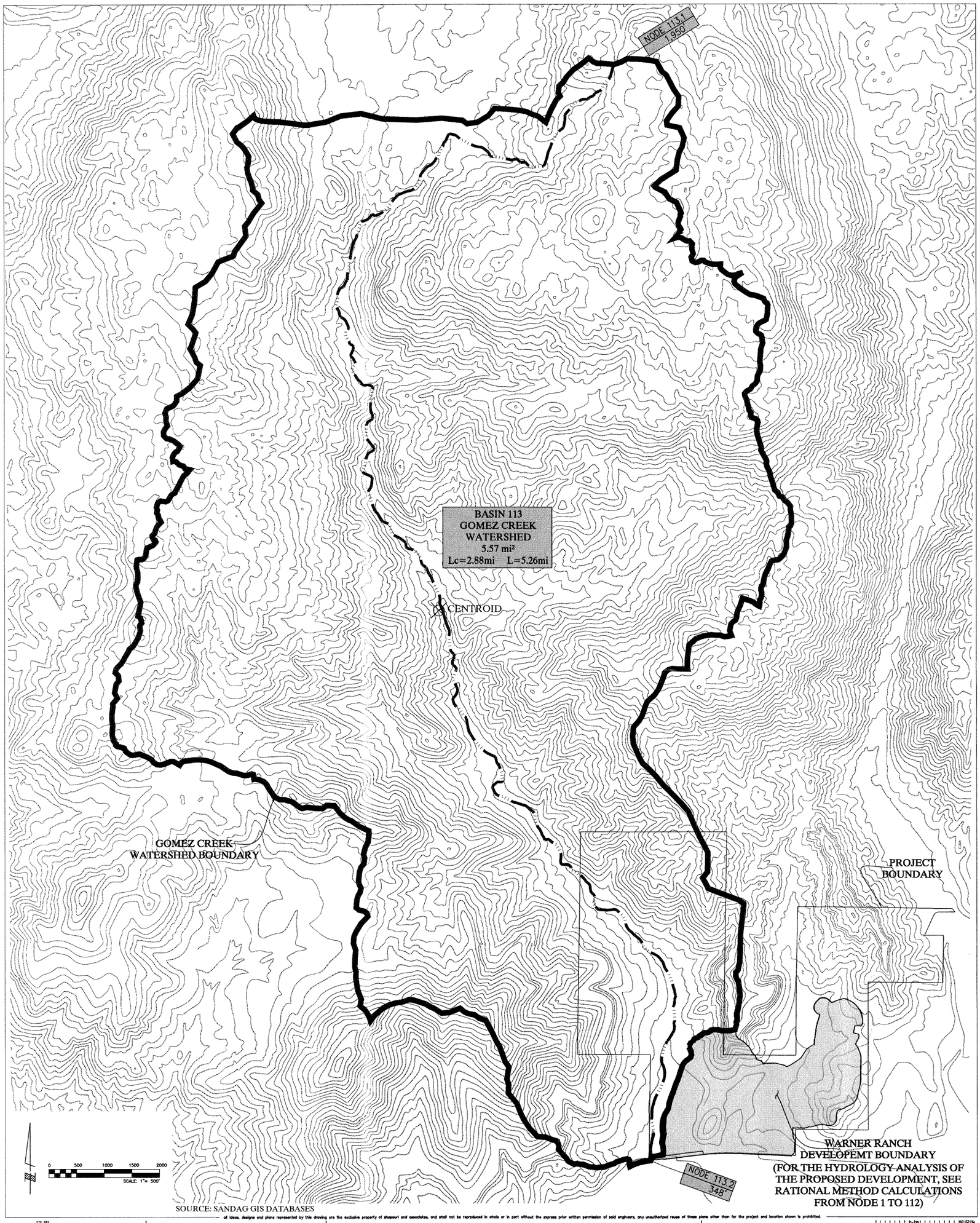
Length to Centroid (L_c) (Section 4.3.1): 2.88 – miles

Slope (s) (Section 4.3.1): 305 – feet/mile Basin $\bar{n}$ Factor (Section 4.3.5): 0.035

Corps lag (T_L) = 24 $\bar{n}$ $((L \times L_c)/s^{0.5})^m$ (Section 4.3.1.1)
OR
Corps lag (T_L) = 0.8 T_c (Section 4.3.1.2) Lag Time: 0.8 – hours

Time to Peak = 0.862 x Corps lag (Section 4.1.5.5): Time to Peak : 0.69 – hours

```
*************************************************************************
*******
  * The San Diego Unit Hydrograph (SDUH) Peak Discharge Program uses the       *
  * procedures described in Section 4 of the San Diego County Hydrology        *
  * Manual for NRCS Hydrologic Method calculations.  The SDUH Peak Discharge   *
  * Program may be used only for determination of peak flow rate, and may not  *
  * be used for detention basin design or other routing purposes for which a   *
  * hydrograph is required.  To generate a hydrograph, the calculation method  *
  * described in Section 4 of the San Diego County Hydrology Manual may be     *
  * used, or a computer program that includes good documentation of the        *
  * calculations (see Section 1.7 of the San Diego County Hydrology manual).   *
  * Note: the RATHYDRO computer program is not based on the calculation method *
  * described in Section 4 of the San Diego County Hydrology Manual and may    *
  * not be used to generate a hydrograph based on the SDUH Peak Discharge      *
  * Program output.                                                            *

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

   Project Identification: WARNER RANCH, GOMEZ CREEK BASIN 113
   Storm Frequency (years) =  100
   Drainage Area (square miles) =    5.57
   6-Hour Rainfall (inches) =     3.50
   6-Hour Depth-Area Factor =    0.984
   24-Hour Rainfall (inches) =     6.00
   24-Hour Depth-Area Factor =    0.989
   Adjusted Curve Number = 79
   Unit Interval (minutes) =  5
   Watershed Lag Time (hours) =    0.800
   Peak Flow Rate (cfs) =     5,066.7
```



SOURCE: SANDAG GIS DATABASES

all ideas, designs and plans represented by this drawing are the exclusive property of shapouri and associates, and shall not be reproduced in whole or in part without the express prior written permission of said engineers, any unauthorized reuse of these plans other than for the project and location shown is prohibited.

SHEET TITLE: Post Hydrology

WATERSHED GEOGRAPHIC LOCATION AND PHYSICAL CHARACTERISTICS

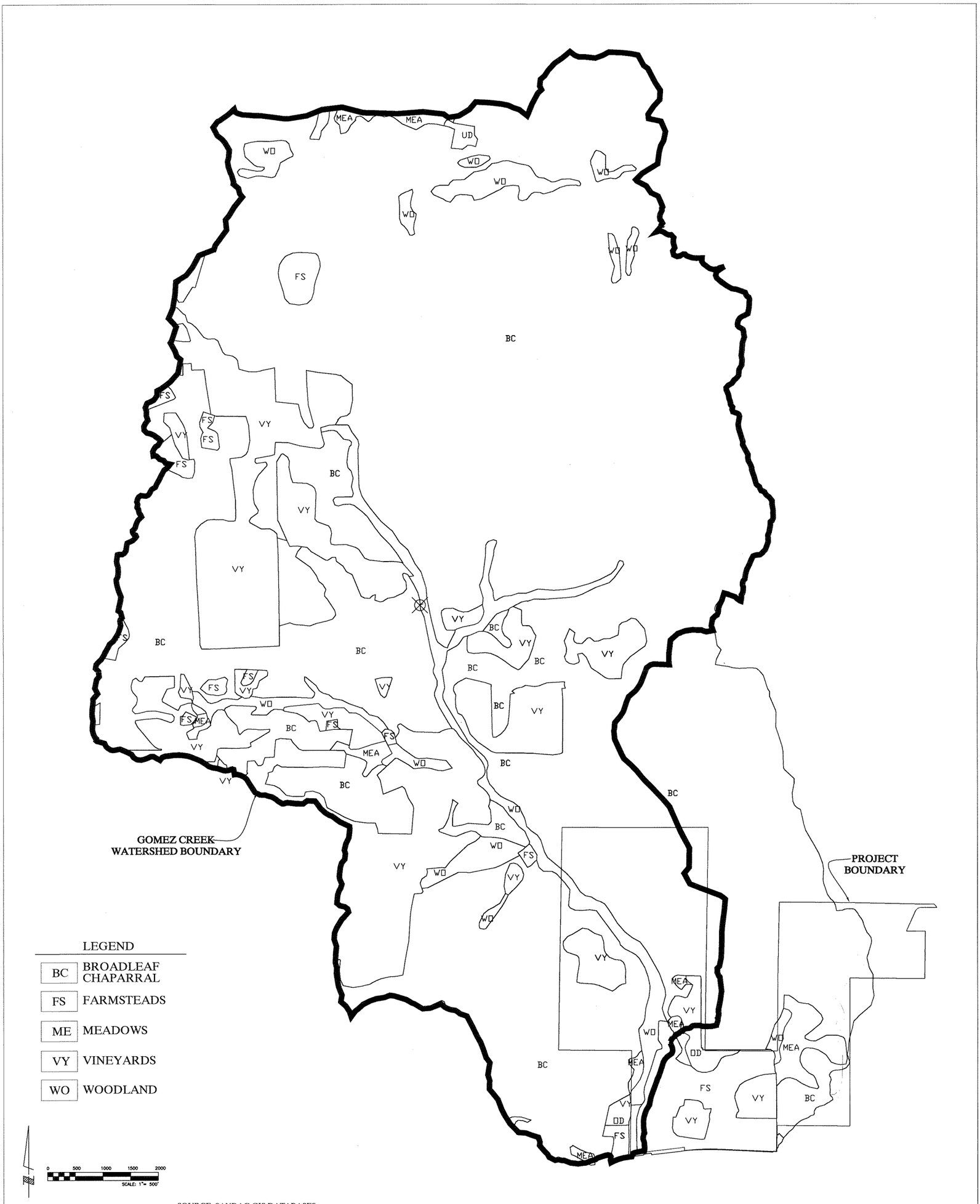
SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING . ARCHITECTURE . PLANNING
CELO VILLAGE, 18029 CALLE AMBIENTE, SUITE 502
P. O. BOX 670221, RANCHO SANTA FE, CALIF. 92067
PHONE (858)756-8340 FAX (858)756-8344

WARNER RANCH

Post-Development Hydrology Map

REVISIONS

JOB NO.:
DRAWN:
SUBMITTALS:



SOURCE: SANDAG GIS DATABASES

all ideas, designs and plans represented by this drawing are the exclusive property of shapouri and associates, and shall not be reproduced in whole or in part without the express prior written permission of said engineers, any unauthorized reuse of these plans other than for the project and location shown is prohibited.

SHEET TITLE: Post-Hydrology

WATERSHED HYDROLOGIC GROUND COVER

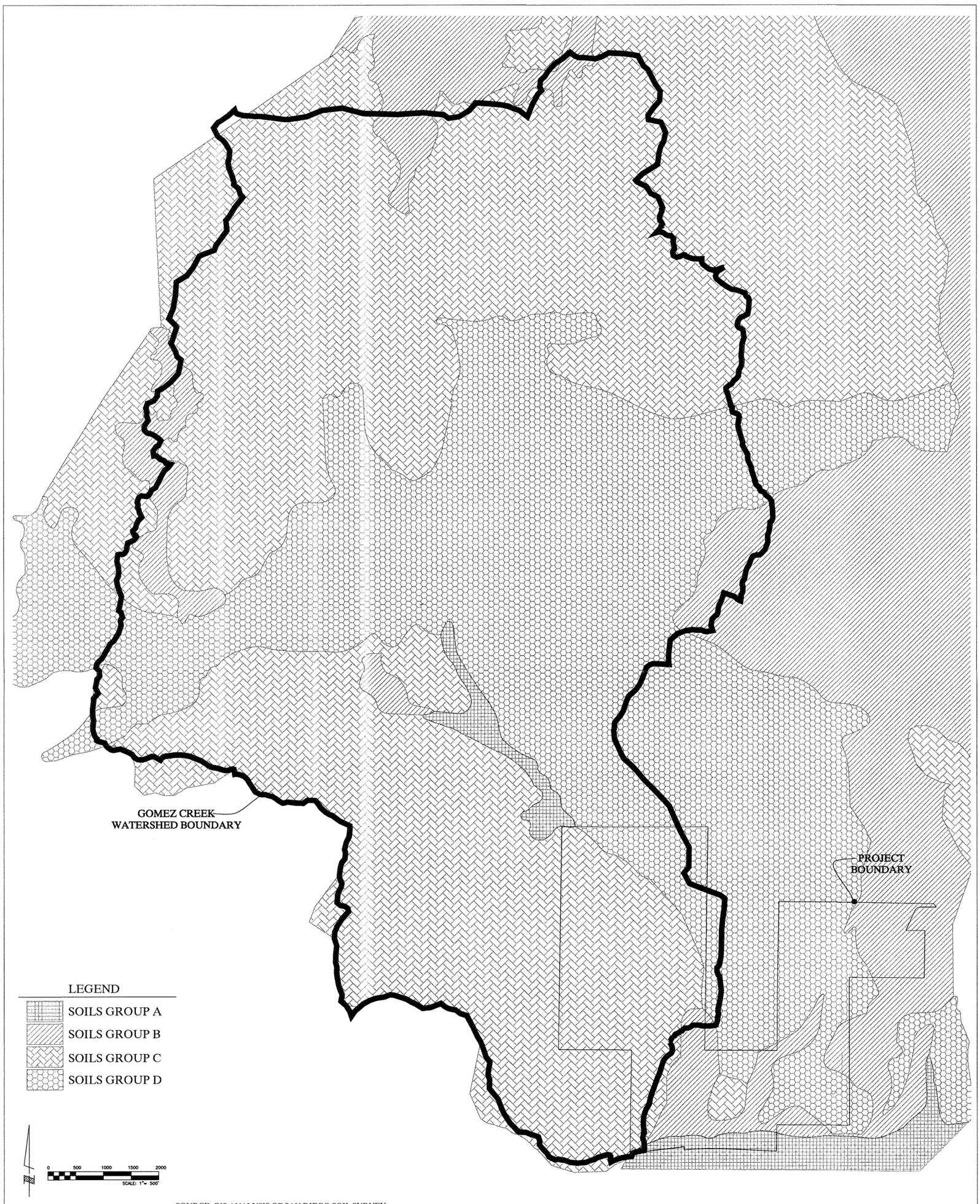
SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING • ARCHITECTURE • PLANNING
CIELO VILLAGE, 18020 CALLE AMBIENTE, SUITE 302
P.O. BOX 670221, RANCHO SANTA FE, CALIF. 92067
PHONE (858)756-8340 FAX (858)756-8344

WARNER RANCH

Post-Development Hydrology Map

REVISIONS

JOB NO.:
DRAWN:
SUBMITTALS:



SOURCE: GIS ANALYSIS OF SAN DIEGO SOIL SURVEY

all ideas, designs and plans represented by this drawing are the exclusive property of shapouri and associates, and shall not be reproduced in whole or in part without the express prior written permission of said engineers, any unauthorized reuse of these plans other than for the project and location shown is prohibited.

SHEET TITLE: Post Hydrology

WATERSHED
HYDROLOGIC
SOILS GROUPS

SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING . ARCHITECTURE . PLANNING
CIELO VILLAGE, 18029 CALLE AMBIENTE, SUITE 303
P. O. BOX 678231, RANCHO SANTA FE, CALIF. 92067
PHONE: (858)756-8340 FAX: (858)756-8344

WARNER RANCH

Post-Development Hydrology Map

REVISIONS

JOB NO.:
DRAWN:
SUBMITTALS:

```
        San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/15/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
(BASIN 102)
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.100 to Point/Station      102.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.250
Decimal fraction soil group C = 0.750
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.287
Initial subarea total flow distance  = 1343.849(Ft.)
Highest elevation =  770.000(Ft.)
Lowest elevation =  460.000(Ft.)
Elevation difference =  310.000(Ft.) Slope = 23.068 %
Top of Initial Area Slope adjusted by User to 30.000 %
Bottom of Initial Area Slope adjusted by User to 15.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  30.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.71 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2875)*( 100.000^.5)/(  30.000^(1/3)]=   4.71
The initial area total distance of 1343.85 (Ft.) entered leaves a
remaining distance of 1243.85 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.92 minutes
for a distance of 1243.85 (Ft.) and a slope of 15.00 %
with an elevation difference of 186.58(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.915 Minutes
Tt=[(11.9*0.2356^3)/(186.58)]^.385=  3.92
Total initial area Ti =   4.71 minutes from Figure 3-3 formula plus
  3.92 minutes from the Figure 3-4 formula =   8.62 minutes
Rainfall intensity (I) =      6.489(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.287
Subarea runoff =     26.584(CFS)
Total initial stream area =       14.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.200 to Point/Station       96.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   460.000(Ft.)
Downstream point/station elevation =   400.000(Ft.)
Pipe length  =  1222.40(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    26.584(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    26.584(CFS)
Normal flow depth in pipe =   13.57(In.)
Flow top width inside pipe =   23.79(In.)
Critical Depth =   21.58(In.)
Pipe flow velocity =     14.52(Ft/s)
Travel time through pipe =    1.40 min.
Time of concentration (TC) =    10.03 min.
End of computations, total study area =          14.250 (Ac.)
```

```
        San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/16/12
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

--------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.100 to Point/Station      103.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.020
Decimal fraction soil group C = 0.980
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                  ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.299
Initial subarea total flow distance  = 10132.000(Ft.)
Highest elevation = 1621.000(Ft.)
Lowest elevation =  384.000(Ft.)
Elevation difference = 1237.000(Ft.) Slope = 12.209 %
Top of Initial Area Slope adjusted by User to 20.000 %
Bottom of Initial Area Slope adjusted by User to  2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  20.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2990)*( 100.000^.5)/(  20.000^(1/3)]=   5.31
The initial area total distance of 10132.00 (Ft.) entered leaves a
remaining distance of 10032.00 (Ft.)
Using Figure 3-4, the travel time for this distance is  42.44 minutes
for a distance of 10032.00 (Ft.) and a slope of  2.00 %
with an elevation difference of 200.64(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =   42.439 Minutes
Tt=[(11.9*1.9000^3)/(200.64)]^.385= 42.44
Total initial area Ti =   5.31 minutes from Figure 3-3 formula plus
 42.44 minutes from the Figure 3-4 formula =  47.75 minutes
Rainfall intensity (I) =      2.151(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.299
Subarea runoff =    248.302(CFS)
Total initial stream area =      386.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.100 to Point/Station      103.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    386.020(Ac.)
Runoff from this stream =    248.302(CFS)
Time of concentration =   47.75 min.
Rainfall intensity =     2.151(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.100 to Point/Station      102.200
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BASIN 102)
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.250
Decimal fraction soil group C = 0.750
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                  ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.287
Rainfall intensity (I) =      5.886(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  10.03 min.  Rain intensity =       5.89(In/Hr)
Total area =       14.250(Ac.)  Total runoff =    26.584(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.100 to Point/Station      102.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      14.250(Ac.)
Runoff from this stream =      26.584(CFS)
Time of concentration =   10.03 min.
Rainfall intensity =      5.886(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1      248.302     47.75           2.151
2       26.584     10.03           5.886
Qmax(1) =
            1.000 *    1.000 *   248.302) +
            0.366 *    1.000 *    26.584) + =      258.018
Qmax(2) =
            1.000 *    0.210 *   248.302) +
            1.000 *    1.000 *    26.584) + =       78.740

Total of 2 main streams to confluence:
Flow rates before confluence point:
     248.302      26.584
Maximum flow rates at confluence using above data:
      258.018       78.740
Area of streams before confluence:
      386.020       14.250


Results of confluence:
Total flow rate =     258.018(CFS)
Time of concentration =     47.751 min.
Effective stream area after confluence  =     400.270(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.200 to Point/Station       78.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    384.000(Ft.)
Downstream point/station elevation =    381.660(Ft.)
Pipe length  =    338.41(Ft.)    Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    258.018(CFS)
Given pipe size =      66.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     1.235(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =       2.659(Ft.)
 Minor friction loss =       0.916(Ft.)      K-factor =    0.50
Pipe flow velocity =      10.86(Ft/s)
Travel time through pipe =     0.52 min.
Time of concentration (TC) =     48.27 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.200 to Point/Station       78.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     400.270(Ac.)
Runoff from this stream =     258.018(CFS)
Time of concentration =    48.27 min.
Rainfall intensity =      2.136(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.100 to Point/Station      104.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.265
Initial subarea total flow distance  =  641.860(Ft.)
Highest elevation =  690.000(Ft.)
Lowest elevation =  403.000(Ft.)
Elevation difference =  287.000(Ft.) Slope = 44.714 %
Top of Initial Area Slope adjusted by User to 30.000 %
Bottom of Initial Area Slope adjusted by User to 30.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  30.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.84 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2650)*( 100.000^.5)/(  30.000^(1/3)]=   4.84
The initial area total distance of  641.86 (Ft.) entered leaves a
remaining distance of  541.86 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.58 minutes
for a distance of 541.86 (Ft.) and a slope of 30.00 %
with an elevation difference of 162.56(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.581 Minutes
Tt=[(11.9*0.1026^3)/(162.56)]^.385=  1.58
Total initial area Ti =   4.84 minutes from Figure 3-3 formula plus
  1.58 minutes from the Figure 3-4 formula =   6.42 minutes
Rainfall intensity (I) =      7.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.265
Subarea runoff =     12.835(CFS)
Total initial stream area =        6.170(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.200 to Point/Station       78.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   398.000(Ft.)
Downstream point/station elevation =   381.660(Ft.)
Pipe length  =   220.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    12.835(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    12.835(CFS)
Normal flow depth in pipe =    8.01(In.)
Flow top width inside pipe =   22.63(In.)
Critical Depth =   15.47(In.)
Pipe flow velocity =     13.98(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =     6.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.200 to Point/Station       78.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.170(Ac.)
Runoff from this stream =     12.835(CFS)
Time of concentration =    6.68 min.
Rainfall intensity =     7.650(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      258.018     48.27           2.136
2       12.835      6.68           7.650
Qmax(1) =
            1.000 *    1.000 *   258.018) +
            0.279 *    1.000 *    12.835) + =     261.603
Qmax(2) =
            1.000 *    0.138 *   258.018) +
            1.000 *    1.000 *    12.835) + =      48.544

Total of 2 main streams to confluence:
Flow rates before confluence point:
     258.018      12.835
Maximum flow rates at confluence using above data:
      261.603       48.544
Area of streams before confluence:
      400.270        6.170


Results of confluence:
Total flow rate =    261.603(CFS)
Time of concentration =    48.270 min.
Effective stream area after confluence  =    406.440(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       79.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   381.660(Ft.)
Downstream point/station elevation =   378.000(Ft.)
Pipe length  =   479.54(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =   261.603(CFS)
Given pipe size =     66.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     1.155(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      3.873(Ft.)
 Minor friction loss =      0.941(Ft.)     K-factor =   0.50
Pipe flow velocity =     11.01(Ft/s)
Travel time through pipe =    0.73 min.
Time of concentration (TC) =    49.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       79.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    406.440(Ac.)
Runoff from this stream =    261.603(CFS)
Time of concentration =   49.00 min.
Rainfall intensity =     2.116(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.100 to Point/Station      105.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.255
Initial subarea total flow distance  =  277.000(Ft.)
Highest elevation =  408.000(Ft.)
Lowest elevation =  391.000(Ft.)
Elevation difference =   17.000(Ft.) Slope =  6.137 %
Top of Initial Area Slope adjusted by User to  3.520 %
Bottom of Initial Area Slope adjusted by User to  2.600 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   3.52 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =  10.00 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
```

```
TC = [1.8*(1.1-0.2550)*( 100.000^.5)/(   3.520^(1/3)]=  10.00
The initial area total distance of  277.00 (Ft.) entered leaves a
remaining distance of  177.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.71 minutes
for a distance of 177.00 (Ft.) and a slope of  2.60 %
with an elevation difference of   4.60(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.713 Minutes
Tt=[(11.9*0.0335^3)/(  4.60)]^.385=  1.71
Total initial area Ti =  10.00 minutes from Figure 3-3 formula plus
  1.71 minutes from the Figure 3-4 formula =  11.71 minutes
Rainfall intensity (I) =      5.326(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.255
Subarea runoff =      0.693(CFS)
Total initial stream area =        0.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.200 to Point/Station       79.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   386.000(Ft.)
Downstream point/station elevation =   378.000(Ft.)
Pipe length  =   148.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     0.693(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     0.693(CFS)
Normal flow depth in pipe =    2.06(In.)
Flow top width inside pipe =   13.46(In.)
Critical Depth =    3.41(In.)
Pipe flow velocity =      5.29(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =    12.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.200 to Point/Station       79.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.510(Ac.)
Runoff from this stream =      0.693(CFS)
Time of concentration =   12.18 min.
Rainfall intensity =     5.193(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      261.603     49.00           2.116
2        0.693     12.18           5.193
Qmax(1) =
           1.000 *    1.000 *   261.603) +
           0.407 *    1.000 *     0.693) + =     261.885

Qmax(2) =
           1.000 *    0.249 *   261.603) +
           1.000 *    1.000 *     0.693) + =      65.716

Total of 2 main streams to confluence:
Flow rates before confluence point:
     261.603       0.693
Maximum flow rates at confluence using above data:
      261.885       65.716
Area of streams before confluence:
      406.440        0.510


Results of confluence:
Total flow rate =    261.885(CFS)
Time of concentration =    48.996 min.
Effective stream area after confluence  =    406.950(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       79.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   378.000(Ft.)
Downstream point/station elevation =   376.000(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =   261.885(CFS)
Given pipe size =     66.00(In.)
Calculated individual pipe flow  =   261.885(CFS)
Normal flow depth in pipe =   31.03(In.)
Flow top width inside pipe =   65.88(In.)
Critical Depth =   54.04(In.)
Pipe flow velocity =     23.85(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    49.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       79.000 to Point/Station       80.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    406.950(Ac.)
Runoff from this stream =    261.885(CFS)
Time of concentration =   49.03 min.
Rainfall intensity =     2.115(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       77.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BIO-RETENTION POND 1)
______________________________________________________________________
User specified 'C' value of 0.465 given for subarea
Rainfall intensity (I) =      3.241(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  25.29 min.  Rain intensity =       3.24(In/Hr)
Total area =       37.810(Ac.)  Total runoff =    36.610(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       77.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   397.000(Ft.)
Downstream point/station elevation =   376.000(Ft.)
Pipe length  =   845.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    36.610(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    36.610(CFS)
Normal flow depth in pipe =   15.87(In.)
Flow top width inside pipe =   35.75(In.)
Critical Depth =   23.60(In.)
Pipe flow velocity =     12.19(Ft/s)
Travel time through pipe =    1.16 min.
Time of concentration (TC) =    26.45 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       77.000 to Point/Station       80.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     37.810(Ac.)
Runoff from this stream =     36.610(CFS)
Time of concentration =   26.45 min.
Rainfall intensity =     3.149(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      261.885     49.03           2.115
2       36.610     26.45           3.149
Qmax(1) =
           1.000 *    1.000 *   261.885) +
           0.672 *    1.000 *    36.610) + =     286.470
Qmax(2) =
           1.000 *    0.539 *   261.885) +
           1.000 *    1.000 *    36.610) + =     177.862

Total of 2 main streams to confluence:
Flow rates before confluence point:
     261.885      36.610
Maximum flow rates at confluence using above data:
     286.470      177.862
Area of streams before confluence:
     406.950       37.810


Results of confluence:
Total flow rate =    286.470(CFS)
Time of concentration =    49.031 min.
Effective stream area after confluence  =    444.760(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       81.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   376.000(Ft.)
Downstream point/station elevation =   359.530(Ft.)
Pipe length  =   648.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =   286.470(CFS)
Given pipe size =     66.00(In.)
Calculated individual pipe flow  =   286.470(CFS)
Normal flow depth in pipe =   37.50(In.)
Flow top width inside pipe =   65.38(In.)
Critical Depth =   56.15(In.)
Pipe flow velocity =     20.55(Ft/s)
Travel time through pipe =    0.53 min.
Time of concentration (TC) =    49.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       81.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    444.760(Ac.)
Runoff from this stream =    286.470(CFS)
Time of concentration =   49.56 min.
Rainfall intensity =     2.100(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       81.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BIO-RETENTION POND 6)
______________________________________________________________________
User specified 'C' value of 0.454 given for subarea
Rainfall intensity (I) =      3.303(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  24.56 min.  Rain intensity =       3.30(In/Hr)
Total area =        4.120(Ac.)  Total runoff =     5.380(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       81.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       4.120(Ac.)
Runoff from this stream =       5.380(CFS)
Time of concentration =   24.56 min.
Rainfall intensity =     3.303(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1      286.470     49.56           2.100
2        5.380     24.56           3.303
Qmax(1) =
           1.000 *    1.000 *   286.470) +
           0.636 *    1.000 *     5.380) + =     289.891
Qmax(2) =
           1.000 *    0.496 *   286.470) +
           1.000 *    1.000 *     5.380) + =     147.353

Total of 2 main streams to confluence:
Flow rates before confluence point:
     286.470       5.380
Maximum flow rates at confluence using above data:
      289.891      147.353
Area of streams before confluence:
      444.760        4.120


Results of confluence:
Total flow rate =    289.891(CFS)
Time of concentration =    49.557 min.
Effective stream area after confluence  =    448.880(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       81.000 to Point/Station       82.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   359.530(Ft.)
Downstream point/station elevation =   355.000(Ft.)
Pipe length  =   277.40(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =   289.891(CFS)
Given pipe size =     66.00(In.)
Calculated individual pipe flow  =   289.891(CFS)
Normal flow depth in pipe =   43.83(In.)
Flow top width inside pipe =   62.35(In.)
Critical Depth =   56.41(In.)
Pipe flow velocity =     17.31(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    49.82 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       81.000 to Point/Station       82.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    448.880(Ac.)
Runoff from this stream =    289.891(CFS)
Time of concentration =   49.82 min.
Rainfall intensity =     2.093(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.000 to Point/Station       82.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BIO-RETENTION POND 4)
______________________________________________________________________
User specified 'C' value of 0.480 given for subarea
Rainfall intensity (I) =      2.511(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  37.58 min.  Rain intensity =       2.51(In/Hr)
Total area =       14.030(Ac.)  Total runoff =    15.090(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.000 to Point/Station       82.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     14.030(Ac.)
Runoff from this stream =     15.090(CFS)
Time of concentration =   37.58 min.
Rainfall intensity =     2.511(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1      289.891     49.82           2.093
2       15.090     37.58           2.511
Qmax(1) =
           1.000 *    1.000 *   289.891) +
           0.834 *    1.000 *    15.090) + =     302.471
Qmax(2) =
           1.000 *    0.754 *   289.891) +
           1.000 *    1.000 *    15.090) + =     233.743

Total of 2 main streams to confluence:
Flow rates before confluence point:
     289.891      15.090
Maximum flow rates at confluence using above data:
      302.471      233.743
Area of streams before confluence:
      448.880       14.030
```

```
Results of confluence:
Total flow rate =    302.471(CFS)
Time of concentration =    49.824 min.
Effective stream area after confluence  =    462.910(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       82.000 to Point/Station       83.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   355.000(Ft.)
Downstream point/station elevation =   353.220(Ft.)
Pipe length  =   223.08(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =   302.471(CFS)
Given pipe size =     66.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     1.887(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      2.409(Ft.)
 Minor friction loss =      1.258(Ft.)     K-factor =   0.50
Pipe flow velocity =     12.73(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    50.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       82.000 to Point/Station       83.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    462.910(Ac.)
Runoff from this stream =    302.471(CFS)
Time of concentration =   50.12 min.
Rainfall intensity =     2.085(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.200 to Point/Station       85.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BIO-RETENTION POND 3)
______________________________________________________________________
User specified 'C' value of 0.688 given for subarea
Rainfall intensity (I) =      5.378(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  11.54 min.  Rain intensity =       5.38(In/Hr)
Total area =        2.450(Ac.)  Total runoff =     6.190(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.000 to Point/Station       87.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   374.000(Ft.)
Downstream point/station elevation =   373.500(Ft.)
Pipe length  =    35.64(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     6.190(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     6.190(CFS)
Normal flow depth in pipe =    8.46(In.)
Flow top width inside pipe =   22.93(In.)
Critical Depth =   10.56(In.)
Pipe flow velocity =      6.25(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    11.63 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.000 to Point/Station       87.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.450(Ac.)
Runoff from this stream =      6.190(CFS)
Time of concentration =   11.63 min.
Rainfall intensity =     5.350(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.200 to Point/Station       86.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BIO-RETENTION POND 8)
______________________________________________________________________
User specified 'C' value of 0.682 given for subarea
Rainfall intensity (I) =      4.962(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  13.07 min.  Rain intensity =       4.96(In/Hr)
Total area =        1.420(Ac.)  Total runoff =     3.300(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       86.000 to Point/Station       87.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   396.000(Ft.)
Downstream point/station elevation =   373.500(Ft.)
Pipe length  =   347.39(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.300(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.300(CFS)
Normal flow depth in pipe =    4.18(In.)
Flow top width inside pipe =   18.21(In.)
Critical Depth =    7.61(In.)
Pipe flow velocity =      9.00(Ft/s)
Travel time through pipe =    0.64 min.
Time of concentration (TC) =    13.71 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       86.000 to Point/Station       87.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.420(Ac.)
Runoff from this stream =      3.300(CFS)
Time of concentration =   13.71 min.
Rainfall intensity =     4.810(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        6.190     11.63           5.350
2        3.300     13.71           4.810
Qmax(1) =
           1.000 *    1.000 *     6.190) +
           1.000 *    0.848 *     3.300) + =       8.989
Qmax(2) =
           0.899 *    1.000 *     6.190) +
           1.000 *    1.000 *     3.300) + =       8.866

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.190       3.300
Maximum flow rates at confluence using above data:
        8.989        8.866
Area of streams before confluence:
        2.450        1.420
Results of confluence:
Total flow rate =      8.989(CFS)
Time of concentration =    11.630 min.
Effective stream area after confluence =      3.870(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       87.000 to Point/Station       88.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   373.500(Ft.)
Downstream point/station elevation =   364.000(Ft.)
Pipe length  =   545.21(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.989(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.989(CFS)
Normal flow depth in pipe =    9.76(In.)
Flow top width inside pipe =   23.58(In.)
Critical Depth =   12.84(In.)
Pipe flow velocity =      7.49(Ft/s)
Travel time through pipe =    1.21 min.
Time of concentration (TC) =    12.84 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       87.000 to Point/Station       88.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.870(Ac.)
Runoff from this stream =      8.989(CFS)
Time of concentration =   12.84 min.
Rainfall intensity =     5.018(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.100 to Point/Station      107.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.225
Initial subarea total flow distance  =  672.900(Ft.)
Highest elevation =  450.000(Ft.)
Lowest elevation =  364.500(Ft.)
Elevation difference =   85.500(Ft.) Slope = 12.706 %
Top of Initial Area Slope adjusted by User to 25.000 %
Bottom of Initial Area Slope adjusted by User to  3.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  25.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.39 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2250)*( 100.000^.5)/(  25.000^(1/3)]=   5.39
The initial area total distance of  672.90 (Ft.) entered leaves a
remaining distance of  572.90 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.77 minutes
for a distance of 572.90 (Ft.) and a slope of  3.50 %
with an elevation difference of  20.05(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.774 Minutes
Tt=[(11.9*0.1085^3)/( 20.05)]^.385=  3.77
Total initial area Ti =   5.39 minutes from Figure 3-3 formula plus
  3.77 minutes from the Figure 3-4 formula =   9.16 minutes
Rainfall intensity (I) =      6.240(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.225
Subarea runoff =      2.934(CFS)
Total initial stream area =        2.090(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.200 to Point/Station       92.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   364.500(Ft.)
Downstream point/station elevation =   364.000(Ft.)
Pipe length  =    65.84(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.934(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.934(CFS)
Normal flow depth in pipe =    6.73(In.)
Flow top width inside pipe =   21.56(In.)
Critical Depth =    7.16(In.)
Pipe flow velocity =      4.07(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =     9.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.200 to Point/Station       92.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.090(Ac.)
Runoff from this stream =      2.934(CFS)
Time of concentration =    9.43 min.
Rainfall intensity =     6.124(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        8.989     12.84           5.018
2        2.934      9.43           6.124
Qmax(1) =
            1.000 *    1.000 *     8.989) +
            0.819 *    1.000 *     2.934) + =      11.393
Qmax(2) =
            1.000 *    0.734 *     8.989) +
            1.000 *    1.000 *     2.934) + =       9.535

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.989       2.934
Maximum flow rates at confluence using above data:
      11.393       9.535
Area of streams before confluence:
        3.870       2.090
Results of confluence:
Total flow rate =     11.393(CFS)
Time of concentration =    12.843 min.
Effective stream area after confluence =      5.960(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.100 to Point/Station       84.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   364.000(Ft.)
Downstream point elevation =   361.000(Ft.)
Channel length thru subarea  =   454.000(Ft.)
Channel base width        =    2.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     13.022(CFS)
Manning's 'N'    = 0.022
Maximum depth of channel  =    2.500(Ft.)
Flow(q) thru subarea =     13.022(CFS)
Depth of flow =   0.827(Ft.), Average velocity =   3.516(Ft/s)
Channel flow top width =    6.960(Ft.)
Flow Velocity =    3.52(Ft/s)
Travel time  =    2.15 min.
Time of concentration =   14.99 min.
Critical depth =      0.758(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      4.541(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.495  CA =      3.242
Subarea runoff =      3.330(CFS) for      0.590(Ac.)
Total runoff =     14.723(CFS)    Total area =       6.550(Ac.)
Depth of flow =   0.876(Ft.), Average velocity =   3.631(Ft/s)
Critical depth =      0.813(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.100 to Point/Station       84.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.550(Ac.)
Runoff from this stream =     14.723(CFS)
Time of concentration =   14.99 min.
Rainfall intensity =     4.541(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       38.000 to Point/Station       84.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BIO-RETENTION POND 2)
______________________________________________________________________
User specified 'C' value of 0.469 given for subarea
Rainfall intensity (I) =      3.831(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  19.52 min.  Rain intensity =       3.83(In/Hr)
Total area =       29.340(Ac.)  Total runoff =    31.070(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       38.000 to Point/Station       84.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =     29.340(Ac.)
Runoff from this stream =     31.070(CFS)
Time of concentration =   19.52 min.
Rainfall intensity =     3.831(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       14.723     14.99           4.541
2       31.070     19.52           3.831
Qmax(1) =
           1.000 *    1.000 *    14.723) +
           1.000 *    0.768 *    31.070) + =      38.591
Qmax(2) =
           0.844 *    1.000 *    14.723) +
           1.000 *    1.000 *    31.070) + =      43.490

Total of 2 streams to confluence:
Flow rates before confluence point:
      14.723      31.070
Maximum flow rates at confluence using above data:
       38.591       43.490
Area of streams before confluence:
        6.550       29.340
Results of confluence:
Total flow rate =     43.490(CFS)
Time of concentration =    19.520 min.
Effective stream area after confluence =     35.890(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       84.000 to Point/Station       93.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   361.000(Ft.)
Downstream point elevation =   353.500(Ft.)
Channel length thru subarea  =   673.657(Ft.)
Channel base width        =    2.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     52.750(CFS)
Manning's 'N'    = 0.022
Maximum depth of channel  =    2.500(Ft.)
Flow(q) thru subarea =     52.750(CFS)
Depth of flow =   1.394(Ft.), Average velocity =   6.124(Ft/s)
Channel flow top width =   10.362(Ft.)
Flow Velocity =    6.12(Ft/s)
Travel time  =    1.83 min.
Time of concentration =   21.35 min.
Critical depth =      1.516(Ft.)
```

```
 Adding area flow to channel
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      3.615(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.467  CA =     17.173
Subarea runoff =     18.593(CFS) for      0.850(Ac.)
Total runoff =     62.083(CFS)    Total area =      36.740(Ac.)
Depth of flow =   1.498(Ft.), Average velocity =   6.384(Ft/s)
Critical depth =      1.625(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       93.000 to Point/Station       94.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   353.500(Ft.)
Downstream point/station elevation =   352.000(Ft.)
Pipe length  =   179.15(Ft.)   Manning's N = 0.015
No. of pipes = 2  Required pipe flow  =    62.083(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    31.042(CFS)
Normal flow depth in pipe =   19.83(In.)
Flow top width inside pipe =   35.81(In.)
Critical Depth =   21.68(In.)
Pipe flow velocity =      7.78(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =    21.74 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       93.000 to Point/Station       94.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     36.740(Ac.)
Runoff from this stream =     62.083(CFS)
Time of concentration =   21.74 min.
Rainfall intensity =     3.574(In/Hr)
Program is now starting with Main Stream No. 3

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       90.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BIO-RETENTION POND 7)
______________________________________________________________________
User specified 'C' value of 0.285 given for subarea
Rainfall intensity (I) =      4.904(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  13.31 min.  Rain intensity =       4.90(In/Hr)
Total area =        4.160(Ac.)  Total runoff =     4.390(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       90.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      4.160(Ac.)
Runoff from this stream =      4.390(CFS)
Time of concentration =   13.31 min.
Rainfall intensity =     4.904(In/Hr)
Program is now starting with Main Stream No. 4

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.100 to Point/Station      106.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.100
[INDUSTRIAL area type                        ]
(General Industrial        )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  660.900(Ft.)
Highest elevation =  375.000(Ft.)
Lowest elevation =  358.000(Ft.)
Elevation difference =   17.000(Ft.) Slope =  2.572 %
Top of Initial Area Slope adjusted by User to  3.310 %
Bottom of Initial Area Slope adjusted by User to  4.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   3.31 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.48 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  80.000^.5)/(   3.310^(1/3)]=   2.48
The initial area total distance of  660.90 (Ft.) entered leaves a
remaining distance of  580.90 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.62 minutes
for a distance of 580.90 (Ft.) and a slope of  4.00 %
with an elevation difference of  23.24(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.624 Minutes
Tt=[(11.9*0.1100^3)/( 23.24)]^.385=  3.62
Total initial area Ti =   2.48 minutes from Figure 3-3 formula plus
  3.62 minutes from the Figure 3-4 formula =   6.11 minutes
Rainfall intensity (I) =      8.104(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      5.570(CFS)
Total initial stream area =        0.790(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.200 to Point/Station       91.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   354.500(Ft.)
Downstream point/station elevation =   354.000(Ft.)
Pipe length  =    18.16(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.570(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.570(CFS)
Normal flow depth in pipe =    6.72(In.)
Flow top width inside pipe =   21.55(In.)
Critical Depth =    9.99(In.)
Pipe flow velocity =      7.74(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.15 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.200 to Point/Station       91.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 4
Stream flow area =      0.790(Ac.)
Runoff from this stream =      5.570(CFS)
Time of concentration =    6.15 min.
Rainfall intensity =     8.071(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      302.471     50.12           2.085
2       62.083     21.74           3.574
3        4.390     13.31           4.904
4        5.570      6.15           8.071
Qmax(1) =
           1.000 *    1.000 *   302.471) +
           0.583 *    1.000 *    62.083) +
           0.425 *    1.000 *     4.390) +
           0.258 *    1.000 *     5.570) + =     342.000
Qmax(2) =
           1.000 *    0.434 *   302.471) +
           1.000 *    1.000 *    62.083) +
           0.729 *    1.000 *     4.390) +
           0.443 *    1.000 *     5.570) + =     198.942
Qmax(3) =
           1.000 *    0.266 *   302.471) +
           1.000 *    0.612 *    62.083) +
           1.000 *    1.000 *     4.390) +
           0.608 *    1.000 *     5.570) + =     126.121
Qmax(4) =
           1.000 *    0.123 *   302.471) +
           1.000 *    0.283 *    62.083) +
           1.000 *    0.462 *     4.390) +
           1.000 *    1.000 *     5.570) + =      62.259
```

```
Total of 4 main streams to confluence:
Flow rates before confluence point:
     302.471      62.083       4.390       5.570
Maximum flow rates at confluence using above data:
      342.000      198.942      126.121       62.259
Area of streams before confluence:
      462.910       36.740        4.160        0.790


Results of confluence:
Total flow rate =    342.000(CFS)
Time of concentration =    50.116 min.
Effective stream area after confluence  =    504.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.100 to Point/Station      110.200
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   354.000(Ft.)
Downstream point elevation =   351.500(Ft.)
Channel length thru subarea  =   858.000(Ft.)
Channel base width        =   12.500(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    342.025(CFS)
Manning's 'N'    = 0.022
Maximum depth of channel  =    3.200(Ft.)
Flow(q) thru subarea =    342.025(CFS)
Depth of flow =   2.845(Ft.), Average velocity =   5.715(Ft/s)
Channel flow top width =   29.570(Ft.)
Flow Velocity =    5.72(Ft/s)
Travel time  =    2.50 min.
Time of concentration =   52.62 min.
Critical depth =      2.344(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
The area added to the existing stream causes a
a lower flow rate of Q =    336.971(CFS)
therefore the upstream flow rate of Q =    342.000(CFS) is being used
Rainfall intensity =      2.021(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.330  CA =    166.756
Subarea runoff =      0.000(CFS) for      1.210(Ac.)
Total runoff =    342.000(CFS)    Total area =     505.810(Ac.)
Depth of flow =   2.845(Ft.), Average velocity =   5.715(Ft/s)
Critical depth =      2.344(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.200 to Point/Station       95.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Covered channel
Upstream point elevation =   351.500(Ft.)
Downstream point elevation =   350.000(Ft.)
Channel length thru subarea  =    69.000(Ft.)
Channel base width        =   20.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =    342.000(CFS)
Depth of flow =   1.104(Ft.), Average velocity =  14.680(Ft/s)
Channel flow top width =   22.208(Ft.)
Flow Velocity =   14.68(Ft/s)
Travel time  =    0.08 min.
Time of concentration =   52.70 min.
Critical depth =      2.016(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.200 to Point/Station       95.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    505.810(Ac.)
Runoff from this stream =    342.000(CFS)
Time of concentration =   52.70 min.
Rainfall intensity =     2.019(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       89.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(BIO-RETENTION POND 5)
______________________________________________________________________
User specified 'C' value of 0.460 given for subarea
Rainfall intensity (I) =      3.014(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  28.31 min.  Rain intensity =       3.01(In/Hr)
Total area =       40.840(Ac.)  Total runoff =    30.840(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       89.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     40.840(Ac.)
Runoff from this stream =     30.840(CFS)
Time of concentration =   28.31 min.
Rainfall intensity =     3.014(In/Hr)
Program is now starting with Main Stream No. 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.100 to Point/Station      111.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  = 2460.000(Ft.)
Highest elevation =  372.000(Ft.)
Lowest elevation =  350.000(Ft.)
Elevation difference =   22.000(Ft.) Slope =  0.894 %
Top of Initial Area Slope adjusted by User to  3.900 %
Bottom of Initial Area Slope adjusted by User to  1.200 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   3.90 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.35 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  80.000^.5)/(   3.900^(1/3)]=   2.35
The initial area total distance of 2460.00 (Ft.) entered leaves a
remaining distance of 2380.00 (Ft.)
Using Figure 3-4, the travel time for this distance is  17.06 minutes
for a distance of 2380.00 (Ft.) and a slope of  1.20 %
with an elevation difference of  28.56(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =   17.064 Minutes
Tt=[(11.9*0.4508^3)/( 28.56)]^.385= 17.06
Total initial area Ti =   2.35 minutes from Figure 3-3 formula plus
 17.06 minutes from the Figure 3-4 formula =  19.42 minutes
Rainfall intensity (I) =      3.844(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      8.695(CFS)
Total initial stream area =        2.600(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.100 to Point/Station      111.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      2.600(Ac.)
Runoff from this stream =      8.695(CFS)
Time of concentration =   19.42 min.
Rainfall intensity =     3.844(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      342.000     52.70           2.019
2       30.840     28.31           3.014
3        8.695     19.42           3.844
Qmax(1) =
           1.000 *    1.000 *   342.000) +
           0.670 *    1.000 *    30.840) +
           0.525 *    1.000 *     8.695) + =     367.223
Qmax(2) =
           1.000 *    0.537 *   342.000) +
           1.000 *    1.000 *    30.840) +
           0.784 *    1.000 *     8.695) + =     221.391
Qmax(3) =
           1.000 *    0.368 *   342.000) +
           1.000 *    0.686 *    30.840) +
           1.000 *    1.000 *     8.695) + =     155.858

Total of 3 main streams to confluence:
Flow rates before confluence point:
     342.000      30.840       8.695
Maximum flow rates at confluence using above data:
      367.223      221.391      155.858
Area of streams before confluence:
      505.810       40.840       2.600


Results of confluence:
Total flow rate =    367.223(CFS)
Time of concentration =    52.696 min.
Effective stream area after confluence  =    549.250(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.100 to Point/Station      113.200
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   350.000(Ft.)
Downstream point elevation =   348.000(Ft.)
Channel length thru subarea  =   397.000(Ft.)
Channel base width        =   12.500(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    371.199(CFS)
Manning's 'N'    = 0.022
Maximum depth of channel  =    3.200(Ft.)
Flow(q) thru subarea =    371.199(CFS)
Depth of flow =   2.577(Ft.), Average velocity =   7.121(Ft/s)
Channel flow top width =   27.960(Ft.)
Flow Velocity =    7.12(Ft/s)
Travel time  =    0.93 min.
Time of concentration =   53.63 min.
Critical depth =      2.469(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      1.996(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.342  CA =    187.977
Subarea runoff =      8.010(CFS) for      0.860(Ac.)
Total runoff =    375.233(CFS)    Total area =     550.110(Ac.)
Depth of flow =   2.591(Ft.), Average velocity =   7.143(Ft/s)
Critical depth =      2.469(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.100 to Point/Station      113.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    550.110(Ac.)
Runoff from this stream =    375.233(CFS)
Time of concentration =   53.63 min.
Rainfall intensity =     1.996(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.100 to Point/Station      113.200
**** USER DEFINED FLOW INFORMATION AT A POINT ****
(SEE NRCS HYDROLOGIC METHOD FOR BASIN 103, GOMEZ CREEK)
______________________________________________________________________
User specified 'C' value of 0.300 given for subarea
Rainfall intensity (I) =      2.144(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  48.00 min.  Rain intensity =       2.14(In/Hr)
Total area =     3567.140(Ac.)  Total runoff =  5066.700(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.100 to Point/Station      113.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =   3567.140(Ac.)
Runoff from this stream =   5066.700(CFS)
Time of concentration =   48.00 min.
Rainfall intensity =     2.144(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      375.233     53.63           1.996
2     5066.700     48.00           2.144
Qmax(1) =
            1.000 *    1.000 *   375.233) +
            0.931 *    1.000 *  5066.700) + =    5092.412
Qmax(2) =
            1.000 *    0.895 *   375.233) +
            1.000 *    1.000 *  5066.700) + =    5402.571

Total of 2 main streams to confluence:
Flow rates before confluence point:
     375.233    5066.700
Maximum flow rates at confluence using above data:
     5092.412     5402.571
Area of streams before confluence:
      550.110     3567.140


Results of confluence:
Total flow rate =   5402.571(CFS)
Time of concentration =    48.000 min.
Effective stream area after confluence  =   4117.250(Ac.)
End of computations, total study area =        4117.250 (Ac.)
```

Bio-Retention Pond-1

Bio-Retention Pond-1

100-year Development Conditions

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/14/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 1
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.100 to Point/Station        1.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  362.000(Ft.)
Highest elevation =  480.000(Ft.)
Lowest elevation =  472.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  2.210 %
Top of Initial Area Slope adjusted by User to  2.750 %
Bottom of Initial Area Slope adjusted by User to  2.350 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   2.75 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.76 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  95.000^.5)/(   2.750^(1/3)]=   7.76
The initial area total distance of  362.00 (Ft.) entered leaves a
remaining distance of  267.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.44 minutes
for a distance of 267.00 (Ft.) and a slope of  2.35 %
with an elevation difference of   6.27(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.444 Minutes
Tt=[(11.9*0.0506^3)/(  6.27)]^.385=  2.44
Total initial area Ti =   7.76 minutes from Figure 3-3 formula plus
  2.44 minutes from the Figure 3-4 formula =  10.21 minutes
Rainfall intensity (I) =      5.819(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      3.855(CFS)
Total initial stream area =        1.380(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   467.000(Ft.)
Downstream point/station elevation =   466.500(Ft.)
Pipe length  =     9.94(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.855(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.855(CFS)
Normal flow depth in pipe =    4.80(In.)
Flow top width inside pipe =   19.21(In.)
Critical Depth =    8.25(In.)
Pipe flow velocity =      8.61(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    10.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   466.500(Ft.)
Downstream point/station elevation =   455.500(Ft.)
Pipe length  =   441.40(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.855(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.855(CFS)
Normal flow depth in pipe =    5.33(In.)
Flow top width inside pipe =   19.95(In.)
Critical Depth =    8.25(In.)
Pipe flow velocity =      7.43(Ft/s)
Travel time through pipe =    0.99 min.
Time of concentration (TC) =    11.22 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.380(Ac.)
Runoff from this stream =      3.855(CFS)
Time of concentration =   11.22 min.
Rainfall intensity =     5.476(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.100 to Point/Station       2.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.860
Decimal fraction soil group C = 0.140
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.454
Initial subarea total flow distance  =  551.500(Ft.)
Highest elevation =  472.000(Ft.)
Lowest elevation =  461.000(Ft.)
Elevation difference =   11.000(Ft.) Slope =  1.995 %
Top of Initial Area Slope adjusted by User to  2.340 %
Bottom of Initial Area Slope adjusted by User to  2.370 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of  2.34 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.83 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4542)*(  80.000^.5)/(   2.340^(1/3)]=   7.83
The initial area total distance of  551.50 (Ft.) entered leaves a
remaining distance of  471.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.77 minutes
for a distance of 471.50 (Ft.) and a slope of  2.37 %
with an elevation difference of  11.17(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.775 Minutes
Tt=[(11.9*0.0893^3)/( 11.17)]^.385=  3.77
Total initial area Ti =   7.83 minutes from Figure 3-3 formula plus
  3.77 minutes from the Figure 3-4 formula =  11.61 minutes
Rainfall intensity (I) =      5.357(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.454
Subarea runoff =      4.501(CFS)
Total initial stream area =        1.850(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.200 to Point/Station       2.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   456.000(Ft.)
Downstream point/station elevation =   455.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.501(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.501(CFS)
Normal flow depth in pipe =    4.71(In.)
Flow top width inside pipe =   19.07(In.)
Critical Depth =    8.94(In.)
Pipe flow velocity =     10.33(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.200 to Point/Station       2.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.850(Ac.)
Runoff from this stream =      4.501(CFS)
Time of concentration =   11.62 min.
Rainfall intensity =     5.353(In/Hr)
Program is now starting with Main Stream No. 3

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.100 to Point/Station       3.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.465
Initial subarea total flow distance  =  696.000(Ft.)
Highest elevation =  478.000(Ft.)
Lowest elevation =  462.000(Ft.)
Elevation difference =   16.000(Ft.) Slope =  2.299 %
Top of Initial Area Slope adjusted by User to  2.890 %
Bottom of Initial Area Slope adjusted by User to  2.370 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   2.89 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.82 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4650)*(  95.000^.5)/(   2.890^(1/3)]=   7.82
The initial area total distance of  696.00 (Ft.) entered leaves a
remaining distance of  601.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.55 minutes
for a distance of 601.00 (Ft.) and a slope of  2.37 %
with an elevation difference of  14.24(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.550 Minutes
Tt=[(11.9*0.1138^3)/( 14.24)]^.385=  4.55
Total initial area Ti =   7.82 minutes from Figure 3-3 formula plus
  4.55 minutes from the Figure 3-4 formula =  12.37 minutes
Rainfall intensity (I) =      5.141(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.465
Subarea runoff =      4.135(CFS)
Total initial stream area =        1.730(Ac.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.200 to Point/Station       2.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   457.000(Ft.)
Downstream point/station elevation =   455.500(Ft.)
Pipe length  =    29.40(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.135(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.135(CFS)
Normal flow depth in pipe =    4.96(In.)
Flow top width inside pipe =   19.43(In.)
Critical Depth =    8.55(In.)
Pipe flow velocity =      8.84(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    12.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.200 to Point/Station       2.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.730(Ac.)
Runoff from this stream =      4.135(CFS)
Time of concentration =   12.43 min.
Rainfall intensity =     5.126(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        3.855     11.22           5.476
2        4.501     11.62           5.353
3        4.135     12.43           5.126
Qmax(1) =
           1.000 *    1.000 *     3.855) +
           1.000 *    0.965 *     4.501) +
           1.000 *    0.903 *     4.135) + =      11.932
Qmax(2) =
           0.977 *    1.000 *     3.855) +
           1.000 *    1.000 *     4.501) +
           1.000 *    0.935 *     4.135) + =      12.136
Qmax(3) =
           0.936 *    1.000 *     3.855) +
           0.958 *    1.000 *     4.501) +
           1.000 *    1.000 *     4.135) + =      12.054

Total of 3 main streams to confluence:
Flow rates before confluence point:
       3.855       4.501       4.135
Maximum flow rates at confluence using above data:
      11.932      12.136      12.054
Area of streams before confluence:
        1.380       1.850       1.730

Results of confluence:
Total flow rate =     12.054(CFS)
Time of concentration =    12.427 min.
Effective stream area after confluence  =      4.960(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   455.500(Ft.)
Downstream point/station elevation =   449.500(Ft.)
Pipe length  =   227.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    12.054(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    12.054(CFS)
Normal flow depth in pipe =   10.23(In.)
Flow top width inside pipe =   23.74(In.)
Critical Depth =   14.98(In.)
Pipe flow velocity =      9.44(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =    12.83 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       4.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.960(Ac.)
Runoff from this stream =     12.054(CFS)
Time of concentration =   12.83 min.
Rainfall intensity =     5.022(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.100 to Point/Station       4.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  429.500(Ft.)
Highest elevation =  470.000(Ft.)
Lowest elevation =  462.500(Ft.)
Elevation difference =    7.500(Ft.) Slope =  1.746 %
Bottom of Initial Area Slope adjusted by User to  2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
```

```
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   1.75 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.28 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  80.000^.5)/(   1.750^(1/3)]=   8.28
The initial area total distance of  429.50 (Ft.) entered leaves a
remaining distance of  349.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.20 minutes
for a distance of 349.50 (Ft.) and a slope of  2.00 %
with an elevation difference of   6.99(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.200 Minutes
Tt=[(11.9*0.0662^3)/(  6.99)]^.385=  3.20
Total initial area Ti =   8.28 minutes from Figure 3-3 formula plus
  3.20 minutes from the Figure 3-4 formula =  11.48 minutes
Rainfall intensity (I) =      5.394(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      2.485(CFS)
Total initial stream area =        0.960(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   457.500(Ft.)
Downstream point/station elevation =   455.500(Ft.)
Pipe length  =    83.85(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.485(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.485(CFS)
Normal flow depth in pipe =    4.65(In.)
Flow top width inside pipe =   18.97(In.)
Critical Depth =    6.58(In.)
Pipe flow velocity =      5.82(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    11.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        3.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.960(Ac.)
Runoff from this stream =      2.485(CFS)
Time of concentration =   11.72 min.
Rainfall intensity =     5.322(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.100 to Point/Station        5.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  354.000(Ft.)
Highest elevation =  468.000(Ft.)
Lowest elevation =  462.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  1.695 %
Top of Initial Area Slope adjusted by User to  1.830 %
Bottom of Initial Area Slope adjusted by User to  2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   1.83 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.16 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  80.000^.5)/(   1.830^(1/3)]=   8.16
The initial area total distance of  354.00 (Ft.) entered leaves a
remaining distance of  274.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.65 minutes
for a distance of 274.00 (Ft.) and a slope of  2.00 %
with an elevation difference of   5.48(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.653 Minutes
Tt=[(11.9*0.0519^3)/(  5.48)]^.385=  2.65
Total initial area Ti =   8.16 minutes from Figure 3-3 formula plus
  2.65 minutes from the Figure 3-4 formula =  10.81 minutes
Rainfall intensity (I) =      5.607(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      2.503(CFS)
Total initial stream area =        0.930(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   457.000(Ft.)
Downstream point/station elevation =   455.500(Ft.)
Pipe length  =    35.35(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.503(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.503(CFS)
Normal flow depth in pipe =    4.05(In.)
Flow top width inside pipe =   17.98(In.)
Critical Depth =    6.60(In.)
Pipe flow velocity =      7.14(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    10.90 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.200 to Point/Station       3.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      2.503(CFS)
Time of concentration =   10.90 min.
Rainfall intensity =     5.579(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.485     11.72          5.322
2        2.503     10.90          5.579
Qmax(1) =
           1.000 *    1.000 *     2.485) +
           0.954 *    1.000 *     2.503) + =       4.873
Qmax(2) =
           1.000 *    0.929 *     2.485) +
           1.000 *    1.000 *     2.503) + =       4.813

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.485       2.503
Maximum flow rates at confluence using above data:
        4.873       4.813
Area of streams before confluence:
        0.960       0.930
Results of confluence:
Total flow rate =      4.873(CFS)
Time of concentration =    11.723 min.
Effective stream area after confluence =      1.890(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   455.500(Ft.)
Downstream point/station elevation =   449.500(Ft.)
Pipe length  =   169.50(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.873(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.873(CFS)
Normal flow depth in pipe =    5.89(In.)
Flow top width inside pipe =   20.65(In.)
Critical Depth =    9.32(In.)
Pipe flow velocity =      8.14(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    12.07 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.890(Ac.)
Runoff from this stream =      4.873(CFS)
Time of concentration =   12.07 min.
Rainfall intensity =     5.223(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       12.054     12.83          5.022
2        4.873     12.07          5.223
Qmax(1) =
           1.000 *    1.000 *    12.054) +
           0.962 *    1.000 *     4.873) + =      16.740
Qmax(2) =
           1.000 *    0.941 *    12.054) +
           1.000 *    1.000 *     4.873) + =      16.216

Total of 2 main streams to confluence:
Flow rates before confluence point:
      12.054       4.873
Maximum flow rates at confluence using above data:
       16.740      16.216
Area of streams before confluence:
        4.960       1.890


Results of confluence:
Total flow rate =     16.740(CFS)
Time of concentration =    12.828 min.
Effective stream area after confluence  =      6.850(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   449.500(Ft.)
Downstream point/station elevation =   447.500(Ft.)
Pipe length  =   111.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    16.740(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    16.740(CFS)
Normal flow depth in pipe =   11.38(In.)
Flow top width inside pipe =   33.48(In.)
Critical Depth =   15.69(In.)
Pipe flow velocity =      8.73(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    13.04 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.850(Ac.)
Runoff from this stream =      16.740(CFS)
Time of concentration =   13.04 min.
Rainfall intensity =     4.969(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.100 to Point/Station       6.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.462
Initial subarea total flow distance  =  448.500(Ft.)
Highest elevation =  462.000(Ft.)
Lowest elevation =  454.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.784 %
Top of Initial Area Slope adjusted by User to  2.200 %
Bottom of Initial Area Slope adjusted by User to  2.300 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.20 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.90 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4620)*(  80.000^.5)/(   2.200^(1/3)]=   7.90
The initial area total distance of  448.50 (Ft.) entered leaves a
remaining distance of  368.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.16 minutes
for a distance of 368.50 (Ft.) and a slope of  2.30 %
with an elevation difference of   8.48(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.159 Minutes
Tt=[(11.9*0.0698^3)/(  8.48)]^.385=  3.16
Total initial area Ti =   7.90 minutes from Figure 3-3 formula plus
  3.16 minutes from the Figure 3-4 formula =  11.06 minutes
Rainfall intensity (I) =      5.527(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.462
Subarea runoff =      4.801(CFS)
Total initial stream area =        1.880(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.200 to Point/Station       5.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   448.500(Ft.)
Downstream point/station elevation =   447.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.801(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.801(CFS)
Normal flow depth in pipe =    4.40(In.)
Flow top width inside pipe =   18.57(In.)
Critical Depth =    9.24(In.)
Pipe flow velocity =     12.15(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.200 to Point/Station       5.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.880(Ac.)
Runoff from this stream =      4.801(CFS)
Time of concentration =   11.07 min.
Rainfall intensity =     5.523(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.740     13.04           4.969
2        4.801     11.07           5.523
Qmax(1) =
           1.000 *    1.000 *    16.740) +
           0.900 *    1.000 *     4.801) + =      21.059
Qmax(2) =
           1.000 *    0.849 *    16.740) +
           1.000 *    1.000 *     4.801) + =      19.008

Total of 2 main streams to confluence:
Flow rates before confluence point:
      16.740       4.801
Maximum flow rates at confluence using above data:
       21.059       19.008
Area of streams before confluence:
        6.850        1.880


Results of confluence:
Total flow rate =     21.059(CFS)
Time of concentration =    13.041 min.
Effective stream area after confluence  =      8.730(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   447.500(Ft.)
Downstream point/station elevation =   439.500(Ft.)
Pipe length  =   267.76(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    21.059(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    21.059(CFS)
Normal flow depth in pipe =   11.21(In.)
Flow top width inside pipe =   33.34(In.)
Critical Depth =   17.69(In.)
Pipe flow velocity =     11.20(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =    13.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.730(Ac.)
Runoff from this stream =     21.059(CFS)
Time of concentration =   13.44 min.
Rainfall intensity =     4.873(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.100 to Point/Station       7.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.474
Initial subarea total flow distance  =  574.600(Ft.)
Highest elevation =  460.000(Ft.)
Lowest elevation =  446.000(Ft.)
Elevation difference =   14.000(Ft.) Slope =  2.436 %
Top of Initial Area Slope adjusted by User to  1.175 %
Bottom of Initial Area Slope adjusted by User to  2.600 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.18 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.93 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4740)*(  70.000^.5)/(   1.175^(1/3)]=   8.93
The initial area total distance of  574.60 (Ft.) entered leaves a
remaining distance of  504.60 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.84 minutes
for a distance of 504.60 (Ft.) and a slope of  2.60 %
with an elevation difference of  13.12(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.838 Minutes
Tt=[(11.9*0.0956^3)/( 13.12)]^.385=  3.84
Total initial area Ti =   8.93 minutes from Figure 3-3 formula plus
  3.84 minutes from the Figure 3-4 formula =  12.77 minutes
Rainfall intensity (I) =      5.036(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.474
Subarea runoff =      5.419(CFS)
Total initial stream area =        2.270(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.200 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   441.000(Ft.)
Downstream point/station elevation =   439.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.419(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.419(CFS)
Normal flow depth in pipe =    4.33(In.)
Flow top width inside pipe =   18.46(In.)
Critical Depth =    9.84(In.)
Pipe flow velocity =     14.05(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    12.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.200 to Point/Station       6.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.270(Ac.)
Runoff from this stream =      5.419(CFS)
Time of concentration =   12.78 min.
Rainfall intensity =     5.033(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.100 to Point/Station       8.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.950
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
```

```
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.452
Initial subarea total flow distance  =  564.000(Ft.)
Highest elevation =  460.000(Ft.)
Lowest elevation =  446.000(Ft.)
Elevation difference =   14.000(Ft.) Slope =  2.482 %
Top of Initial Area Slope adjusted by User to  1.170 %
Bottom of Initial Area Slope adjusted by User to  2.680 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.17 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.27 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4515)*(  70.000^.5)/(   1.170^(1/3)]=   9.27
The initial area total distance of  564.00 (Ft.) entered leaves a
remaining distance of  494.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.73 minutes
for a distance of 494.00 (Ft.) and a slope of  2.68 %
with an elevation difference of  13.24(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.732 Minutes
Tt=[(11.9*0.0936^3)/( 13.24)]^.385=  3.73
Total initial area Ti =   9.27 minutes from Figure 3-3 formula plus
  3.73 minutes from the Figure 3-4 formula =  13.00 minutes
Rainfall intensity (I) =      4.979(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.452
Subarea runoff =      3.260(CFS)
Total initial stream area =        1.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.200 to Point/Station        6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   441.000(Ft.)
Downstream point/station elevation =   439.500(Ft.)
Pipe length  =    25.96(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.260(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.260(CFS)
Normal flow depth in pipe =    4.27(In.)
Flow top width inside pipe =   18.36(In.)
Critical Depth =    7.56(In.)
Pipe flow velocity =      8.61(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    13.05 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.200 to Point/Station        6.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
```

```
Stream flow area =      1.450(Ac.)
Runoff from this stream =      3.260(CFS)
Time of concentration =   13.05 min.
Rainfall intensity =     4.967(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1       21.059     13.44           4.873
2        5.419     12.78           5.033
3        3.260     13.05           4.967
Qmax(1) =
           1.000 *    1.000 *    21.059) +
           0.968 *    1.000 *     5.419) +
           0.981 *    1.000 *     3.260) + =      29.504
Qmax(2) =
           1.000 *    0.951 *    21.059) +
           1.000 *    1.000 *     5.419) +
           1.000 *    0.980 *     3.260) + =      28.642
Qmax(3) =
           1.000 *    0.971 *    21.059) +
           0.987 *    1.000 *     5.419) +
           1.000 *    1.000 *     3.260) + =      29.055

Total of 3 main streams to confluence:
Flow rates before confluence point:
      21.059       5.419       3.260
Maximum flow rates at confluence using above data:
       29.504       28.642       29.055
Area of streams before confluence:
        8.730        2.270        1.450


Results of confluence:
Total flow rate =     29.504(CFS)
Time of concentration =    13.440 min.
Effective stream area after confluence  =     12.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   439.500(Ft.)
Downstream point/station elevation =   432.500(Ft.)
Pipe length  =   145.26(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    29.504(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    29.504(CFS)
Normal flow depth in pipe =   11.81(In.)
Flow top width inside pipe =   33.81(In.)
Critical Depth =   21.12(In.)
Pipe flow velocity =     14.63(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    13.61 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.000 to Point/Station       7.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      12.450(Ac.)
Runoff from this stream =      29.504(CFS)
Time of concentration =   13.61 min.
Rainfall intensity =     4.835(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.100 to Point/Station       9.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.471
Initial subarea total flow distance  =  740.000(Ft.)
Highest elevation =  470.000(Ft.)
Lowest elevation =  438.000(Ft.)
Elevation difference =   32.000(Ft.) Slope =  4.324 %
Top of Initial Area Slope adjusted by User to  1.700 %
Bottom of Initial Area Slope adjusted by User to  6.800 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   1.70 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.48 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4710)*(  80.000^.5)/(   1.700^(1/3)]=   8.48
The initial area total distance of  740.00 (Ft.) entered leaves a
remaining distance of  660.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.26 minutes
for a distance of 660.00 (Ft.) and a slope of  6.80 %
with an elevation difference of  44.88(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.259 Minutes
Tt=[(11.9*0.1250^3)/( 44.88)]^.385=  3.26
Total initial area Ti =   8.48 minutes from Figure 3-3 formula plus
  3.26 minutes from the Figure 3-4 formula =  11.74 minutes
Rainfall intensity (I) =      5.316(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.471
Subarea runoff =      4.282(CFS)
Total initial stream area =        1.710(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.200 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   433.000(Ft.)
Downstream point/station elevation =   432.500(Ft.)
Pipe length  =     7.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.282(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.282(CFS)
Normal flow depth in pipe =    4.64(In.)
Flow top width inside pipe =   18.96(In.)
Critical Depth =    8.72(In.)
Pipe flow velocity =     10.05(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.200 to Point/Station       7.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.710(Ac.)
Runoff from this stream =      4.282(CFS)
Time of concentration =   11.76 min.
Rainfall intensity =     5.313(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       29.504     13.61           4.835
2        4.282     11.76           5.313
Qmax(1) =
            1.000 *    1.000 *    29.504) +
            0.910 *    1.000 *     4.282) + =      33.400
Qmax(2) =
            1.000 *    0.864 *    29.504) +
            1.000 *    1.000 *     4.282) + =      29.775

Total of 2 main streams to confluence:
Flow rates before confluence point:
      29.504       4.282
Maximum flow rates at confluence using above data:
       33.400       29.775
Area of streams before confluence:
       12.450        1.710


Results of confluence:
Total flow rate =     33.400(CFS)
Time of concentration =    13.605 min.
Effective stream area after confluence  =     14.160(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station      11.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   432.500(Ft.)
Downstream point/station elevation =   427.500(Ft.)
Pipe length  =   111.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    33.400(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    33.400(CFS)
Normal flow depth in pipe =   12.83(In.)
Flow top width inside pipe =   34.48(In.)
Critical Depth =   22.53(In.)
Pipe flow velocity =     14.77(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    13.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station      11.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     14.160(Ac.)
Runoff from this stream =     33.400(CFS)
Time of concentration =   13.73 min.
Rainfall intensity =     4.806(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.100 to Point/Station      10.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.474
Initial subarea total flow distance  =  726.000(Ft.)
Highest elevation =  470.000(Ft.)
Lowest elevation =  451.000(Ft.)
Elevation difference =   19.000(Ft.) Slope =  2.617 %
Top of Initial Area Slope adjusted by User to  1.770 %
Bottom of Initial Area Slope adjusted by User to  3.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   1.77 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.33 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4740)*(  80.000^.5)/(   1.770^(1/3)]=   8.33
The initial area total distance of  726.00 (Ft.) entered leaves a
remaining distance of  646.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.19 minutes
for a distance of 646.00 (Ft.) and a slope of  3.40 %
with an elevation difference of  21.96(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.187 Minutes
Tt=[(11.9*0.1223^3)/( 21.96)]^.385=  4.19
Total initial area Ti =   8.33 minutes from Figure 3-3 formula plus
  4.19 minutes from the Figure 3-4 formula =  12.52 minutes
Rainfall intensity (I) =      5.102(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.474
Subarea runoff =      8.996(CFS)
Total initial stream area =        3.720(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.200 to Point/Station       8.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   446.000(Ft.)
Downstream point/station elevation =   444.500(Ft.)
Pipe length  =    11.73(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.996(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.996(CFS)
Normal flow depth in pipe =    5.81(In.)
Flow top width inside pipe =   20.56(In.)
Critical Depth =   12.84(In.)
Pipe flow velocity =     15.35(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    12.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   444.500(Ft.)
Downstream point/station elevation =   436.500(Ft.)
Pipe length  =   244.50(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.996(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.996(CFS)
Normal flow depth in pipe =    8.24(In.)
Flow top width inside pipe =   22.79(In.)
Critical Depth =   12.84(In.)
Pipe flow velocity =      9.42(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =    12.96 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.720(Ac.)
Runoff from this stream =      8.996(CFS)
Time of concentration =   12.96 min.
Rainfall intensity =     4.988(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.100 to Point/Station      11.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.471
Initial subarea total flow distance  =  770.600(Ft.)
Highest elevation =  468.000(Ft.)
Lowest elevation =  442.000(Ft.)
Elevation difference =   26.000(Ft.) Slope =  3.374 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  3.580 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.04 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4710)*(  80.000^.5)/(   2.000^(1/3)]=   8.04
The initial area total distance of  770.60 (Ft.) entered leaves a
remaining distance of  690.60 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.32 minutes
for a distance of 690.60 (Ft.) and a slope of  3.58 %
with an elevation difference of  24.72(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.321 Minutes
Tt=[(11.9*0.1308^3)/( 24.72)]^.385=  4.32
Total initial area Ti =   8.04 minutes from Figure 3-3 formula plus
  4.32 minutes from the Figure 3-4 formula =  12.36 minutes
Rainfall intensity (I) =      5.144(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.471
Subarea runoff =      4.676(CFS)
Total initial stream area =        1.930(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.200 to Point/Station       9.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   437.000(Ft.)
Downstream point/station elevation =   436.500(Ft.)
Pipe length  =    37.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.676(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.676(CFS)
Normal flow depth in pipe =    7.38(In.)
Flow top width inside pipe =   22.15(In.)
Critical Depth =    9.13(In.)
Pipe flow velocity =      5.71(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    12.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.200 to Point/Station       9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.930(Ac.)
Runoff from this stream =      4.676(CFS)
Time of concentration =   12.47 min.
Rainfall intensity =     5.116(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        8.996     12.96           4.988
2        4.676     12.47           5.116
Qmax(1) =
            1.000 *    1.000 *     8.996) +
            0.975 *    1.000 *     4.676) + =      13.556
Qmax(2) =
            1.000 *    0.962 *     8.996) +
            1.000 *    1.000 *     4.676) + =      13.327

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.996       4.676
Maximum flow rates at confluence using above data:
      13.556      13.327
Area of streams before confluence:
        3.720       1.930
Results of confluence:
Total flow rate =     13.556(CFS)
Time of concentration =    12.964 min.
Effective stream area after confluence =      5.650(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   436.500(Ft.)
Downstream point/station elevation =   432.500(Ft.)
Pipe length  =   109.50(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    13.556(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    13.556(CFS)
Normal flow depth in pipe =    9.98(In.)
Flow top width inside pipe =   23.66(In.)
Critical Depth =   15.92(In.)
Pipe flow velocity =     10.97(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    13.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       10.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.650(Ac.)
Runoff from this stream =     13.556(CFS)
Time of concentration =   13.13 min.
Rainfall intensity =     4.947(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       12.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.474
Initial subarea total flow distance  =  454.800(Ft.)
Highest elevation =  450.000(Ft.)
Lowest elevation =  438.000(Ft.)
Elevation difference =   12.000(Ft.) Slope =  2.639 %
Top of Initial Area Slope adjusted by User to  3.570 %
Bottom of Initial Area Slope adjusted by User to  3.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   3.57 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.19 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4740)*(  95.000^.5)/(   3.570^(1/3)]=   7.19
The initial area total distance of  454.80 (Ft.) entered leaves a
remaining distance of  359.80 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.64 minutes
for a distance of 359.80 (Ft.) and a slope of  3.50 %
with an elevation difference of  12.59(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.638 Minutes
Tt=[(11.9*0.0681^3)/( 12.59)]^.385=  2.64
Total initial area Ti =   7.19 minutes from Figure 3-3 formula plus
  2.64 minutes from the Figure 3-4 formula =   9.82 minutes
Rainfall intensity (I) =      5.965(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.474
Subarea runoff =      2.941(CFS)
Total initial stream area =        1.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.200 to Point/Station       10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   433.000(Ft.)
Downstream point/station elevation =   432.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.941(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.941(CFS)
Normal flow depth in pipe =    4.10(In.)
Flow top width inside pipe =   18.07(In.)
Critical Depth =    7.16(In.)
Pipe flow velocity =      8.24(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     9.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.200 to Point/Station       10.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.040(Ac.)
Runoff from this stream =      2.941(CFS)
Time of concentration =    9.84 min.
Rainfall intensity =     5.958(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       13.556     13.13           4.947
2        2.941      9.84           5.958
Qmax(1) =
            1.000 *    1.000 *    13.556) +
            0.830 *    1.000 *     2.941) + =      15.997
Qmax(2) =
            1.000 *    0.750 *    13.556) +
            1.000 *    1.000 *     2.941) + =      13.102

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
      13.556       2.941
Maximum flow rates at confluence using above data:
       15.997       13.102
Area of streams before confluence:
        5.650        1.040
Results of confluence:
Total flow rate =      15.997(CFS)
Time of concentration =    13.130 min.
Effective stream area after confluence =      6.690(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   432.500(Ft.)
Downstream point/station elevation =   427.500(Ft.)
Pipe length  =   149.48(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    15.997(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    15.997(CFS)
Normal flow depth in pipe =   11.23(In.)
Flow top width inside pipe =   23.95(In.)
Critical Depth =   17.31(In.)
Pipe flow velocity =     11.09(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    13.35 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.690(Ac.)
Runoff from this stream =     15.997(CFS)
Time of concentration =   13.35 min.
Rainfall intensity =     4.893(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       33.400     13.73           4.806
2       15.997     13.35           4.893
Qmax(1) =
            1.000 *    1.000 *    33.400) +
            0.982 *    1.000 *    15.997) + =      49.114
Qmax(2) =
            1.000 *    0.973 *    33.400) +
            1.000 *    1.000 *    15.997) + =      48.483

Total of 2 main streams to confluence:
Flow rates before confluence point:
      33.400      15.997
Maximum flow rates at confluence using above data:
       49.114       48.483
Area of streams before confluence:
       14.160        6.690


Results of confluence:
Total flow rate =     49.114(CFS)
Time of concentration =    13.731 min.
Effective stream area after confluence  =     20.850(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   427.500(Ft.)
Downstream point/station elevation =   418.500(Ft.)
Pipe length  =   303.65(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    49.114(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    49.114(CFS)
Normal flow depth in pipe =   17.86(In.)
Flow top width inside pipe =   36.00(In.)
Critical Depth =   27.37(In.)
Pipe flow velocity =     14.03(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =    14.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     20.850(Ac.)
Runoff from this stream =     49.114(CFS)
Time of concentration =   14.09 min.
Rainfall intensity =     4.727(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.100 to Point/Station       13.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.459
Initial subarea total flow distance  =  679.740(Ft.)
Highest elevation =  460.000(Ft.)
```

```
Lowest elevation =  424.000(Ft.)
Elevation difference =   36.000(Ft.) Slope =  5.296 %
Top of Initial Area Slope adjusted by User to  6.300 %
Bottom of Initial Area Slope adjusted by User to  3.180 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.30 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.25 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4590)*( 100.000^.5)/(   6.300^(1/3)]=   6.25
The initial area total distance of  679.74 (Ft.) entered leaves a
remaining distance of  579.74 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.95 minutes
for a distance of 579.74 (Ft.) and a slope of  3.18 %
with an elevation difference of  18.44(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.952 Minutes
Tt=[(11.9*0.1098^3)/( 18.44)]^.385=  3.95
Total initial area Ti =   6.25 minutes from Figure 3-3 formula plus
  3.95 minutes from the Figure 3-4 formula =  10.20 minutes
Rainfall intensity (I) =      5.822(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.459
Subarea runoff =      3.742(CFS)
Total initial stream area =        1.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.200 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   419.000(Ft.)
Downstream point/station elevation =   418.500(Ft.)
Pipe length  =    27.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.742(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.742(CFS)
Normal flow depth in pipe =    6.07(In.)
Flow top width inside pipe =   20.87(In.)
Critical Depth =    8.12(In.)
Pipe flow velocity =      5.99(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    10.27 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.200 to Point/Station       12.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.400(Ac.)
Runoff from this stream =      3.742(CFS)
Time of concentration =   10.27 min.
Rainfall intensity =     5.795(In/Hr)
Summary of stream data:
```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	49.114	14.09	4.727
2	3.742	10.27	5.795

```
Qmax(1) =
           1.000 *    1.000 *    49.114) +
           0.816 *    1.000 *     3.742) + =      52.166
Qmax(2) =
           1.000 *    0.729 *    49.114) +
           1.000 *    1.000 *     3.742) + =      39.552

Total of 2 main streams to confluence:
Flow rates before confluence point:
      49.114       3.742
Maximum flow rates at confluence using above data:
       52.166       39.552
Area of streams before confluence:
       20.850       1.400


Results of confluence:
Total flow rate =      52.166(CFS)
Time of concentration =    14.091 min.
Effective stream area after confluence  =     22.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   418.500(Ft.)
Downstream point/station elevation =   408.500(Ft.)
Pipe length  =   357.72(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    52.166(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    52.166(CFS)
Normal flow depth in pipe =   18.84(In.)
Flow top width inside pipe =   35.96(In.)
Critical Depth =   28.18(In.)
Pipe flow velocity =     13.94(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =    14.52 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     22.250(Ac.)
Runoff from this stream =     52.166(CFS)
Time of concentration =   14.52 min.
Rainfall intensity =     4.636(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.100 to Point/Station       15.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.462
Initial subarea total flow distance  =  406.000(Ft.)
Highest elevation =  428.000(Ft.)
Lowest elevation =  416.000(Ft.)
Elevation difference =   12.000(Ft.) Slope =  2.956 %
Top of Initial Area Slope adjusted by User to  2.700 %
Bottom of Initial Area Slope adjusted by User to  2.320 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   2.70 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.04 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4620)*(  95.000^.5)/(   2.700^(1/3)]=   8.04
The initial area total distance of  406.00 (Ft.) entered leaves a
remaining distance of  311.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.76 minutes
for a distance of 311.00 (Ft.) and a slope of  2.32 %
with an elevation difference of   7.22(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.763 Minutes
Tt=[(11.9*0.0589^3)/(  7.22)]^.385=  2.76
Total initial area Ti =   8.04 minutes from Figure 3-3 formula plus
  2.76 minutes from the Figure 3-4 formula =  10.80 minutes
Rainfall intensity (I) =      5.611(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.462
Subarea runoff =      2.100(CFS)
Total initial stream area =        0.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.200 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   411.000(Ft.)
Downstream point/station elevation =   408.500(Ft.)
Pipe length  =    32.32(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.100(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.100(CFS)
Normal flow depth in pipe =    3.22(In.)
Flow top width inside pipe =   16.35(In.)
Critical Depth =    6.04(In.)
Pipe flow velocity =      8.37(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    10.87 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.200 to Point/Station       13.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.810(Ac.)
Runoff from this stream =      2.100(CFS)
Time of concentration =   10.87 min.
Rainfall intensity =     5.590(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.100 to Point/Station       14.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  = 1070.000(Ft.)
Highest elevation =  442.000(Ft.)
Lowest elevation =  414.000(Ft.)
Elevation difference =   28.000(Ft.) Slope =  2.617 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  2.280 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of 1070.00 (Ft.) entered leaves a
remaining distance of  990.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   6.78 minutes
for a distance of 990.00 (Ft.) and a slope of  2.28 %
with an elevation difference of  22.57(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    6.783 Minutes
Tt=[(11.9*0.1875^3)/( 22.57)]^.385=  6.78
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  6.78 minutes from the Figure 3-4 formula =  15.09 minutes
Rainfall intensity (I) =      4.523(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      3.460(CFS)
Total initial stream area =        1.700(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.200 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   409.000(Ft.)
Downstream point/station elevation =   408.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.460(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.460(CFS)
Normal flow depth in pipe =    4.55(In.)
Flow top width inside pipe =   18.81(In.)
Critical Depth =    7.80(In.)
Pipe flow velocity =      8.35(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    15.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.200 to Point/Station       13.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.700(Ac.)
Runoff from this stream =      3.460(CFS)
Time of concentration =   15.11 min.
Rainfall intensity =     4.519(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       52.166     14.52           4.636
2        2.100     10.87           5.590
3        3.460     15.11           4.519
Qmax(1) =
            1.000 *    1.000 *    52.166) +
            0.829 *    1.000 *     2.100) +
            1.000 *    0.961 *     3.460) + =      57.232
Qmax(2) =
            1.000 *    0.748 *    52.166) +
            1.000 *    1.000 *     2.100) +
            1.000 *    0.719 *     3.460) + =      43.625
Qmax(3) =
            0.975 *    1.000 *    52.166) +
            0.808 *    1.000 *     2.100) +
            1.000 *    1.000 *     3.460) + =      56.001

Total of 3 main streams to confluence:
Flow rates before confluence point:
      52.166       2.100       3.460
Maximum flow rates at confluence using above data:
       57.232       43.625       56.001
Area of streams before confluence:
       22.250        0.810        1.700

Results of confluence:
Total flow rate =     57.232(CFS)
Time of concentration =    14.519 min.
Effective stream area after confluence  =     24.760(Ac.)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   408.500(Ft.)
Downstream point/station elevation =   405.500(Ft.)
Pipe length  =   366.31(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    57.232(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =    57.232(CFS)
Normal flow depth in pipe =   26.53(In.)
Flow top width inside pipe =   40.52(In.)
Critical Depth =   28.45(In.)
Pipe flow velocity =      8.94(Ft/s)
Travel time through pipe =    0.68 min.
Time of concentration (TC) =    15.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     24.760(Ac.)
Runoff from this stream =     57.232(CFS)
Time of concentration =   15.20 min.
Rainfall intensity =     4.501(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.100 to Point/Station       16.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.459
Initial subarea total flow distance  =  445.000(Ft.)
Highest elevation =  420.000(Ft.)
Lowest elevation =  411.000(Ft.)
Elevation difference =    9.000(Ft.) Slope =  2.022 %
Top of Initial Area Slope adjusted by User to  2.500 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
```

```
for the top area slope value of   2.50 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.29 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4590)*(  95.000^.5)/(   2.500^(1/3)]=   8.29
The initial area total distance of  445.00 (Ft.) entered leaves a
remaining distance of  350.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.18 minutes
for a distance of 350.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.50(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.183 Minutes
Tt=[(11.9*0.0663^3)/(  3.50)]^.385=  4.18
Total initial area Ti =   8.29 minutes from Figure 3-3 formula plus
  4.18 minutes from the Figure 3-4 formula =  12.47 minutes
Rainfall intensity (I) =      5.115(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.459
Subarea runoff =      2.066(CFS)
Total initial stream area =        0.880(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.200 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   406.000(Ft.)
Downstream point/station elevation =   405.500(Ft.)
Pipe length  =    24.56(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.066(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.066(CFS)
Normal flow depth in pipe =    4.41(In.)
Flow top width inside pipe =   18.59(In.)
Critical Depth =    5.98(In.)
Pipe flow velocity =      5.21(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    12.55 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.200 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.880(Ac.)
Runoff from this stream =      2.066(CFS)
Time of concentration =   12.55 min.
Rainfall intensity =     5.094(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       57.232     15.20           4.501
2        2.066     12.55           5.094
Qmax(1) =
            1.000 *    1.000 *    57.232) +
            0.884 *    1.000 *     2.066) + =      59.058
Qmax(2) =
            1.000 *    0.825 *    57.232) +
            1.000 *    1.000 *     2.066) + =      49.306

Total of 2 main streams to confluence:
Flow rates before confluence point:
     57.232       2.066
Maximum flow rates at confluence using above data:
       59.058       49.306
Area of streams before confluence:
       24.760        0.880


Results of confluence:
Total flow rate =     59.058(CFS)
Time of concentration =    15.202 min.
Effective stream area after confluence  =     25.640(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   405.500(Ft.)
Downstream point/station elevation =   404.000(Ft.)
Pipe length  =    71.52(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    59.058(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =    59.058(CFS)
Normal flow depth in pipe =   20.20(In.)
Flow top width inside pipe =   41.97(In.)
Critical Depth =   28.91(In.)
Pipe flow velocity =     12.91(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    15.29 min.
End of computations, total study area =          25.640 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/07/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 1
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.100 to Point/Station       17.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  683.000(Ft.)
Highest elevation =  470.000(Ft.)
Lowest elevation =  436.000(Ft.)
Elevation difference =   34.000(Ft.) Slope =  4.978 %
Top of Initial Area Slope adjusted by User to  1.780 %
Bottom of Initial Area Slope adjusted by User to  9.410 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   1.78 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.24 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  80.000^.5)/(   1.780^(1/3)]=   8.24
The initial area total distance of  683.00 (Ft.) entered leaves a
remaining distance of  603.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.68 minutes
for a distance of 603.00 (Ft.) and a slope of  9.41 %
with an elevation difference of  56.74(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.683 Minutes
Tt=[(11.9*0.1142^3)/( 56.74)]^.385=  2.68
Total initial area Ti =   8.24 minutes from Figure 3-3 formula plus
  2.68 minutes from the Figure 3-4 formula =  10.92 minutes
Rainfall intensity (I) =      5.572(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      5.697(CFS)
Total initial stream area =        2.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.200 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   431.000(Ft.)
Downstream point/station elevation =   429.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.697(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.697(CFS)
Normal flow depth in pipe =    4.44(In.)
Flow top width inside pipe =   18.63(In.)
Critical Depth =   10.11(In.)
Pipe flow velocity =     14.25(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.93 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   429.500(Ft.)
Downstream point/station elevation =   417.500(Ft.)
Pipe length  =   195.60(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.697(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.697(CFS)
Normal flow depth in pipe =    5.55(In.)
Flow top width inside pipe =   20.24(In.)
Critical Depth =   10.11(In.)
Pipe flow velocity =     10.35(Ft/s)
Travel time through pipe =    0.31 min.
Time of concentration (TC) =    11.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.130(Ac.)
Runoff from this stream =      5.697(CFS)
Time of concentration =   11.25 min.
Rainfall intensity =     5.467(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.100 to Point/Station       18.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.400
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.468
Initial subarea total flow distance  =  615.670(Ft.)
Highest elevation =  458.000(Ft.)
Lowest elevation =  423.000(Ft.)
Elevation difference =   35.000(Ft.) Slope =  5.685 %
Top of Initial Area Slope adjusted by User to  5.440 %
Bottom of Initial Area Slope adjusted by User to  5.600 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   5.44 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.47 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4680)*( 100.000^.5)/(   5.440^(1/3)]=   6.47
The initial area total distance of  615.67 (Ft.) entered leaves a
remaining distance of  515.67 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.90 minutes
for a distance of 515.67 (Ft.) and a slope of  5.60 %
with an elevation difference of  28.88(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.904 Minutes
Tt=[(11.9*0.0977^3)/( 28.88)]^.385=  2.90
Total initial area Ti =   6.47 minutes from Figure 3-3 formula plus
  2.90 minutes from the Figure 3-4 formula =   9.37 minutes
Rainfall intensity (I) =      6.149(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.468
Subarea runoff =      4.460(CFS)
Total initial stream area =        1.550(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.200 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   418.000(Ft.)
Downstream point/station elevation =   417.500(Ft.)
Pipe length  =    25.50(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.460(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.460(CFS)
Normal flow depth in pipe =    6.54(In.)
Flow top width inside pipe =   21.37(In.)
Critical Depth =    8.91(In.)
Pipe flow velocity =      6.43(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     9.44 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.200 to Point/Station       17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.550(Ac.)
Runoff from this stream =      4.460(CFS)
Time of concentration =    9.44 min.
Rainfall intensity =     6.121(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        5.697     11.25           5.467
2        4.460      9.44           6.121
Qmax(1) =
           1.000 *    1.000 *     5.697) +
           0.893 *    1.000 *     4.460) + =       9.681
Qmax(2) =
           1.000 *    0.839 *     5.697) +
           1.000 *    1.000 *     4.460) + =       9.242

Total of 2 main streams to confluence:
Flow rates before confluence point:
       5.697       4.460
Maximum flow rates at confluence using above data:
       9.681       9.242
Area of streams before confluence:
       2.130       1.550


Results of confluence:
Total flow rate =      9.681(CFS)
Time of concentration =    11.246 min.
Effective stream area after confluence  =      3.680(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   417.500(Ft.)
Downstream point/station elevation =   410.500(Ft.)
Pipe length  =   345.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     9.681(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     9.681(CFS)
Normal flow depth in pipe =    9.75(In.)
Flow top width inside pipe =   23.57(In.)
Critical Depth =   13.35(In.)
Pipe flow velocity =      8.08(Ft/s)
Travel time through pipe =    0.71 min.
Time of concentration (TC) =    11.96 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.680(Ac.)
Runoff from this stream =      9.681(CFS)
Time of concentration =   11.96 min.
Rainfall intensity =     5.255(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.100 to Point/Station       20.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  490.500(Ft.)
Highest elevation =  464.000(Ft.)
Lowest elevation =  434.000(Ft.)
Elevation difference =   30.000(Ft.) Slope =  6.116 %
Top of Initial Area Slope adjusted by User to  2.330 %
Bottom of Initial Area Slope adjusted by User to  9.800 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.33 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.53 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  80.000^.5)/(   2.330^(1/3)]=   7.53
The initial area total distance of  490.50 (Ft.) entered leaves a
remaining distance of  410.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.96 minutes
for a distance of 410.50 (Ft.) and a slope of  9.80 %
with an elevation difference of  40.23(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.964 Minutes
Tt=[(11.9*0.0777^3)/( 40.23)]^.385=  1.96
Total initial area Ti =   7.53 minutes from Figure 3-3 formula plus
  1.96 minutes from the Figure 3-4 formula =   9.49 minutes
Rainfall intensity (I) =      6.098(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      3.073(CFS)
Total initial stream area =        1.050(Ac.)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.200 to Point/Station       18.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   429.000(Ft.)
Downstream point/station elevation =   426.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.073(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.073(CFS)
Normal flow depth in pipe =    2.91(In.)
Flow top width inside pipe =   15.66(In.)
Critical Depth =    7.33(In.)
Pipe flow velocity =     14.20(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     9.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.200 to Point/Station       18.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.050(Ac.)
Runoff from this stream =      3.073(CFS)
Time of concentration =    9.51 min.
Rainfall intensity =     6.093(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.100 to Point/Station       21.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  402.600(Ft.)
Highest elevation =  462.000(Ft.)
Lowest elevation =  432.000(Ft.)
Elevation difference =   30.000(Ft.) Slope =  7.452 %
Top of Initial Area Slope adjusted by User to  4.900 %
Bottom of Initial Area Slope adjusted by User to  9.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   4.90 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.57 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*( 100.000^.5)/(   4.900^(1/3)]=   6.57
The initial area total distance of  402.60 (Ft.) entered leaves a
remaining distance of  302.60 (Ft.)
```

```
Using Figure 3-4, the travel time for this distance is   1.57 minutes
for a distance of 302.60 (Ft.) and a slope of  9.50 %
with an elevation difference of  28.75(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.572 Minutes
Tt=[(11.9*0.0573^3)/( 28.75)]^.385=  1.57
Total initial area Ti =   6.57 minutes from Figure 3-3 formula plus
  1.57 minutes from the Figure 3-4 formula =   8.14 minutes
Rainfall intensity (I) =      6.733(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      3.296(CFS)
Total initial stream area =        1.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.200 to Point/Station       18.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   427.000(Ft.)
Downstream point/station elevation =   426.500(Ft.)
Pipe length  =    25.56(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.296(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.296(CFS)
Normal flow depth in pipe =    5.62(In.)
Flow top width inside pipe =   20.33(In.)
Critical Depth =    7.61(In.)
Pipe flow velocity =      5.89(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     8.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.200 to Point/Station       18.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.020(Ac.)
Runoff from this stream =      3.296(CFS)
Time of concentration =    8.21 min.
Rainfall intensity =     6.695(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        3.073      9.51           6.093
2        3.296      8.21           6.695
Qmax(1) =
           1.000 *    1.000 *     3.073) +
           0.910 *    1.000 *     3.296) + =       6.074
Qmax(2) =
           1.000 *    0.864 *     3.073) +
           1.000 *    1.000 *     3.296) + =       5.953

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.073       3.296
Maximum flow rates at confluence using above data:
        6.074        5.953
Area of streams before confluence:
        1.050        1.020
Results of confluence:
Total flow rate =      6.074(CFS)
Time of concentration =     9.505 min.
Effective stream area after confluence =      2.070(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   426.500(Ft.)
Downstream point/station elevation =   410.500(Ft.)
Pipe length  =   330.72(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     6.074(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     6.074(CFS)
Normal flow depth in pipe =    6.08(In.)
Flow top width inside pipe =   20.88(In.)
Critical Depth =   10.44(In.)
Pipe flow velocity =      9.69(Ft/s)
Travel time through pipe =    0.57 min.
Time of concentration (TC) =    10.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.070(Ac.)
Runoff from this stream =      6.074(CFS)
Time of concentration =   10.07 min.
Rainfall intensity =     5.869(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.100 to Point/Station       19.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  613.170(Ft.)
Highest elevation =  436.000(Ft.)
```

```
Lowest elevation =  416.000(Ft.)
Elevation difference =   20.000(Ft.) Slope =  3.262 %
Top of Initial Area Slope adjusted by User to  2.500 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   2.50 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.01 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  95.000^.5)/(   2.500^(1/3)]=   8.01
The initial area total distance of  613.17 (Ft.) entered leaves a
remaining distance of  518.17 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.66 minutes
for a distance of 518.17 (Ft.) and a slope of  1.00 %
with an elevation difference of   5.18(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.659 Minutes
Tt=[(11.9*0.0981^3)/(  5.18)]^.385=  5.66
Total initial area Ti =   8.01 minutes from Figure 3-3 formula plus
  5.66 minutes from the Figure 3-4 formula =  13.67 minutes
Rainfall intensity (I) =      4.819(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      4.927(CFS)
Total initial stream area =        2.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.100 to Point/Station       19.200
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      2.130(Ac.)
Runoff from this stream =      4.927(CFS)
Time of concentration =   13.67 min.
Rainfall intensity =     4.819(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.100 to Point/Station       22.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  443.000(Ft.)
Highest elevation =  442.000(Ft.)
Lowest elevation =  416.000(Ft.)
Elevation difference =   26.000(Ft.) Slope =  5.869 %
Top of Initial Area Slope adjusted by User to  8.950 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   8.95 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.38 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*( 100.000^.5)/(   8.950^(1/3)]=   5.38
The initial area total distance of  443.00 (Ft.) entered leaves a
remaining distance of  343.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.12 minutes
for a distance of 343.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.43(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.119 Minutes
Tt=[(11.9*0.0650^3)/(  3.43)]^.385=  4.12
Total initial area Ti =   5.38 minutes from Figure 3-3 formula plus
  4.12 minutes from the Figure 3-4 formula =   9.49 minutes
Rainfall intensity (I) =      6.098(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      3.103(CFS)
Total initial stream area =        1.060(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.100 to Point/Station       22.200
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      1.060(Ac.)
Runoff from this stream =      3.103(CFS)
Time of concentration =    9.49 min.
Rainfall intensity =     6.098(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        4.927     13.67           4.819
2        3.103      9.49           6.098
Qmax(1) =
            1.000 *    1.000 *     4.927) +
            0.790 *    1.000 *     3.103) + =       7.380
Qmax(2) =
            1.000 *    0.694 *     4.927) +
            1.000 *    1.000 *     3.103) + =       6.524

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.927       3.103
Maximum flow rates at confluence using above data:
        7.380        6.524
Area of streams before confluence:
        2.130        1.060
Results of confluence:
Total flow rate =      7.380(CFS)
Time of concentration =    13.674 min.
Effective stream area after confluence =      3.190(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.200 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   411.000(Ft.)
Downstream point/station elevation =   410.500(Ft.)
Pipe length  =     8.77(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.380(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.380(CFS)
Normal flow depth in pipe =    6.45(In.)
Flow top width inside pipe =   21.27(In.)
Critical Depth =   11.57(In.)
Pipe flow velocity =     10.87(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    13.69 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.200 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      3.190(Ac.)
Runoff from this stream =      7.380(CFS)
Time of concentration =   13.69 min.
Rainfall intensity =     4.816(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        9.681     11.96           5.255
2        6.074     10.07           5.869
3        7.380     13.69           4.816
Qmax(1) =
           1.000 *    1.000 *     9.681) +
           0.895 *    1.000 *     6.074) +
           1.000 *    0.874 *     7.380) + =      21.566
Qmax(2) =
           1.000 *    0.843 *     9.681) +
           1.000 *    1.000 *     6.074) +
           1.000 *    0.736 *     7.380) + =      19.661
Qmax(3) =
           0.917 *    1.000 *     9.681) +
           0.821 *    1.000 *     6.074) +
           1.000 *    1.000 *     7.380) + =      21.237

Total of 3 main streams to confluence:
Flow rates before confluence point:
       9.681       6.074       7.380
Maximum flow rates at confluence using above data:
       21.566       19.661       21.237
Area of streams before confluence:
        3.680        2.070        3.190

Results of confluence:
Total flow rate =     21.566(CFS)
Time of concentration =    11.957 min.
Effective stream area after confluence  =      8.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       23.200
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   410.500(Ft.)
Downstream point/station elevation =   409.500(Ft.)
Pipe length  =    29.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    21.566(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    21.566(CFS)
Normal flow depth in pipe =   13.29(In.)
Flow top width inside pipe =   23.86(In.)
Critical Depth =   19.93(In.)
Pipe flow velocity =     12.08(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    12.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       23.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.940(Ac.)
Runoff from this stream =     21.566(CFS)
Time of concentration =   12.00 min.
Rainfall intensity =     5.244(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.100 to Point/Station       23.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  373.000(Ft.)
Highest elevation =  434.000(Ft.)
Lowest elevation =  416.000(Ft.)
Elevation difference =   18.000(Ft.) Slope =  4.826 %
Top of Initial Area Slope adjusted by User to  6.900 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.90 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.86 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*( 100.000^.5)/(   6.900^(1/3)]=   5.86
The initial area total distance of  373.00 (Ft.) entered leaves a
remaining distance of  273.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.45 minutes
for a distance of 273.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.73(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.455 Minutes
Tt=[(11.9*0.0517^3)/(  2.73)]^.385=  3.45
Total initial area Ti =   5.86 minutes from Figure 3-3 formula plus
  3.45 minutes from the Figure 3-4 formula =   9.32 minutes
Rainfall intensity (I) =      6.172(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      2.489(CFS)
Total initial stream area =        0.840(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.100 to Point/Station       23.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.840(Ac.)
Runoff from this stream =      2.489(CFS)
Time of concentration =    9.32 min.
Rainfall intensity =     6.172(In/Hr)
Program is now starting with Main Stream No. 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.100 to Point/Station       23.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  428.500(Ft.)
Highest elevation =  422.000(Ft.)
Lowest elevation =  416.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  1.400 %
Top of Initial Area Slope adjusted by User to  4.270 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   4.27 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.88 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*( 100.000^.5)/(   4.270^(1/3)]=   6.88
The initial area total distance of  428.50 (Ft.) entered leaves a
remaining distance of  328.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.98 minutes
for a distance of 328.50 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.29(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.984 Minutes
Tt=[(11.9*0.0622^3)/(  3.29)]^.385=  3.98
Total initial area Ti =   6.88 minutes from Figure 3-3 formula plus
  3.98 minutes from the Figure 3-4 formula =  10.86 minutes
Rainfall intensity (I) =      5.591(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      2.388(CFS)
Total initial stream area =        0.890(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.100 to Point/Station       23.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.890(Ac.)
Runoff from this stream =      2.388(CFS)
Time of concentration =   10.86 min.
Rainfall intensity =     5.591(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       21.566     12.00           5.244
2        2.489      9.32           6.172
3        2.388     10.86           5.591
Qmax(1) =
           1.000 *    1.000 *    21.566) +
           0.850 *    1.000 *     2.489) +
           0.938 *    1.000 *     2.388) + =      25.920
Qmax(2) =
           1.000 *    0.777 *    21.566) +
           1.000 *    1.000 *     2.489) +
           1.000 *    0.858 *     2.388) + =      21.285
Qmax(3) =
           1.000 *    0.905 *    21.566) +
           0.906 *    1.000 *     2.489) +
           1.000 *    1.000 *     2.388) + =      24.169

Total of 3 main streams to confluence:
Flow rates before confluence point:
      21.566       2.489       2.388
Maximum flow rates at confluence using above data:
       25.920       21.285       24.169
Area of streams before confluence:
        8.940        0.840        0.890


Results of confluence:
Total flow rate =     25.920(CFS)
Time of concentration =    11.997 min.
Effective stream area after confluence  =     10.670(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.200 to Point/Station       20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   409.500(Ft.)
Downstream point/station elevation =   404.000(Ft.)
Pipe length  =    25.11(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    25.920(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    25.920(CFS)
Normal flow depth in pipe =    8.73(In.)
Flow top width inside pipe =   23.09(In.)
Critical Depth =   21.41(In.)
Pipe flow velocity =     25.12(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.01 min.
End of computations, total study area =          10.670 (Ac.)
```

```
        San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/14/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 1
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.100 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.265
Initial subarea total flow distance  =  325.000(Ft.)
Highest elevation =  418.000(Ft.)
Lowest elevation =  404.000(Ft.)
Elevation difference =   14.000(Ft.) Slope =  4.308 %
Top of Initial Area Slope adjusted by User to 25.000 %
Bottom of Initial Area Slope adjusted by User to  2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  25.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.14 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2650)*( 100.000^.5)/(  25.000^(1/3)]=   5.14
The initial area total distance of  325.00 (Ft.) entered leaves a
remaining distance of  225.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.28 minutes
for a distance of 225.00 (Ft.) and a slope of  2.00 %
with an elevation difference of   4.50(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.280 Minutes
Tt=[(11.9*0.0426^3)/(  4.50)]^.385=  2.28
Total initial area Ti =   5.14 minutes from Figure 3-3 formula plus
  2.28 minutes from the Figure 3-4 formula =   7.42 minutes
Rainfall intensity (I) =      7.149(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.265
Subarea runoff =      2.842(CFS)
Total initial stream area =        1.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.100 to Point/Station       21.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.500(Ac.)
Runoff from this stream =      2.842(CFS)
Time of concentration =    7.42 min.
Rainfall intensity =     7.149(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.200 to Point/Station       20.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                     ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.474
Rainfall intensity (I) =      5.240(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  12.01 min.  Rain intensity =       5.24(In/Hr)
Total area =       10.670(Ac.)  Total runoff =    25.920(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.200 to Point/Station       20.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     10.670(Ac.)
Runoff from this stream =     25.920(CFS)
Time of concentration =   12.01 min.
Rainfall intensity =     5.240(In/Hr)
Program is now starting with Main Stream No. 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.465
Rainfall intensity (I) =      4.484(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  15.29 min.  Rain intensity =       4.48(In/Hr)
Total area =       25.640(Ac.)  Total runoff =    59.058(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     25.640(Ac.)
Runoff from this stream =     59.058(CFS)
Time of concentration =   15.29 min.
Rainfall intensity =     4.484(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.842      7.42           7.149
2       25.920     12.01           5.240
3       59.058     15.29           4.484
Qmax(1) =
            1.000 *    1.000 *     2.842) +
            1.000 *    0.618 *    25.920) +
            1.000 *    0.485 *    59.058) + =      47.515
Qmax(2) =
            0.733 *    1.000 *     2.842) +
            1.000 *    1.000 *    25.920) +
            1.000 *    0.785 *    59.058) + =      74.392
Qmax(3) =
            0.627 *    1.000 *     2.842) +
            0.856 *    1.000 *    25.920) +
            1.000 *    1.000 *    59.058) + =      83.022

Total of 3 main streams to confluence:
Flow rates before confluence point:
       2.842      25.920      59.058
Maximum flow rates at confluence using above data:
       47.515       74.392       83.022
Area of streams before confluence:
        1.500       10.670       25.640
```

```
Results of confluence:
Total flow rate =     83.022(CFS)
Time of concentration =    15.290 min.
Effective stream area after confluence  =     37.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       21.000
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =  15.29
Basin Area =    37.81 Acres
6 Hour Rainfall =  3.500 Inches
Runoff Coefficient =  0.460
Peak Discharge =    83.02 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       15              3.656
       30              3.760
       45              3.993
       60              4.123
       75              4.422
       90              4.593
       105              4.992
       120              5.228
       135              5.798
       150              6.149
       165              7.048
       180              7.642
       195              9.341
       210             10.639
       225             15.622
       240             22.011
       255             83.022
       270             12.530
       285              8.383
       300              6.559
       315              5.494
       330              4.782
       345              4.266
       360              3.872
       375              3.559
```

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: **NODE 21**
5508rpl4 - Detention Pond - BMP 1

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01

********** RUNOFF HYDROGRAPHS **********

HYD 1..... 100
Read HYG 3.01

********** POND VOLUMES **********

DETENTION 1..... Vol: Elev-Area 4.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 5.01

********** POND ROUTING **********

DETENTION 1..... Pond E-V-Q Table 6.01

Table of Contents (continued)

DETENTION 1 OUT 100
Pond Routing Summary 6.02
Detention Time 6.03

S/N:
PondPack Ver: Compute Time: Date:

Type.... Master Network Summary
Name.... Watershed
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
DETENTION 1 IN	POND	100	224628		255.00	83.02		
DETENTION 1 OUT	POND	100	182388	R	265.00	36.61	408.87	152870
HYD 1	HYG	100	224734	R	255.00	83.02		
*OUT 1 - N77	JCT	100	182388	R	265.00	36.61		

S/N:
PondPack Ver: Compute Time: Date:

Type.... Executive Summary (Nodes) Page 2.01
Name.... Watershed Event: 100 yr
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\
Storm... 100 Tag: 100

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID		Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
DETENTION 1	IN	POND	224628		255.00	83.02	
DETENTION 1	OUT	POND	182388	R	265.00	36.61	408.87
HYD 1		HYG	224734	R	255.00	83.02	
Outfall OUT 1 - N77		JCT	182388	R	265.00	36.61	

S/N:
PondPack Ver: Compute Time: Date:

Type.... Read HYG
Name.... HYD 1 Tag: 100 Event: 100 yr
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW
Storm... Tag: 100

HYG file =
HYG ID = HYG 1
HYG Tag = N-21

Peak Discharge = 83.02 cfs
Time to Peak = 255.00 min
HYG Volume = 224734 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 15.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	3.66	3.76	3.99	4.12
75.00	4.42	4.59	4.99	5.23	5.80
150.00	6.15	7.05	7.64	9.34	10.64
225.00	15.62	22.01	83.02	12.53	8.38
300.00	6.56	5.49	4.78	4.27	3.87
375.00	3.56				

S/N:
PondPack Ver: Compute Time: Date:

Type.... Vol: Elev-Area
Name.... DETENTION 1

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
405.00	-----	33800	0	0	0
406.00	-----	36650	105646	35215	35215
408.00	-----	42700	118910	79273	114488
410.00	-----	49100	137588	91726	206214

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 405.00 ft
Increment = .50 ft
Max. Elev.= 410.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Circular	O0	--->	CV	407.250	410.000
Stand Pipe	RP	--->	CV	408.200	410.000
Orifice-Circular	O1	--->	CV	405.000	410.000
Culvert-Circular	CV	--->	TW	400.000	410.000
TW SETUP, DS Channel					

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = O0
Structure Type    = Orifice-Circular
-----------------------------------
# of Openings     =         1
Invert Elev.      =    407.25 ft
Diameter          =    1.5000 ft
Orifice Coeff.    =      .600


Structure ID      = RP
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    408.20 ft
Diameter          =    5.0000 ft
Orifice Area      =   19.6350 sq.ft
Orifice Coeff.    =      .600
Weir Length       =     15.71 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No


Structure ID      = O1
Structure Type    = Orifice-Circular
-----------------------------------
# of Openings     =         1
Invert Elev.      =    405.00 ft
Diameter          =     .3750 ft
Orifice Coeff.    =      .600
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = CV
Structure Type     = Culvert-Circular
-----------------------------------
No. Barrels        =         1
Barrel Diameter    =    3.0000 ft
Upstream Invert    =    400.00 ft
Dnstream Invert    =    399.00 ft
Horiz. Length      =     72.35 ft
Barrel Length      =     72.36 ft
Barrel Slope       =    .01382 ft/ft

OUTLET CONTROL DATA...
Mannings n         =     .0130
Ke                 =     .5000  (forward entrance loss)
Kb                 =   .007228  (per ft of full flow)
Kr                 =     .5000  (reverse entrance loss)
HW Convergence     =      .001  +/- ft

INLET CONTROL DATA...
Equation form      =         1
Inlet Control K    =     .0078
Inlet Control M    =    2.0000
Inlet Control c    =    .03790
Inlet Control Y    =     .6900
T1 ratio (HW/D)    =     1.129
T2 ratio (HW/D)    =     1.289
Slope Factor       =     -.500
```

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...
At T1 Elev = 403.39 ft ---> Flow = 42.85 cfs
At T2 Elev = 403.87 ft ---> Flow = 48.97 cfs

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
-----------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID:   Chn-Cir - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID: Chn-Cir - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

CIRCULAR CROSS SECTION

Slope = .005000 ft/ft
Mannings n = 0.01300
Invert Elev. = 397.00 ft
Top of Channel = 400.00 ft
Diameter = 3.0000 ft

Type.... Pond E-V-Q Table
Name.... DETENTION 1
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\5508RPL4-100 YR-BMP 1.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\
Inflow HYG file = NONE STORED - DETENTION 1 IN 100
Outflow HYG file = NONE STORED - DETENTION 1 OUT 100

Pond Node Data = DETENTION 1
Pond Volume Data = DETENTION 1
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 405.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
405.00	.00	0	33800	.00	.00	.00
405.50	.30	17251	35211	.08	.38	575.42
406.00	.48	35215	36650	.08	.56	1174.41
406.50	.61	53906	38119	.09	.70	1797.58
407.00	.72	73339	39617	.09	.81	2445.45
407.25	.76	83339	40377	.09	.86	2778.80
407.50	1.06	93529	41144	.10	1.16	3118.77
408.00	3.00	114488	42700	.10	3.10	3819.37
408.20	4.17	123091	43320	.10	4.27	4107.29
408.50	14.22	136227	44258	.10	14.32	4555.20
409.00	44.38	158751	45844	.11	44.49	5336.18
409.50	83.30	182076	47458	.11	83.41	6152.59
410.00	102.38	206214	49100	.11	102.49	6976.28

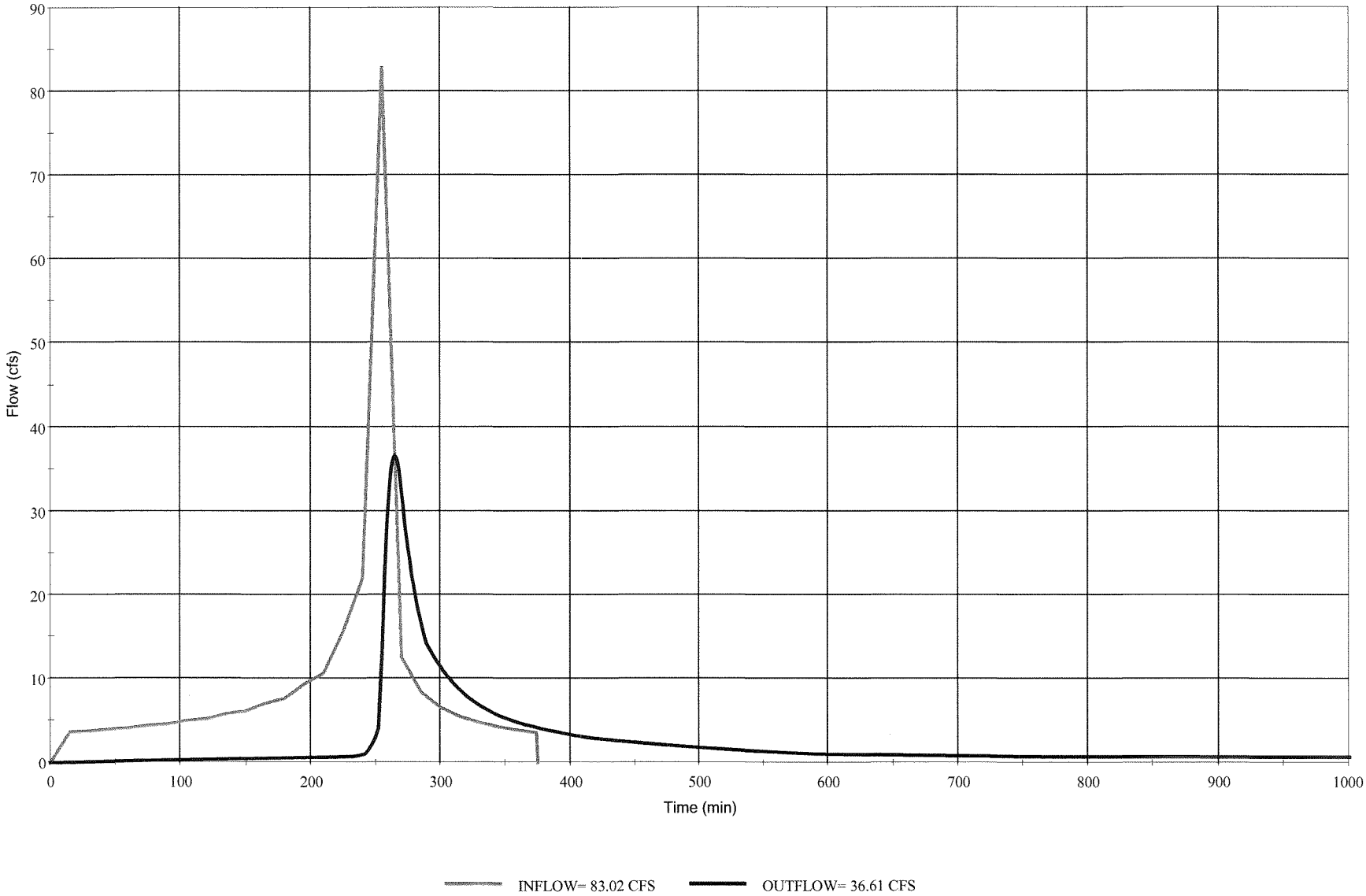
S/N:
PondPack Ver: Compute Time: Date:

```
   Type.... Pond Routing Summary                                    Page 6.02
   Name.... DETENTION 1  OUT   Tag: 100                         Event: 100 yr
   File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP
1\5508RPL4-100 YR-BMP 1.PPW
   Storm... 100   Tag: 100

                       LEVEL POOL ROUTING SUMMARY

    HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 1\
    Inflow  HYG file = NONE STORED - DETENTION 1  IN  100
    Outflow HYG file = NONE STORED - DETENTION 1  OUT 100

    Pond Node   Data = DETENTION 1
    Pond Volume Data = DETENTION 1
    Pond Outlet Data = Outlet 1

    Infiltration =    .1000 in/hr

    INITIAL CONDITIONS
    ----------------------------------
    Starting WS Elev   =   405.00 ft
    Starting Volume    =        0 cu.ft
    Starting Outflow   =      .00 cfs
    Starting Infiltr.  =      .00 cfs
    Starting Total Qout=      .00 cfs
    Time Increment     =     1.00 min


    INFLOW/OUTFLOW HYDROGRAPH SUMMARY
    ====================================================
    Peak Inflow       =     83.02 cfs    at    255.00 min
    Peak Outflow      =     36.61 cfs    at    265.00 min
    Peak Infiltration =       .11 cfs    at    265.00 min
    ----------------------------------------------------
    Peak Elevation    =    408.87 ft
    Peak Storage =         152870 cu.ft
    ====================================================


    MASS BALANCE (cu.ft)
    --------------------------
  + Initial Vol  =           0
  + HYG Vol IN   =      224628
  - Infiltration =       10617
  - HYG Vol OUT  =      182388
  - Retained Vol =       31565
                   ----------
    Unrouted Vol =         -58 cu.ft  (.026% of Inflow Volume)


    WARNING: Outflow hydrograph truncated on right side.

   S/N:
   PondPack Ver:                  Compute Time:             Date:
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 1\
Inflow  HYG file = NONE STORED - DETENTION 1  IN  100
Outflow HYG file = NONE STORED - DETENTION 1  OUT 100

Pond Node   Data = DETENTION 1
Pond Volume Data = DETENTION 1
Pond Outlet Data = Outlet 1

Infiltration =    .1000 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------
Tp, Outflow + Infilt.   =    265.00 min
Tp, Total Inflow        =    255.00 min
Peak to Peak            =     10.00 min

Qout+Infilt. Centroid   =    611.54 min
Inflow Centroid         =    221.52 min
Centroid to Centroid    =    390.03 min

Weighted Avg. Plug Time =    597.13 min
Max.Plug Vol. Plug Time =    568.76 min
Max.Inflow Plug Volume  =      4859 cu.ft   (From 254.00 to 255.00 min)
--------------------------------------
```

NODE 21 - DETENTION POND - BMP 1
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



Bio-Retention Pond-2

Bio-Retention Pond-2

100-year Development Conditions

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/08/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 2
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.100 to Point/Station       34.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less       )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.686
Initial subarea total flow distance  =  339.000(Ft.)
Highest elevation =  388.000(Ft.)
Lowest elevation =  384.000(Ft.)
Elevation difference =    4.000(Ft.) Slope =  1.180 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 65.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.01 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6860)*(  65.000^.5)/(   1.000^(1/3)]=   6.01
The initial area total distance of  339.00 (Ft.) entered leaves a
remaining distance of  274.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.46 minutes
for a distance of 274.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.74(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.465 Minutes
Tt=[(11.9*0.0519^3)/(  2.74)]^.385=  3.46
Total initial area Ti =   6.01 minutes from Figure 3-3 formula plus
  3.46 minutes from the Figure 3-4 formula =   9.47 minutes
Rainfall intensity (I) =      6.107(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.686
Subarea runoff =      5.320(CFS)
Total initial stream area =        1.270(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.200 to Point/Station       29.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   379.000(Ft.)
Downstream point/station elevation =   378.500(Ft.)
Pipe length  =     7.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.320(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.320(CFS)
Normal flow depth in pipe =    5.17(In.)
Flow top width inside pipe =   19.73(In.)
Critical Depth =    9.75(In.)
Pipe flow velocity =     10.71(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     9.48 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.200 to Point/Station       29.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area =      1.270(Ac.)
Runoff from this stream =      5.320(CFS)
Time of concentration =    9.48 min.
Rainfall intensity =     6.102(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.100 to Point/Station       35.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.500
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  357.550(Ft.)
Highest elevation =  387.000(Ft.)
Lowest elevation =  384.000(Ft.)
```

```
Elevation difference =    3.000(Ft.) Slope =  0.839 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.21 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  60.000^.5)/(   1.000^(1/3)]=   3.21
The initial area total distance of  357.55 (Ft.) entered leaves a
remaining distance of  297.55 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.69 minutes
for a distance of 297.55 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.98(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.692 Minutes
Tt=[(11.9*0.0564^3)/(  2.98)]^.385=  3.69
Total initial area Ti =   3.21 minutes from Figure 3-3 formula plus
  3.69 minutes from the Figure 3-4 formula =   6.90 minutes
Rainfall intensity (I) =      7.493(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      1.760(CFS)
Total initial stream area =        0.270(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.200 to Point/Station       29.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   379.000(Ft.)
Downstream point/station elevation =   378.500(Ft.)
Pipe length  =    26.24(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.760(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.760(CFS)
Normal flow depth in pipe =    4.15(In.)
Flow top width inside pipe =   18.15(In.)
Critical Depth =    5.51(In.)
Pipe flow velocity =      4.85(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     6.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.200 to Point/Station       29.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.270(Ac.)
Runoff from this stream =      1.760(CFS)
Time of concentration =    6.99 min.
Rainfall intensity =     7.430(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        5.320      9.48           6.102
2        1.760      6.99           7.430
Qmax(1) =
           1.000 *    1.000 *     5.320) +
           0.821 *    1.000 *     1.760) + =       6.766
Qmax(2) =
           1.000 *    0.737 *     5.320) +
           1.000 *    1.000 *     1.760) + =       5.681

Total of 2 main streams to confluence:

Flow rates before confluence point:
       5.320       1.760
Maximum flow rates at confluence using above data:
        6.766        5.681
Area of streams before confluence:
        1.270        0.270


Results of confluence:
Total flow rate =      6.766(CFS)
Time of concentration =     9.484 min.
Effective stream area after confluence  =      1.540(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station       32.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   378.500(Ft.)
Downstream point/station elevation =   377.500(Ft.)
Pipe length  =   198.28(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     6.766(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     6.766(CFS)
Normal flow depth in pipe =   11.80(In.)
Flow top width inside pipe =   24.00(In.)
Critical Depth =   11.07(In.)
Pipe flow velocity =      4.40(Ft/s)
Travel time through pipe =    0.75 min.
Time of concentration (TC) =    10.23 min.
End of computations, total study area =           1.540 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/14/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 2
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.100 to Point/Station       26.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  448.600(Ft.)
Highest elevation =  470.000(Ft.)
Lowest elevation =  460.000(Ft.)
Elevation difference =   10.000(Ft.) Slope =  2.229 %
Top of Initial Area Slope adjusted by User to  1.700 %
Bottom of Initial Area Slope adjusted by User to  5.140 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   1.70 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.36 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  80.000^.5)/(   1.700^(1/3)]=   8.36
The initial area total distance of  448.60 (Ft.) entered leaves a
remaining distance of  368.60 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.32 minutes
for a distance of 368.60 (Ft.) and a slope of  5.14 %
with an elevation difference of  18.95(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.318 Minutes
Tt=[(11.9*0.0698^3)/( 18.95)]^.385=  2.32
Total initial area Ti =   8.36 minutes from Figure 3-3 formula plus
  2.32 minutes from the Figure 3-4 formula =  10.68 minutes
Rainfall intensity (I) =      5.652(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      3.201(CFS)
Total initial stream area =        1.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.200 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   455.000(Ft.)
Downstream point/station elevation =   454.500(Ft.)
Pipe length  =    11.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.201(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.201(CFS)
Normal flow depth in pipe =    4.58(In.)
Flow top width inside pipe =   18.87(In.)
Critical Depth =    7.50(In.)
Pipe flow velocity =      7.65(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    10.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   454.500(Ft.)
Downstream point/station elevation =   436.500(Ft.)
Pipe length  =   266.25(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.201(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.201(CFS)
Normal flow depth in pipe =    4.08(In.)
Flow top width inside pipe =   18.03(In.)
Critical Depth =    7.50(In.)
Pipe flow velocity =      9.05(Ft/s)
Travel time through pipe =    0.49 min.
Time of concentration (TC) =    11.20 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.180(Ac.)
Runoff from this stream =      3.201(CFS)
Time of concentration =   11.20 min.
Rainfall intensity =     5.482(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.100 to Point/Station       27.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  598.000(Ft.)
Highest elevation =  470.000(Ft.)
Lowest elevation =  442.000(Ft.)
Elevation difference =   28.000(Ft.) Slope =  4.682 %
Top of Initial Area Slope adjusted by User to  1.830 %
Bottom of Initial Area Slope adjusted by User to  6.910 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   1.83 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.16 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  80.000^.5)/(   1.830^(1/3)]=   8.16
The initial area total distance of  598.00 (Ft.) entered leaves a
remaining distance of  518.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.69 minutes
for a distance of 518.00 (Ft.) and a slope of  6.91 %
with an elevation difference of  35.79(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.688 Minutes
Tt=[(11.9*0.0981^3)/( 35.79)]^.385=  2.69
Total initial area Ti =   8.16 minutes from Figure 3-3 formula plus
  2.69 minutes from the Figure 3-4 formula =  10.85 minutes
Rainfall intensity (I) =      5.595(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      3.706(CFS)
Total initial stream area =        1.380(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.200 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   437.000(Ft.)
Downstream point/station elevation =   436.500(Ft.)
Pipe length  =    26.25(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.706(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.706(CFS)
Normal flow depth in pipe =    6.00(In.)
Flow top width inside pipe =   20.78(In.)
Critical Depth =    8.08(In.)
Pipe flow velocity =      6.03(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    10.92 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.200 to Point/Station       23.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.380(Ac.)
Runoff from this stream =      3.706(CFS)
Time of concentration =   10.92 min.
Rainfall intensity =     5.571(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        3.201     11.20           5.482
2        3.706     10.92           5.571
Qmax(1) =
           1.000 *    1.000 *     3.201) +
           0.984 *    1.000 *     3.706) + =       6.848
Qmax(2) =
           1.000 *    0.975 *     3.201) +
           1.000 *    1.000 *     3.706) + =       6.828

Total of 2 main streams to confluence:
Flow rates before confluence point:
      3.201       3.706
Maximum flow rates at confluence using above data:
       6.848       6.828
Area of streams before confluence:
       1.180       1.380


Results of confluence:
Total flow rate =      6.848(CFS)
Time of concentration =    11.198 min.
Effective stream area after confluence  =      2.560(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   436.500(Ft.)
Downstream point/station elevation =   426.500(Ft.)
Pipe length  =   131.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     6.848(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     6.848(CFS)
Normal flow depth in pipe =    5.76(In.)
Flow top width inside pipe =   20.50(In.)
Critical Depth =   11.14(In.)
Pipe flow velocity =     11.80(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    11.38 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.560(Ac.)
Runoff from this stream =      6.848(CFS)
Time of concentration =   11.38 min.
Rainfall intensity =     5.424(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.100 to Point/Station       28.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  471.780(Ft.)
Highest elevation =  460.000(Ft.)
Lowest elevation =  433.000(Ft.)
Elevation difference =   27.000(Ft.) Slope =  5.723 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  7.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.92 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  80.000^.5)/(   2.000^(1/3)]=   7.92
The initial area total distance of  471.78 (Ft.) entered leaves a
remaining distance of  391.78 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.16 minutes
for a distance of 391.78 (Ft.) and a slope of  7.00 %
with an elevation difference of  27.42(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.157 Minutes
Tt=[(11.9*0.0742^3)/( 27.42)]^.385=  2.16
Total initial area Ti =   7.92 minutes from Figure 3-3 formula plus
  2.16 minutes from the Figure 3-4 formula =  10.08 minutes
Rainfall intensity (I) =      5.867(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      3.295(CFS)
Total initial stream area =        1.170(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.200 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   428.000(Ft.)
Downstream point/station elevation =   426.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.295(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.295(CFS)
Normal flow depth in pipe =    3.32(In.)
Flow top width inside pipe =   16.58(In.)
Critical Depth =    7.61(In.)
Pipe flow velocity =     12.53(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.200 to Point/Station       24.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.170(Ac.)
Runoff from this stream =      3.295(CFS)
Time of concentration =   10.09 min.
Rainfall intensity =     5.863(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        6.848     11.38           5.424
2        3.295     10.09           5.863
Qmax(1) =
            1.000 *    1.000 *     6.848) +
            0.925 *    1.000 *     3.295) + =       9.897
Qmax(2) =
            1.000 *    0.887 *     6.848) +
            1.000 *    1.000 *     3.295) + =       9.366

Total of 2 main streams to confluence:
Flow rates before confluence point:
       6.848       3.295
Maximum flow rates at confluence using above data:
        9.897        9.366
Area of streams before confluence:
        2.560        1.170


Results of confluence:
Total flow rate =      9.897(CFS)
Time of concentration =    11.383 min.
Effective stream area after confluence  =      3.730(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   426.500(Ft.)
Downstream point/station elevation =   404.500(Ft.)
Pipe length  =   288.15(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     9.897(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     9.897(CFS)
Normal flow depth in pipe =    6.95(In.)
Flow top width inside pipe =   21.77(In.)
Critical Depth =   13.50(In.)
Pipe flow velocity =     13.12(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =    11.75 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.730(Ac.)
Runoff from this stream =      9.897(CFS)
Time of concentration =   11.75 min.
Rainfall intensity =     5.315(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.100 to Point/Station       29.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.477
Initial subarea total flow distance  =  359.770(Ft.)
Highest elevation =  432.000(Ft.)
Lowest elevation =  411.000(Ft.)
Elevation difference =   21.000(Ft.) Slope =  5.837 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  8.940 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.96 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4770)*(  80.000^.5)/(   2.000^(1/3)]=   7.96
The initial area total distance of  359.77 (Ft.) entered leaves a
remaining distance of  279.77 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.51 minutes
for a distance of 279.77 (Ft.) and a slope of  8.94 %
with an elevation difference of  25.01(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.515 Minutes
Tt=[(11.9*0.0530^3)/( 25.01)]^.385=  1.51
Total initial area Ti =   7.96 minutes from Figure 3-3 formula plus
  1.51 minutes from the Figure 3-4 formula =   9.48 minutes
Rainfall intensity (I) =      6.106(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.477
Subarea runoff =      2.359(CFS)
Total initial stream area =        0.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.200 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   406.000(Ft.)
Downstream point/station elevation =   404.500(Ft.)
Pipe length  =     9.92(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.359(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.359(CFS)
Normal flow depth in pipe =    2.90(In.)
Flow top width inside pipe =   15.64(In.)
Critical Depth =    6.39(In.)
Pipe flow velocity =     10.96(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     9.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.200 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.810(Ac.)
Runoff from this stream =      2.359(CFS)
Time of concentration =    9.49 min.
Rainfall intensity =     6.099(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        9.897     11.75           5.315
2        2.359      9.49           6.099
Qmax(1) =
           1.000 *    1.000 *     9.897) +
           0.871 *    1.000 *     2.359) + =      11.952
Qmax(2) =
           1.000 *    0.808 *     9.897) +
           1.000 *    1.000 *     2.359) + =      10.354
```

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
      9.897       2.359
Maximum flow rates at confluence using above data:
     11.952      10.354
Area of streams before confluence:
      3.730       0.810


Results of confluence:
Total flow rate =      11.952(CFS)
Time of concentration =    11.749 min.
Effective stream area after confluence  =      4.540(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       28.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   404.500(Ft.)
Downstream point/station elevation =   386.500(Ft.)
Pipe length  =   201.65(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    11.952(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.952(CFS)
Normal flow depth in pipe =    7.35(In.)
Flow top width inside pipe =   22.13(In.)
Critical Depth =   14.91(In.)
Pipe flow velocity =     14.64(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    11.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       28.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.540(Ac.)
Runoff from this stream =     11.952(CFS)
Time of concentration =   11.98 min.
Rainfall intensity =     5.249(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.100 to Point/Station       30.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Initial subarea total flow distance  =  531.500(Ft.)
Highest elevation =  478.000(Ft.)
Lowest elevation =  448.000(Ft.)
Elevation difference =   30.000(Ft.) Slope =  5.644 %
Top of Initial Area Slope adjusted by User to  1.370 %
Bottom of Initial Area Slope adjusted by User to 10.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.37 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.41 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4800)*(  70.000^.5)/(   1.370^(1/3)]=   8.41
The initial area total distance of  531.50 (Ft.) entered leaves a
remaining distance of  461.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.13 minutes
for a distance of 461.50 (Ft.) and a slope of 10.00 %
with an elevation difference of  46.15(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.133 Minutes
Tt=[(11.9*0.0874^3)/( 46.15)]^.385=  2.13
Total initial area Ti =   8.41 minutes from Figure 3-3 formula plus
  2.13 minutes from the Figure 3-4 formula =  10.54 minutes
Rainfall intensity (I) =      5.700(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.480
Subarea runoff =      3.749(CFS)
Total initial stream area =        1.370(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.200 to Point/Station       26.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   443.000(Ft.)
Downstream point/station elevation =   439.500(Ft.)
Pipe length  =    37.34(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.749(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.749(CFS)
Normal flow depth in pipe =    4.07(In.)
Flow top width inside pipe =   18.01(In.)
Critical Depth =    8.14(In.)
Pipe flow velocity =     10.64(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    10.60 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.200 to Point/Station       26.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.370(Ac.)
Runoff from this stream =      3.749(CFS)
Time of concentration =   10.60 min.
Rainfall intensity =     5.680(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.100 to Point/Station       31.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.477
Initial subarea total flow distance  =  553.370(Ft.)
Highest elevation =  480.000(Ft.)
Lowest elevation =  446.000(Ft.)
Elevation difference =   34.000(Ft.) Slope =  6.144 %
Top of Initial Area Slope adjusted by User to  1.330 %
Bottom of Initial Area Slope adjusted by User to 10.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.33 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.53 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4770)*(  70.000^.5)/(   1.330^(1/3)]=   8.53
The initial area total distance of  553.37 (Ft.) entered leaves a
remaining distance of  483.37 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.21 minutes
for a distance of 483.37 (Ft.) and a slope of 10.00 %
with an elevation difference of  48.34(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.210 Minutes
Tt=[(11.9*0.0915^3)/( 48.34)]^.385=  2.21
Total initial area Ti =   8.53 minutes from Figure 3-3 formula plus
  2.21 minutes from the Figure 3-4 formula =  10.74 minutes
Rainfall intensity (I) =      5.631(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.477
Subarea runoff =      6.017(CFS)
Total initial stream area =        2.240(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.200 to Point/Station       26.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   441.000(Ft.)
Downstream point/station elevation =   439.500(Ft.)
Pipe length  =    11.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     6.017(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     6.017(CFS)
Normal flow depth in pipe =    4.77(In.)
Flow top width inside pipe =   19.15(In.)
Critical Depth =   10.41(In.)
Pipe flow velocity =     13.58(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.200 to Point/Station       26.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.240(Ac.)
Runoff from this stream =      6.017(CFS)
Time of concentration =   10.76 min.
Rainfall intensity =     5.626(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        3.749     10.60          5.680
2        6.017     10.76          5.626
Qmax(1) =
           1.000 *    1.000 *     3.749) +
           1.000 *    0.985 *     6.017) + =       9.677
Qmax(2) =
           0.990 *    1.000 *     3.749) +
           1.000 *    1.000 *     6.017) + =       9.730

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.749       6.017
Maximum flow rates at confluence using above data:
        9.677       9.730
Area of streams before confluence:
        1.370       2.240
Results of confluence:
Total flow rate =      9.730(CFS)
Time of concentration =    10.757 min.
Effective stream area after confluence =      3.610(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station       27.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   439.500(Ft.)
Downstream point/station elevation =   392.500(Ft.)
Pipe length  =   497.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     9.730(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     9.730(CFS)
Normal flow depth in pipe =    6.52(In.)
Flow top width inside pipe =   21.35(In.)
Critical Depth =   13.37(In.)
Pipe flow velocity =     14.10(Ft/s)
Travel time through pipe =    0.59 min.
Time of concentration (TC) =    11.34 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station       27.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.610(Ac.)
Runoff from this stream =      9.730(CFS)
Time of concentration =   11.34 min.
Rainfall intensity =     5.436(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.100 to Point/Station       32.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.456
Initial subarea total flow distance  =  590.500(Ft.)
Highest elevation =  448.000(Ft.)
Lowest elevation =  398.000(Ft.)
Elevation difference =   50.000(Ft.) Slope =  8.467 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to 10.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.23 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4560)*(  80.000^.5)/(   2.000^(1/3)]=   8.23
The initial area total distance of  590.50 (Ft.) entered leaves a
remaining distance of  510.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.31 minutes
for a distance of 510.50 (Ft.) and a slope of 10.00 %
with an elevation difference of  51.05(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.305 Minutes
Tt=[(11.9*0.0967^3)/( 51.05)]^.385=  2.31
Total initial area Ti =   8.23 minutes from Figure 3-3 formula plus
  2.31 minutes from the Figure 3-4 formula =  10.53 minutes
Rainfall intensity (I) =      5.702(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.456
Subarea runoff =      3.016(CFS)
Total initial stream area =        1.160(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.200 to Point/Station       27.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   393.000(Ft.)
Downstream point/station elevation =   392.500(Ft.)
Pipe length  =    25.96(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.016(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.016(CFS)
Normal flow depth in pipe =    5.40(In.)
Flow top width inside pipe =   20.04(In.)
Critical Depth =    7.26(In.)
Pipe flow velocity =      5.71(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    10.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.200 to Point/Station       27.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.160(Ac.)
Runoff from this stream =      3.016(CFS)
Time of concentration =   10.61 min.
Rainfall intensity =     5.676(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.100 to Point/Station       33.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.453
Initial subarea total flow distance  =  493.500(Ft.)
Highest elevation =  446.000(Ft.)
```

```
Lowest elevation =  398.000(Ft.)
Elevation difference =   48.000(Ft.) Slope =  9.726 %
Top of Initial Area Slope adjusted by User to 10.000 %
Bottom of Initial Area Slope adjusted by User to 10.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  10.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.41 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4530)*( 100.000^.5)/(  10.000^(1/3)]=   5.41
The initial area total distance of  493.50 (Ft.) entered leaves a
remaining distance of  393.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.89 minutes
for a distance of 393.50 (Ft.) and a slope of 10.00 %
with an elevation difference of  39.35(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.887 Minutes
Tt=[(11.9*0.0745^3)/( 39.35)]^.385=  1.89
Total initial area Ti =   5.41 minutes from Figure 3-3 formula plus
  1.89 minutes from the Figure 3-4 formula =   7.29 minutes
Rainfall intensity (I) =      7.229(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.453
Subarea runoff =      7.237(CFS)
Total initial stream area =        2.210(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.200 to Point/Station       27.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   393.000(Ft.)
Downstream point/station elevation =   392.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.237(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.237(CFS)
Normal flow depth in pipe =    6.58(In.)
Flow top width inside pipe =   21.41(In.)
Critical Depth =   11.46(In.)
Pipe flow velocity =     10.35(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     7.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.200 to Point/Station       27.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      2.210(Ac.)
Runoff from this stream =      7.237(CFS)
Time of concentration =    7.31 min.
Rainfall intensity =     7.219(In/Hr)
Summary of stream data:
```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	9.730	11.34	5.436
2	3.016	10.61	5.676
3	7.237	7.31	7.219

```
Qmax(1) =
          1.000 *    1.000 *     9.730) +
          0.958 *    1.000 *     3.016) +
          0.753 *    1.000 *     7.237) + =      18.069
Qmax(2) =
          1.000 *    0.935 *     9.730) +
          1.000 *    1.000 *     3.016) +
          0.786 *    1.000 *     7.237) + =      17.807
Qmax(3) =
          1.000 *    0.644 *     9.730) +
          1.000 *    0.689 *     3.016) +
          1.000 *    1.000 *     7.237) + =      15.583

Total of 3 streams to confluence:
Flow rates before confluence point:
      9.730       3.016       7.237
Maximum flow rates at confluence using above data:
      18.069       17.807       15.583
Area of streams before confluence:
       3.610        1.160        2.210
Results of confluence:
Total flow rate =     18.069(CFS)
Time of concentration =    11.344 min.
Effective stream area after confluence =      6.980(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       28.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   392.500(Ft.)
Downstream point/station elevation =   386.500(Ft.)
Pipe length  =    73.04(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.069(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    18.069(CFS)
Normal flow depth in pipe =    9.36(In.)
Flow top width inside pipe =   23.41(In.)
Critical Depth =   18.38(In.)
Pipe flow velocity =     15.93(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    11.42 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       28.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.980(Ac.)
Runoff from this stream =      18.069(CFS)
Time of concentration =   11.42 min.
Rainfall intensity =     5.413(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       11.952     11.98           5.249
2       18.069     11.42           5.413
Qmax(1) =
            1.000 *    1.000 *    11.952) +
            0.970 *    1.000 *    18.069) + =      29.474
Qmax(2) =
            1.000 *    0.953 *    11.952) +
            1.000 *    1.000 *    18.069) + =      29.465

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.952      18.069
Maximum flow rates at confluence using above data:
       29.474       29.465
Area of streams before confluence:
        4.540        6.980


Results of confluence:
Total flow rate =      29.474(CFS)
Time of concentration =    11.978 min.
Effective stream area after confluence  =     11.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station       35.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   386.500(Ft.)
Downstream point/station elevation =   372.000(Ft.)
Pipe length  =   204.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    29.474(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    29.474(CFS)
Normal flow depth in pipe =   12.91(In.)
Flow top width inside pipe =   23.93(In.)
Critical Depth =   22.26(In.)
Pipe flow velocity =     17.11(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =    12.18 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station       35.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     11.520(Ac.)
Runoff from this stream =     29.474(CFS)
Time of concentration =   12.18 min.
Rainfall intensity =     5.193(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.100 to Point/Station       36.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.300
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less       )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.682
Initial subarea total flow distance  =  584.900(Ft.)
Highest elevation =  412.500(Ft.)
Lowest elevation =  394.000(Ft.)
Elevation difference =   18.500(Ft.) Slope =  3.163 %
Top of Initial Area Slope adjusted by User to  3.600 %
Bottom of Initial Area Slope adjusted by User to  2.310 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 90.00 (Ft)
for the top area slope value of   3.60 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.66 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6820)*(  90.000^.5)/(   3.600^(1/3)]=   4.66
The initial area total distance of  584.90 (Ft.) entered leaves a
remaining distance of  494.90 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.96 minutes
for a distance of 494.90 (Ft.) and a slope of  2.31 %
with an elevation difference of  11.43(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.957 Minutes
Tt=[(11.9*0.0937^3)/( 11.43)]^.385=  3.96
Total initial area Ti =   4.66 minutes from Figure 3-3 formula plus
  3.96 minutes from the Figure 3-4 formula =   8.61 minutes
Rainfall intensity (I) =      6.493(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.682
Subarea runoff =     11.955(CFS)
Total initial stream area =        2.700(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.200 to Point/Station       30.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   389.000(Ft.)
Downstream point/station elevation =   383.500(Ft.)
Pipe length  =   239.43(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    11.955(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.955(CFS)
Normal flow depth in pipe =   10.59(In.)
Flow top width inside pipe =   23.83(In.)
Critical Depth =   14.91(In.)
Pipe flow velocity =      8.95(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =     9.06 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.200 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.700(Ac.)
Runoff from this stream =     11.955(CFS)
Time of concentration =    9.06 min.
Rainfall intensity =     6.285(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.100 to Point/Station       37.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.686
Initial subarea total flow distance  =  450.690(Ft.)
Highest elevation =  395.500(Ft.)
Lowest elevation =  390.000(Ft.)
Elevation difference =    5.500(Ft.) Slope =  1.220 %
Top of Initial Area Slope adjusted by User to  1.200 %
Bottom of Initial Area Slope adjusted by User to  1.810 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 65.00 (Ft)
for the top area slope value of   1.20 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.65 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6860)*(  65.000^.5)/(   1.200^(1/3)]=   5.65
The initial area total distance of  450.69 (Ft.) entered leaves a
remaining distance of  385.69 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.59 minutes
for a distance of 385.69 (Ft.) and a slope of  1.81 %
with an elevation difference of   6.98(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.588 Minutes
Tt=[(11.9*0.0730^3)/(  6.98)]^.385=  3.59
Total initial area Ti =   5.65 minutes from Figure 3-3 formula plus
  3.59 minutes from the Figure 3-4 formula =   9.24 minutes
Rainfall intensity (I) =      6.205(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.686
Subarea runoff =      7.321(CFS)
Total initial stream area =        1.720(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.200 to Point/Station       30.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   385.000(Ft.)
Downstream point/station elevation =   383.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.321(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.321(CFS)
Normal flow depth in pipe =    5.02(In.)
Flow top width inside pipe =   19.52(In.)
Critical Depth =   11.53(In.)
Pipe flow velocity =     15.35(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     9.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.200 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.720(Ac.)
Runoff from this stream =      7.321(CFS)
Time of concentration =    9.25 min.
Rainfall intensity =     6.200(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       11.955      9.06           6.285
2        7.321      9.25           6.200
Qmax(1) =
            1.000 *    1.000 *    11.955) +
            1.000 *    0.979 *     7.321) + =      19.125
Qmax(2) =
            0.987 *    1.000 *    11.955) +
            1.000 *    1.000 *     7.321) + =      19.117

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
      11.955       7.321
Maximum flow rates at confluence using above data:
       19.125       19.117
Area of streams before confluence:
        2.700        1.720
Results of confluence:
Total flow rate =      19.125(CFS)
Time of concentration =      9.060 min.
Effective stream area after confluence =       4.420(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       31.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   383.500(Ft.)
Downstream point/station elevation =   380.000(Ft.)
Pipe length  =   246.76(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    19.125(CFS)
Given pipe size =      24.00(In.)
Calculated individual pipe flow  =    19.125(CFS)
Normal flow depth in pipe =   16.52(In.)
Flow top width inside pipe =   22.23(In.)
Critical Depth =   18.88(In.)
Pipe flow velocity =       8.29(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =      9.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       31.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       4.420(Ac.)
Runoff from this stream =      19.125(CFS)
Time of concentration =    9.56 min.
Rainfall intensity =      6.072(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       38.100 to Point/Station       38.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.900
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less       )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.706
Initial subarea total flow distance  =  788.000(Ft.)
Highest elevation =  402.000(Ft.)
Lowest elevation =  385.500(Ft.)
Elevation difference =   16.500(Ft.) Slope =  2.094 %
Top of Initial Area Slope adjusted by User to  3.000 %
Bottom of Initial Area Slope adjusted by User to  1.810 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 90.00 (Ft)
for the top area slope value of   3.00 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.66 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7060)*(  90.000^.5)/(   3.000^(1/3)]=   4.66
The initial area total distance of  788.00 (Ft.) entered leaves a
remaining distance of  698.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.66 minutes
for a distance of 698.00 (Ft.) and a slope of  1.81 %
with an elevation difference of  12.63(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.664 Minutes
Tt=[(11.9*0.1322^3)/( 12.63)]^.385=  5.66
Total initial area Ti =   4.66 minutes from Figure 3-3 formula plus
  5.66 minutes from the Figure 3-4 formula =  10.33 minutes
Rainfall intensity (I) =      5.775(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.706
Subarea runoff =      8.644(CFS)
Total initial stream area =        2.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       38.200 to Point/Station       31.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   380.500(Ft.)
Downstream point/station elevation =   380.000(Ft.)
Pipe length  =    27.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.644(CFS)
Given pipe size =      24.00(In.)
Calculated individual pipe flow  =     8.644(CFS)
Normal flow depth in pipe =    9.40(In.)
Flow top width inside pipe =   23.43(In.)
Critical Depth =   12.58(In.)
Pipe flow velocity =       7.58(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    10.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       38.200 to Point/Station       31.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =       2.120(Ac.)
Runoff from this stream =      8.644(CFS)
Time of concentration =   10.39 min.
Rainfall intensity =     5.754(In/Hr)
Summary of stream data:
```

```
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       19.125      9.56           6.072
2        8.644     10.39           5.754
Qmax(1) =
            1.000 *    1.000 *    19.125) +
            1.000 *    0.920 *     8.644) + =      27.077
Qmax(2) =
            0.948 *    1.000 *    19.125) +
            1.000 *    1.000 *     8.644) + =      26.766

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.125       8.644
Maximum flow rates at confluence using above data:
       27.077       26.766
Area of streams before confluence:
        4.420        2.120
Results of confluence:
Total flow rate =     27.077(CFS)
Time of concentration =     9.556 min.
Effective stream area after confluence =      6.540(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       32.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   380.000(Ft.)
Downstream point/station elevation =   377.500(Ft.)
Pipe length  =    84.47(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    27.077(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    27.077(CFS)
Normal flow depth in pipe =   16.29(In.)
Flow top width inside pipe =   22.41(In.)
Critical Depth =   21.73(In.)
Pipe flow velocity =     11.94(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     9.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       32.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.540(Ac.)
Runoff from this stream =     27.077(CFS)
Time of concentration =    9.67 min.
Rainfall intensity =     6.024(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station       32.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.500
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.690
Rainfall intensity (I) =      5.811(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  10.23 min.  Rain intensity =       5.81(In/Hr)
Total area =        1.540(Ac.)  Total runoff =     6.766(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station       32.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.540(Ac.)
Runoff from this stream =      6.766(CFS)
Time of concentration =   10.23 min.
Rainfall intensity =     5.811(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       27.077      9.67           6.024
2        6.766     10.23           5.811
Qmax(1) =
            1.000 *    1.000 *    27.077) +
            1.000 *    0.946 *     6.766) + =      33.475
Qmax(2) =
            0.965 *    1.000 *    27.077) +
            1.000 *    1.000 *     6.766) + =      32.885

Total of 2 streams to confluence:
Flow rates before confluence point:
      27.077       6.766
Maximum flow rates at confluence using above data:
       33.475       32.885
Area of streams before confluence:
        6.540        1.540
Results of confluence:
Total flow rate =     33.475(CFS)
Time of concentration =     9.674 min.
Effective stream area after confluence =      8.080(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   377.500(Ft.)
Downstream point/station elevation =   375.500(Ft.)
Pipe length  =   275.13(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    33.475(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    33.475(CFS)
Normal flow depth in pipe =   21.75(In.)
Flow top width inside pipe =   35.21(In.)
Critical Depth =   22.53(In.)
Pipe flow velocity =      7.49(Ft/s)
Travel time through pipe =    0.61 min.
Time of concentration (TC) =    10.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       33.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      8.080(Ac.)
Runoff from this stream =     33.475(CFS)
Time of concentration =   10.29 min.
Rainfall intensity =     5.791(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.100 to Point/Station       39.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.200
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less       )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.678
Initial subarea total flow distance  =  574.000(Ft.)
Highest elevation =  390.000(Ft.)
Lowest elevation =  382.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.394 %
Top of Initial Area Slope adjusted by User to  1.730 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   1.73 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.48 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6780)*(  75.000^.5)/(   1.730^(1/3)]=   5.48
The initial area total distance of  574.00 (Ft.) entered leaves a
remaining distance of  499.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.50 minutes
for a distance of 499.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.99(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.497 Minutes
Tt=[(11.9*0.0945^3)/(  4.99)]^.385=  5.50
Total initial area Ti =   5.48 minutes from Figure 3-3 formula plus
  5.50 minutes from the Figure 3-4 formula =  10.98 minutes
Rainfall intensity (I) =      5.553(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.678
Subarea runoff =      8.170(CFS)
Total initial stream area =        2.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.200 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   377.000(Ft.)
Downstream point/station elevation =   375.500(Ft.)
Pipe length  =     9.45(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.170(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.170(CFS)
Normal flow depth in pipe =    5.24(In.)
Flow top width inside pipe =   19.83(In.)
Critical Depth =   12.21(In.)
Pipe flow velocity =     16.11(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.200 to Point/Station       33.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.170(Ac.)
Runoff from this stream =      8.170(CFS)
Time of concentration =   10.99 min.
Rainfall intensity =     5.550(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.100 to Point/Station       40.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.434
Initial subarea total flow distance  =  350.000(Ft.)
Highest elevation =  384.500(Ft.)
```

```
Lowest elevation =  382.000(Ft.)
Elevation difference =    2.500(Ft.) Slope =  0.714 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =  10.03 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4340)*(  70.000^.5)/(   1.000^(1/3)]=  10.03
The initial area total distance of  350.00 (Ft.) entered leaves a
remaining distance of  280.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.52 minutes
for a distance of 280.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.80(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.523 Minutes
Tt=[(11.9*0.0530^3)/(  2.80)]^.385=  3.52
Total initial area Ti =  10.03 minutes from Figure 3-3 formula plus
  3.52 minutes from the Figure 3-4 formula =  13.55 minutes
Rainfall intensity (I) =      4.847(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.434
Subarea runoff =      1.304(CFS)
Total initial stream area =        0.620(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.200 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   377.000(Ft.)
Downstream point/station elevation =   375.500(Ft.)
Pipe length  =    29.23(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.304(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.304(CFS)
Normal flow depth in pipe =    2.82(In.)
Flow top width inside pipe =   15.47(In.)
Critical depth could not be calculated.
Pipe flow velocity =      6.28(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    13.63 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.200 to Point/Station       33.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.620(Ac.)
Runoff from this stream =      1.304(CFS)
Time of concentration =   13.63 min.
Rainfall intensity =     4.829(In/Hr)
Summary of stream data:
```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	33.475	10.29	5.791
2	8.170	10.99	5.550
3	1.304	13.63	4.829

```
Qmax(1) =
            1.000 *    1.000 *    33.475) +
            1.000 *    0.936 *     8.170) +
            1.000 *    0.755 *     1.304) + =      42.109
Qmax(2) =
            0.958 *    1.000 *    33.475) +
            1.000 *    1.000 *     8.170) +
            1.000 *    0.806 *     1.304) + =      41.304
Qmax(3) =
            0.834 *    1.000 *    33.475) +
            0.870 *    1.000 *     8.170) +
            1.000 *    1.000 *     1.304) + =      36.331

Total of 3 streams to confluence:
Flow rates before confluence point:
      33.475       8.170       1.304
Maximum flow rates at confluence using above data:
       42.109       41.304       36.331
Area of streams before confluence:
        8.080        2.170        0.620
Results of confluence:
Total flow rate =     42.109(CFS)
Time of concentration =    10.286 min.
Effective stream area after confluence =     10.870(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   375.500(Ft.)
Downstream point/station elevation =   373.500(Ft.)
Pipe length  =   251.22(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    42.109(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    42.109(CFS)
Normal flow depth in pipe =   24.73(In.)
Flow top width inside pipe =   33.39(In.)
Critical Depth =   25.34(In.)
Pipe flow velocity =      8.14(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =    10.80 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       34.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      10.870(Ac.)
Runoff from this stream =      42.109(CFS)
Time of concentration =   10.80 min.
Rainfall intensity =     5.611(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.100 to Point/Station       41.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.950
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.050
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.672
Initial subarea total flow distance  =  527.700(Ft.)
Highest elevation =  408.000(Ft.)
Lowest elevation =  380.000(Ft.)
Elevation difference =   28.000(Ft.) Slope =  5.306 %
Top of Initial Area Slope adjusted by User to  5.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   5.00 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.39 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6720)*(  95.000^.5)/(   5.000^(1/3)]=   4.39
The initial area total distance of  527.70 (Ft.) entered leaves a
remaining distance of  432.70 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.93 minutes
for a distance of 432.70 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.33(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.926 Minutes
Tt=[(11.9*0.0820^3)/(  4.33)]^.385=  4.93
Total initial area Ti =   4.39 minutes from Figure 3-3 formula plus
  4.93 minutes from the Figure 3-4 formula =   9.32 minutes
Rainfall intensity (I) =      6.173(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.672
Subarea runoff =      5.185(CFS)
Total initial stream area =        1.250(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.200 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   375.000(Ft.)
Downstream point/station elevation =   373.500(Ft.)
Pipe length  =    21.70(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.185(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.185(CFS)
Normal flow depth in pipe =    5.14(In.)
Flow top width inside pipe =   19.69(In.)
Critical Depth =    9.62(In.)
Pipe flow velocity =     10.51(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     9.35 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.200 to Point/Station       34.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.250(Ac.)
Runoff from this stream =      5.185(CFS)
Time of concentration =    9.35 min.
Rainfall intensity =     6.158(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       42.109     10.80           5.611
2        5.185      9.35           6.158
Qmax(1) =
           1.000 *    1.000 *    42.109) +
           0.911 *    1.000 *     5.185) + =      46.833
Qmax(2) =
           1.000 *    0.866 *    42.109) +
           1.000 *    1.000 *     5.185) + =      41.642

Total of 2 streams to confluence:
Flow rates before confluence point:
     42.109       5.185
Maximum flow rates at confluence using above data:
      46.833       41.642
Area of streams before confluence:
      10.870        1.250
Results of confluence:
Total flow rate =     46.833(CFS)
Time of concentration =    10.801 min.
Effective stream area after confluence =     12.120(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       35.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   373.500(Ft.)
Downstream point/station elevation =   372.000(Ft.)
Pipe length  =   183.85(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    46.833(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    46.833(CFS)
Normal flow depth in pipe =   26.63(In.)
Flow top width inside pipe =   31.60(In.)
Critical Depth =   26.75(In.)
Pipe flow velocity =      8.36(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =    11.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       35.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.120(Ac.)
Runoff from this stream =     46.833(CFS)
Time of concentration =   11.17 min.
Rainfall intensity =     5.492(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       29.474     12.18           5.193
2       46.833     11.17           5.492
Qmax(1) =
           1.000 *    1.000 *    29.474) +
           0.946 *    1.000 *    46.833) + =      73.762
Qmax(2) =
           1.000 *    0.917 *    29.474) +
           1.000 *    1.000 *    46.833) + =      73.862

Total of 2 main streams to confluence:
Flow rates before confluence point:
      29.474      46.833
Maximum flow rates at confluence using above data:
       73.762       73.862
Area of streams before confluence:
       11.520       12.120


Results of confluence:
Total flow rate =     73.862(CFS)
Time of concentration =    11.168 min.
Effective stream area after confluence  =     23.640(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   372.000(Ft.)
Downstream point/station elevation =   368.500(Ft.)
Pipe length  =   171.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    73.862(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    73.862(CFS)
Normal flow depth in pipe =   26.53(In.)
Flow top width inside pipe =   31.70(In.)
Critical Depth =   32.48(In.)
Pipe flow velocity =     13.23(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    11.38 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     23.640(Ac.)
Runoff from this stream =     73.862(CFS)
Time of concentration =   11.38 min.
Rainfall intensity =     5.424(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.100 to Point/Station       42.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.451
Initial subarea total flow distance  =  740.000(Ft.)
Highest elevation =  422.000(Ft.)
Lowest elevation =  374.000(Ft.)
Elevation difference =   48.000(Ft.) Slope =  6.486 %
Top of Initial Area Slope adjusted by User to  8.370 %
Bottom of Initial Area Slope adjusted by User to  3.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   8.37 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.75 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4510)*( 100.000^.5)/(   8.370^(1/3)]=   5.75
```

```
The initial area total distance of  740.00 (Ft.) entered leaves a
remaining distance of  640.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.11 minutes
for a distance of 640.00 (Ft.) and a slope of  3.50 %
with an elevation difference of  22.40(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.110 Minutes
Tt=[(11.9*0.1212^3)/( 22.40)]^.385=  4.11
Total initial area Ti =   5.75 minutes from Figure 3-3 formula plus
  4.11 minutes from the Figure 3-4 formula =   9.86 minutes
Rainfall intensity (I) =      5.949(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.451
Subarea runoff =      4.508(CFS)
Total initial stream area =        1.680(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.200 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   369.000(Ft.)
Downstream point/station elevation =   368.500(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.508(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.508(CFS)
Normal flow depth in pipe =    6.18(In.)
Flow top width inside pipe =   20.99(In.)
Critical Depth =    8.94(In.)
Pipe flow velocity =      7.03(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     9.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.200 to Point/Station       36.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.680(Ac.)
Runoff from this stream =      4.508(CFS)
Time of concentration =    9.91 min.
Rainfall intensity =     5.931(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.100 to Point/Station       43.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.452
Initial subarea total flow distance  =  667.700(Ft.)
Highest elevation =  410.000(Ft.)
Lowest elevation =  373.000(Ft.)
Elevation difference =   37.000(Ft.) Slope =  5.541 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  3.840 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.28 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4520)*(  80.000^.5)/(   2.000^(1/3)]=   8.28
The initial area total distance of  667.70 (Ft.) entered leaves a
remaining distance of  587.70 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.71 minutes
for a distance of 587.70 (Ft.) and a slope of  3.84 %
with an elevation difference of  22.57(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.714 Minutes
Tt=[(11.9*0.1113^3)/( 22.57)]^.385=  3.71
Total initial area Ti =   8.28 minutes from Figure 3-3 formula plus
  3.71 minutes from the Figure 3-4 formula =  11.99 minutes
Rainfall intensity (I) =      5.244(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.452
Subarea runoff =      1.896(CFS)
Total initial stream area =        0.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.200 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   369.000(Ft.)
Downstream point/station elevation =   368.500(Ft.)
Pipe length  =    33.32(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.896(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.896(CFS)
Normal flow depth in pipe =    4.56(In.)
Flow top width inside pipe =   18.83(In.)
Critical Depth =    5.72(In.)
Pipe flow velocity =      4.56(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    12.12 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.200 to Point/Station       36.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =       0.800(Ac.)
Runoff from this stream =       1.896(CFS)
Time of concentration =   12.12 min.
Rainfall intensity =     5.210(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        73.862     11.38           5.424
2         4.508      9.91           5.931
3         1.896     12.12           5.210
Qmax(1) =
            1.000 *    1.000 *    73.862) +
            0.915 *    1.000 *     4.508) +
            1.000 *    0.939 *     1.896) + =      79.766
Qmax(2) =
            1.000 *    0.871 *    73.862) +
            1.000 *    1.000 *     4.508) +
            1.000 *    0.818 *     1.896) + =      70.372
Qmax(3) =
            0.961 *    1.000 *    73.862) +
            0.878 *    1.000 *     4.508) +
            1.000 *    1.000 *     1.896) + =      76.803

Total of 3 main streams to confluence:
Flow rates before confluence point:
      73.862       4.508       1.896
Maximum flow rates at confluence using above data:
       79.766       70.372       76.803
Area of streams before confluence:
       23.640        1.680        0.800


Results of confluence:
Total flow rate =     79.766(CFS)
Time of concentration =    11.383 min.
Effective stream area after confluence  =     26.120(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       37.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   368.500(Ft.)
Downstream point/station elevation =   368.000(Ft.)
Pipe length  =    66.44(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    79.766(CFS)
Given pipe size =     42.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.589(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.556(Ft.)
 Minor friction loss =      0.534(Ft.)     K-factor =   0.50
Pipe flow velocity =      8.29(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    11.52 min.
End of computations, total study area =          26.120 (Ac.)
```

```
        San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/14/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 2
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       44.100 to Point/Station       38.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  423.586(Ft.)
Highest elevation =  374.000(Ft.)
Lowest elevation =  367.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.653 %
Top of Initial Area Slope adjusted by User to  6.330 %
Bottom of Initial Area Slope adjusted by User to  0.300 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.33 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.76 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2000)*( 100.000^.5)/(   6.330^(1/3)]=   8.76
The initial area total distance of  423.59 (Ft.) entered leaves a
remaining distance of  323.59 (Ft.)
Using Figure 3-4, the travel time for this distance is   6.26 minutes
for a distance of 323.59 (Ft.) and a slope of  0.30 %
with an elevation difference of   0.97(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    6.260 Minutes
Tt=[(11.9*0.0613^3)/(  0.97)]^.385=  6.26
Total initial area Ti =   8.76 minutes from Figure 3-3 formula plus
  6.26 minutes from the Figure 3-4 formula =  15.02 minutes
Rainfall intensity (I) =      4.537(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      2.922(CFS)
Total initial stream area =        3.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       44.100 to Point/Station       38.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.220(Ac.)
Runoff from this stream =      2.922(CFS)
Time of concentration =   15.02 min.
Rainfall intensity =     4.537(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.000 to Point/Station       38.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.050
Decimal fraction soil group B = 0.460
Decimal fraction soil group C = 0.330
Decimal fraction soil group D = 0.160
[MEDIUM DENSITY RESIDENTIAL                     ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.469
Rainfall intensity (I) =      5.383(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  11.52 min.  Rain intensity =       5.38(In/Hr)
Total area =       26.120(Ac.)  Total runoff =    79.766(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.000 to Point/Station       38.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     26.120(Ac.)
Runoff from this stream =     79.766(CFS)
Time of concentration =   11.52 min.
Rainfall intensity =     5.383(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.922     15.02           4.537
2       79.766     11.52           5.383
Qmax(1) =
           1.000 *    1.000 *     2.922) +
           0.843 *    1.000 *    79.766) + =      70.149
Qmax(2) =
           1.000 *    0.767 *     2.922) +
           1.000 *    1.000 *    79.766) + =      82.007

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.922      79.766
Maximum flow rates at confluence using above data:
       70.149       82.007
Area of streams before confluence:
        3.220       26.120


Results of confluence:
Total flow rate =     82.007(CFS)
Time of concentration =    11.520 min.
Effective stream area after confluence  =     29.340(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.000 to Point/Station       38.000
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =  11.52
Basin Area =    29.34 Acres
6 Hour Rainfall =  3.500 Inches
Runoff Coefficient =  0.440
Peak Discharge =    82.01 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       11               2.688
       22               2.743
       33               2.862
       44               2.926
       55               3.067
       66               3.144
       77               3.314
       88               3.408
       99               3.619
       110               3.738
       121               4.008
       132               4.163
       143               4.525
       154               4.739
       165               5.256
       176               5.574
       187               6.389
       198               6.928
       209               8.468
       220               9.645
       231              14.161
       242              19.953
       253              82.007
       264              11.358
       275               7.599
       286               5.946
       297               4.980
       308               4.335
       319               3.867
       330               3.510
       341               3.226
       352               2.994
       363               2.801
```

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments:**NODE 38**
5508rpl4 - Detention Pond - BMP 2

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01

********** RUNOFF HYDROGRAPHS **********

HYD 2..... 100
Read HYG 3.01

********** POND VOLUMES **********

DETENTION 2..... Vol: Elev-Area 4.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 5.01

********** POND ROUTING **********

DETENTION 2..... Pond E-V-Q Table 6.01

Table of Contents (continued)

DETENTION 2 OUT 100
Pond Routing Summary 6.07
Detention Time 6.08

S/N:
PondPack Ver: Compute Time: Date:

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
DETENTION 2 IN	POND	100	169233		253.00	82.01		
DETENTION 2 OUT	POND	100	134429		261.00	31.07	368.80	101852
HYD 2	HYG	100	169317	R	253.00	82.01		
*OUT 1 - N84	JCT	100	134425		261.00	31.07		

S/N:
PondPack Ver: Compute Time: Date:

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID		Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
	DETENTION 2	IN	POND	169233		253.00	82.01	
	DETENTION 2	OUT	POND	134429		261.00	31.07	368.80
	HYD 2		HYG	169317	R	253.00	82.01	
Outfall	OUT 1 - N84		JCT	134425		261.00	31.07	

S/N:
PondPack Ver: Compute Time: Date:

HYG file =
HYG ID = HYG 2
HYG Tag = N-38

Peak Discharge	=	82.01 cfs
Time to Peak	=	253.00 min
HYG Volume	=	169317 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 11.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	2.69	2.74	2.86	2.93
55.00	3.07	3.14	3.31	3.41	3.62
110.00	3.74	4.01	4.16	4.53	4.74
165.00	5.26	5.57	6.39	6.93	8.47
220.00	9.65	14.16	19.95	82.01	11.36
275.00	7.60	5.95	4.98	4.34	3.87
330.00	3.51	3.23	2.99	2.80	

S/N:
PondPack Ver: Compute Time: Date:

Type.... Vol: Elev-Area
Name.... DETENTION 2

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
367.00	-----	25600	0	0	0
368.00	-----	68850	136433	45478	45478
369.00	-----	72200	211555	70518	115996
370.00	-----	75650	221755	73918	189914
371.00	-----	79150	232180	77393	267308
372.00	-----	82700	242756	80919	348226

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 367.00 ft
Increment = .05 ft
Max. Elev.= 372.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Circular	O0	--->	CV	367.800	372.000
Stand Pipe	RP	--->	CV	368.200	372.000
Orifice-Circular	O1	--->	CV	367.000	372.000
Culvert-Circular	CV	--->	TW	362.000	372.000
TW SETUP, DS Channel					

S/N:
PondPack Ver: Compute Time: Date:

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = O0
Structure Type    = Orifice-Circular
-----------------------------------
# of Openings     =         2
Invert Elev.      =    367.80 ft
Diameter          =     .5830 ft
Orifice Coeff.    =      .600


Structure ID      = RP
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    368.20 ft
Diameter          =    6.0000 ft
Orifice Area      =   28.2743 sq.ft
Orifice Coeff.    =      .600
Weir Length       =     18.85 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No


Structure ID      = O1
Structure Type    = Orifice-Circular
-----------------------------------
# of Openings     =         5
Invert Elev.      =    367.00 ft
Diameter          =     .2500 ft
Orifice Coeff.    =      .600
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CV
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         1
Barrel Diameter   =    3.0000 ft
Upstream Invert   =    362.00 ft
Dnstream Invert   =    361.25 ft
Horiz. Length     =    106.66 ft
Barrel Length     =    106.66 ft
Barrel Slope      =    .00703 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .007228  (per ft of full flow)
Kr                =     .5000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0078
Inlet Control M   =    2.0000
Inlet Control c   =    .03790
Inlet Control Y   =     .6900
T1 ratio (HW/D)   =     1.132
T2 ratio (HW/D)   =     1.293
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    365.40 ft  --->  Flow =     42.85 cfs
At T2 Elev =    365.88 ft  --->  Flow =     48.97 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = TW
Structure Type     = TW SETUP, DS Channel
-----------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID:   Chn-Trapz - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID: Chn-Trapz - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

TRAPEZOIDAL CROSS SECTION

Slope = .010000 ft/ft
Mannings n = 0.02200
Invert Elev. = 353.00 ft
Top of Channel = 356.00 ft
Base width = 3.00 ft
Rt Side slope = 3.000 horizontal :1 vert.
Lt Side slope = 3.000 horizontal :1 vert.

Type.... Pond E-V-Q Table
Name.... DETENTION 2
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\
Inflow HYG file = NONE STORED - DETENTION 2 IN 100
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2
Pond Volume Data = DETENTION 2
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 367.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
367.00	.00	0	25600	.00	.00	.00
367.05	.02	1321	27264	.25	.27	44.31
367.10	.08	2728	28982	.27	.35	91.26
367.15	.17	4220	30751	.28	.45	141.12
367.20	.28	5804	32573	.30	.58	194.03
367.25	.42	7479	34447	.32	.74	250.02
367.30	.49	9248	36373	.34	.83	309.11
367.35	.56	11117	38353	.36	.92	371.48
367.40	.62	13085	40384	.37	.99	437.15
367.45	.67	15157	42468	.39	1.06	506.28
367.50	.72	17333	44604	.41	1.14	578.89
367.55	.77	19617	46792	.43	1.20	655.09
367.60	.81	22013	49034	.45	1.27	735.03
367.65	.86	24521	51327	.48	1.33	818.70
367.70	.90	27147	53674	.50	1.39	906.29
367.75	.93	29890	56072	.52	1.45	997.77
367.80	.97	32754	58522	.54	1.51	1093.30
367.85	1.02	35743	61026	.57	1.58	1193.02
367.90	1.09	38857	63581	.59	1.68	1296.93
367.95	1.18	42103	66190	.61	1.80	1405.22

S/N:
PondPack Ver: Compute Time: Date:

Type.... Pond E-V-Q Table
Name.... DETENTION 2
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\
Inflow HYG file = NONE STORED - DETENTION 2 IN 100
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2
Pond Volume Data = DETENTION 2
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 367.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
368.00	1.30	45478	68850	.64	1.94	1517.85
368.05	1.43	48923	69016	.64	2.07	1632.85
368.10	1.58	52380	69181	.64	2.22	1748.21
368.15	1.75	55842	69347	.64	2.39	1863.78
368.20	1.93	59315	69514	.64	2.57	1979.73
368.25	2.77	62794	69680	.65	3.42	2096.54
368.30	4.17	66281	69847	.65	4.82	2214.18
368.35	5.93	69779	70013	.65	6.57	2332.53
368.40	7.98	73283	70180	.65	8.63	2451.39
368.45	10.21	76797	70348	.65	10.86	2570.77
368.50	12.62	80318	70515	.65	13.27	2690.54
368.55	15.25	83847	70683	.65	15.90	2810.80
368.60	18.06	87387	70850	.66	18.71	2931.60
368.65	21.01	90933	71018	.66	21.67	3052.75
368.70	24.15	94489	71187	.66	24.81	3174.44
368.75	27.44	98052	71355	.66	28.10	3296.48
368.80	30.84	101623	71524	.66	31.50	3418.92
368.85	34.42	105205	71692	.66	35.08	3541.89
368.90	38.11	108793	71861	.67	38.78	3665.19
368.95	41.90	112391	72031	.67	42.57	3788.93

Name.... DETENTION 2
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\
Inflow HYG file = NONE STORED - DETENTION 2 IN 100
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2
Pond Volume Data = DETENTION 2
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 367.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
369.00	45.89	115996	72200	.67	46.55	3913.08
369.05	49.94	119609	72371	.67	50.61	4037.58
369.10	54.12	123234	72541	.67	54.79	4162.57
369.15	58.41	126864	72712	.67	59.09	4287.88
369.20	62.82	130505	72884	.67	63.50	4413.66
369.25	67.17	134153	73055	.68	67.85	4539.60
369.30	71.57	137809	73227	.68	72.25	4665.87
369.35	75.67	141476	73398	.68	76.35	4792.21
369.40	79.54	145149	73570	.68	80.22	4918.51
369.45	83.14	148833	73743	.68	83.82	5044.92
369.50	84.69	152524	73915	.68	85.37	5169.49
369.55	85.07	156223	74087	.69	85.75	5293.18
369.60	85.46	159933	74260	.69	86.15	5417.24
369.65	85.85	163650	74433	.69	86.54	5541.52
369.70	86.24	167377	74607	.69	86.93	5666.15
369.75	86.62	171111	74780	.69	87.31	5790.99
369.80	87.00	174853	74954	.69	87.69	5916.12
369.85	87.37	178607	75127	.70	88.06	6041.60
369.90	87.75	182366	75301	.70	88.45	6167.31
369.95	88.12	186137	75476	.70	88.82	6293.38

Name.... DETENTION 2
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\
Inflow HYG file = NONE STORED - DETENTION 2 IN 100
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2
Pond Volume Data = DETENTION 2
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 367.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
370.00	88.50	189914	75650	.70	89.20	6419.67
370.05	88.87	193700	75823	.70	89.57	6546.23
370.10	89.24	197497	75996	.70	89.94	6673.17
370.15	89.61	201300	76170	.71	90.31	6800.31
370.20	89.98	205115	76344	.71	90.69	6927.82
370.25	90.34	208935	76518	.71	91.05	7055.54
370.30	90.71	212764	76692	.71	91.42	7183.55
370.35	91.06	216605	76866	.71	91.78	7311.92
370.40	91.43	220452	77040	.71	92.15	7440.52
370.45	91.79	224309	77215	.71	92.51	7569.47
370.50	92.15	228174	77390	.72	92.87	7698.63
370.55	92.51	232046	77565	.72	93.22	7828.09
370.60	92.86	235931	77741	.72	93.58	7957.92
370.65	93.21	239821	77916	.72	93.93	8087.95
370.70	93.57	243723	78092	.72	94.29	8218.36
370.75	93.91	247631	78268	.72	94.64	8348.98
370.80	94.27	251547	78444	.73	95.00	8479.90
370.85	94.62	255475	78620	.73	95.34	8611.18
370.90	94.96	259410	78796	.73	95.69	8742.67
370.95	95.31	263356	78973	.73	96.04	8874.54

Name.... DETENTION 2
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\
Inflow HYG file = NONE STORED - DETENTION 2 IN 100
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2
Pond Volume Data = DETENTION 2
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 367.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
371.00	95.65	267308	79150	.73	96.39	9006.63
371.05	96.00	271269	79326	.73	96.73	9139.00
371.10	96.34	275241	79502	.74	97.08	9271.76
371.15	96.68	279219	79678	.74	97.42	9404.71
371.20	97.02	283209	79854	.74	97.76	9538.05
371.25	97.36	287205	80030	.74	98.10	9671.59
371.30	97.70	291210	80207	.74	98.45	9805.43
371.35	98.04	295226	80384	.74	98.78	9939.64
371.40	98.37	299249	80561	.75	99.12	10074.06
371.45	98.71	303283	80738	.75	99.45	10208.86
371.50	99.04	307323	80915	.75	99.79	10343.87
371.55	99.37	311372	81093	.75	100.12	10479.18
371.60	99.71	315433	81271	.75	100.46	10614.87
371.65	100.04	319500	81449	.75	100.79	10750.77
371.70	100.36	323578	81627	.76	101.12	10887.04
371.75	100.70	327663	81805	.76	101.45	11023.54
371.80	101.02	331757	81984	.76	101.78	11160.32
371.85	101.34	335862	82163	.76	102.10	11297.48
371.90	101.67	339974	82341	.76	102.44	11434.87
371.95	102.00	344097	82521	.76	102.76	11572.63

Name.... DETENTION 2
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\
Inflow HYG file = NONE STORED - DETENTION 2 IN 100
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2
Pond Volume Data = DETENTION 2
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 367.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
372.00	102.32	348226	82700	.77	103.08	11710.60

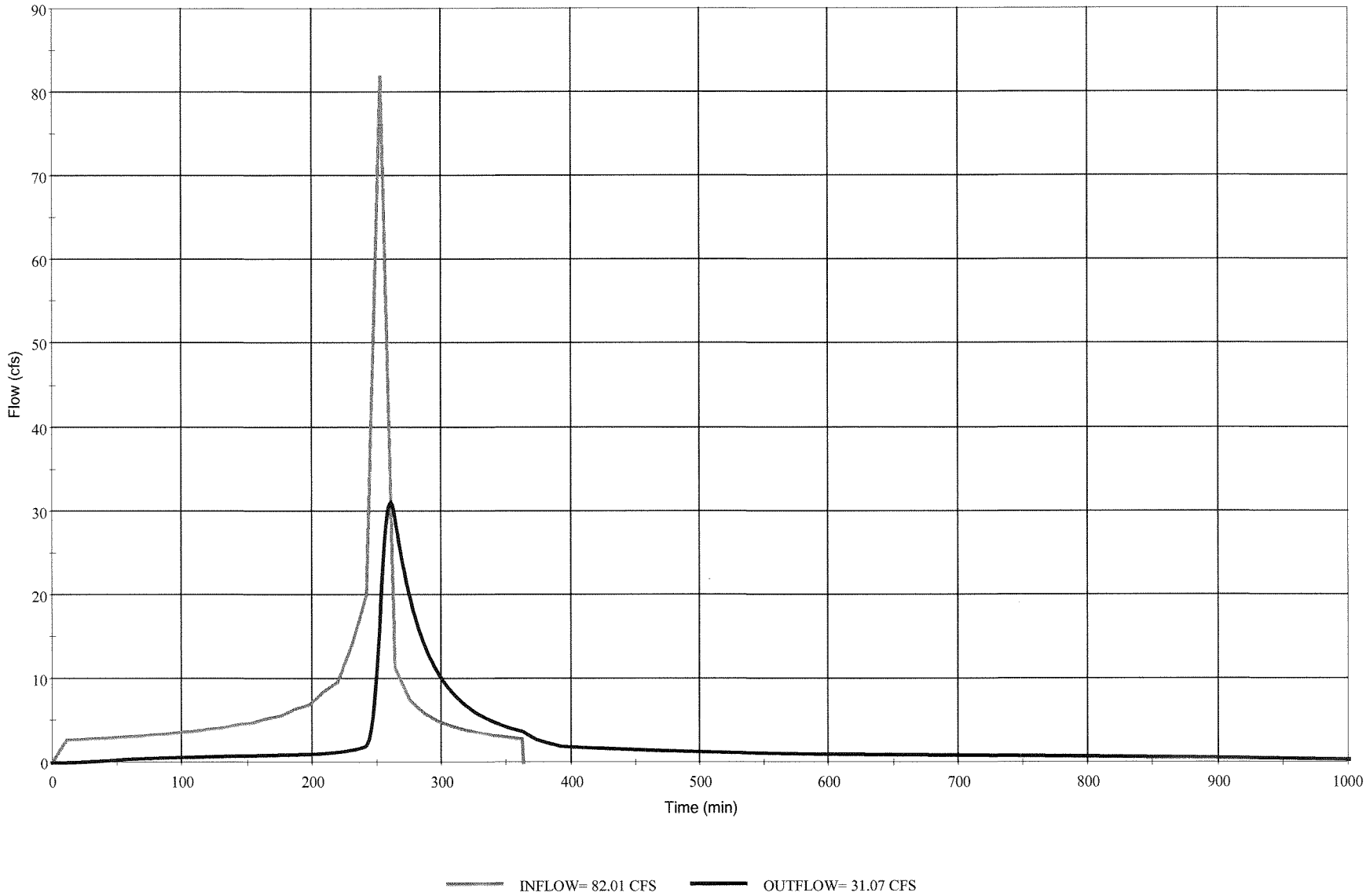
S/N:
PondPack Ver: Compute Time: Date:

```
   Type.... Pond Routing Summary                                  Page 6.07
   Name.... DETENTION 2  OUT   Tag: 100                        Event: 100 yr
   File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP
2\5508RPL4-100 YR-BMP 2.PPW
   Storm... 100   Tag: 100

                      LEVEL POOL ROUTING SUMMARY

    HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 2\
    Inflow  HYG file = NONE STORED - DETENTION 2  IN  100
    Outflow HYG file = NONE STORED - DETENTION 2  OUT 100

    Pond Node   Data = DETENTION 2
    Pond Volume Data = DETENTION 2
    Pond Outlet Data = Outlet 1

    Infiltration =    .4000 in/hr

    INITIAL CONDITIONS
    ----------------------------------
    Starting WS Elev   =   367.00 ft
    Starting Volume    =        0 cu.ft
    Starting Outflow   =      .00 cfs
    Starting Infiltr.  =      .00 cfs
    Starting Total Qout=      .00 cfs
    Time Increment     =     1.00 min


    INFLOW/OUTFLOW HYDROGRAPH SUMMARY
    ====================================================
    Peak Inflow       =     82.01 cfs    at    253.00 min
    Peak Outflow      =     31.07 cfs    at    261.00 min
    Peak Infiltration =       .66 cfs    at    261.00 min
    ----------------------------------------------------
    Peak Elevation    =    368.80 ft
    Peak Storage =         101852 cu.ft
    ====================================================


    MASS BALANCE (cu.ft)
    --------------------------
  + Initial Vol  =           0
  + HYG Vol IN   =      169233
  - Infiltration =       34790
  - HYG Vol OUT  =      134429
  - Retained Vol =          14
                  ----------
    Unrouted Vol = -            cu.ft  (.000% of Inflow Volume)


   S/N:
   PondPack Ver:                  Compute Time:             Date:
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 2\
Inflow  HYG file = NONE STORED - DETENTION 2  IN  100
Outflow HYG file = NONE STORED - DETENTION 2  OUT 100

Pond Node   Data = DETENTION 2
Pond Volume Data = DETENTION 2
Pond Outlet Data = Outlet 1

Infiltration =    .4000 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------
Tp, Outflow + Infilt.   =    261.00 min
Tp, Total Inflow        =    253.00 min
Peak to Peak            =      8.00 min

Qout+Infilt. Centroid   =    421.13 min
Inflow Centroid         =    219.12 min
Centroid to Centroid    =    202.01 min

Weighted Avg. Plug Time =    206.18 min
Max.Plug Vol. Plug Time =    138.30 min
Max.Inflow Plug Volume  =      4751 cu.ft   (From 252.00 to 253.00 min)
--------------------------------------
```

NODE 38 - DETENTION POND - BMP 2
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



Bio-Retention Pond-3

100-year Development Conditions

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/13/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 3
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.100 to Point/Station       80.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.680
Initial subarea total flow distance  =  585.460(Ft.)
Highest elevation =  410.000(Ft.)
Lowest elevation =  379.000(Ft.)
Elevation difference =   31.000(Ft.) Slope =  5.295 %
Top of Initial Area Slope adjusted by User to  2.400 %
Bottom of Initial Area Slope adjusted by User to  7.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.40 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.89 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6800)*(  75.000^.5)/(   2.400^(1/3)]=   4.89
The initial area total distance of  585.46 (Ft.) entered leaves a
remaining distance of  510.46 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.64 minutes
for a distance of 510.46 (Ft.) and a slope of  7.00 %
with an elevation difference of  35.73(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.645 Minutes
Tt=[(11.9*0.0967^3)/( 35.73)]^.385=  2.64
Total initial area Ti =   4.89 minutes from Figure 3-3 formula plus
  2.64 minutes from the Figure 3-4 formula =   7.53 minutes
Rainfall intensity (I) =      7.078(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.680
Subarea runoff =      7.509(CFS)
Total initial stream area =        1.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.100 to Point/Station       80.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.560(Ac.)
Runoff from this stream =      7.509(CFS)
Time of concentration =    7.53 min.
Rainfall intensity =     7.078(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       81.100 to Point/Station       81.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.688
Initial subarea total flow distance  =  373.600(Ft.)
Highest elevation =  407.000(Ft.)
Lowest elevation =  379.000(Ft.)
Elevation difference =   28.000(Ft.) Slope =  7.495 %
Top of Initial Area Slope adjusted by User to  7.000 %
Bottom of Initial Area Slope adjusted by User to  7.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   7.00 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.78 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6880)*(  95.000^.5)/(   7.000^(1/3)]=   3.78
The initial area total distance of  373.60 (Ft.) entered leaves a
remaining distance of  278.60 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.66 minutes
for a distance of 278.60 (Ft.) and a slope of  7.00 %
with an elevation difference of  19.50(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.659 Minutes
Tt=[(11.9*0.0528^3)/( 19.50)]^.385=  1.66
Total initial area Ti =   3.78 minutes from Figure 3-3 formula plus
  1.66 minutes from the Figure 3-4 formula =   5.44 minutes
```

```
Rainfall intensity (I) =      8.736(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.688
Subarea runoff =      5.349(CFS)
Total initial stream area =        0.890(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       81.100 to Point/Station       81.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.890(Ac.)
Runoff from this stream =      5.349(CFS)
Time of concentration =    5.44 min.
Rainfall intensity =     8.736(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        7.509      7.53           7.078
2        5.349      5.44           8.736
Qmax(1) =
            1.000 *    1.000 *     7.509) +
            0.810 *    1.000 *     5.349) + =      11.843
Qmax(2) =
            1.000 *    0.722 *     7.509) +
            1.000 *    1.000 *     5.349) + =      10.768

Total of 2 main streams to confluence:
Flow rates before confluence point:
       7.509       5.349
Maximum flow rates at confluence using above data:
       11.843       10.768
Area of streams before confluence:
        1.560        0.890


Results of confluence:
Total flow rate =     11.843(CFS)
Time of concentration =     7.535 min.
Effective stream area after confluence  =      2.450(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       81.100 to Point/Station       81.200
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =   7.53
Basin Area =     2.45 Acres
6 Hour Rainfall =  3.500 Inches
Runoff Coefficient =  0.683
Peak Discharge =    11.84 CFS
```

Time (Min)	Discharge (CFS)
0	0.000
7	0.351
14	0.356
21	0.365
28	0.371
35	0.381
42	0.387
49	0.399
56	0.405
63	0.419
70	0.426
77	0.441
84	0.449
91	0.467
98	0.476
105	0.497
112	0.508
119	0.533
126	0.546
133	0.575
140	0.592
147	0.628
154	0.649
161	0.696
168	0.723
175	0.786
182	0.823
189	0.913
196	0.968
203	1.109
210	1.203
217	1.470
224	1.675
231	2.459
238	3.465
245	11.843
252	1.972
259	1.320
266	1.032
273	0.865
280	0.753
287	0.671
294	0.609
301	0.560
308	0.520
315	0.486
322	0.458
329	0.433
336	0.412
343	0.393
350	0.376
357	0.361
364	0.347

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: **NODE 80.2**
5508rpl4 - Bioretention - BMP 3

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01

********** RUNOFF HYDROGRAPHS **********

HYD 3..... 100
Read HYG 3.01

********** POND VOLUMES **********

BIORETENTION3... Vol: Elev-Area 4.01
Vol: Void Adjustments 4.02

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 5.01

********** POND ROUTING **********

BIORETENTION3... Pond E-V-Q Table 6.01

Table of Contents (continued)

BIORETENTION3OUT 100
Pond Routing Summary 6.05
Detention Time 6.06

S/N:
PondPack Ver: Compute Time: Date:

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
BIORETENTION3IN	POND	100	20884		245.00	11.84		
BIORETENTION3OUT	POND	100	11136		249.00	6.19	381.92	11291
HYD 3	HYG	100	20894	R	245.00	11.84		
*OUT 6 - N34	JCT	100	11136		249.00	6.19		

S/N:
PondPack Ver: Compute Time: Date:

Type.... Executive Summary (Nodes) Page 2.01
Name.... Watershed Event: 100 yr
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\
Storm... 100 Tag: 100

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
BIORETENTION3IN	POND	20884		245.00	11.84	
BIORETENTION3OUT	POND	11136		249.00	6.19	381.92
HYD 3	HYG	20894	R	245.00	11.84	
Outfall OUT 6 - N34	JCT	11136		249.00	6.19	

S/N:
PondPack Ver: Compute Time: Date:

HYG file =
HYG ID = HYG 3
HYG Tag = N-80.2

Peak Discharge	=	11.84 cfs
Time to Peak	=	245.00 min
HYG Volume	=	20894 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 7.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	.35	.36	.37	.37
35.00	.38	.39	.40	.41	.42
70.00	.43	.44	.45	.47	.48
105.00	.50	.51	.53	.55	.58
140.00	.59	.63	.65	.70	.72
175.00	.79	.82	.91	.97	1.11
210.00	1.20	1.47	1.68	2.46	3.47
245.00	11.84	1.97	1.32	1.03	.87
280.00	.75	.67	.61	.56	.52
315.00	.49	.46	.43	.41	.39
350.00	.38	.36	.35		

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
379.00	-----	5050	0	0	0
380.50	-----	5050	15150	7575	7575
381.00	-----	5500	15820	2637	10212
382.00	-----	6500	17979	5993	16205

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

VOLUME COMPLETELY FILLED WITH MATERIAL
(Adjust Volumes for Voids)

Void Spaces = 72.00000 %

HW Elv, ft	Total, cu.ft	Adjusted,cu.ft
379.00	0	0
380.50	7575	5454
381.00	10212	7352
382.00	16205	11667

S/N:
PondPack Ver: Compute Time: Date:

Name.... Outlet 1

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 379.00 ft
Increment = .05 ft
Max. Elev.= 382.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	R8	--->	CV	381.250	382.000
Stand Pipe	R3	--->	CV	381.250	382.000
Stand Pipe	R6	--->	CV	381.250	382.000
Stand Pipe	R2	--->	CV	381.250	382.000
Stand Pipe	R9	--->	CV	381.250	382.000
Stand Pipe	R1	--->	CV	381.250	372.000
Stand Pipe	R5	--->	CV	381.250	382.000
Stand Pipe	R0	--->	CV	381.250	372.000
Stand Pipe	R7	--->	CV	381.250	382.000
Stand Pipe	RP	--->	CV	381.250	372.000
Stand Pipe	R4	--->	CV	381.250	382.000
Culvert-Circular	CV	--->	TW	374.000	382.000
TW SETUP, DS Channel					

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R8
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    381.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = R3
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    381.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = R6
Structure Type     = Stand Pipe
------------------------------------
# of Openings      =         1
Invert Elev.       =    381.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

```
Structure ID       = R2
Structure Type     = Stand Pipe
------------------------------------
# of Openings      =         1
Invert Elev.       =    381.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R9
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    381.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = R1
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    381.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = R5
Structure Type     = Stand Pipe
------------------------------------
# of Openings      =         1
Invert Elev.       =    381.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

```
Structure ID       = R0
Structure Type     = Stand Pipe
------------------------------------
# of Openings      =         1
Invert Elev.       =    381.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R7
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    381.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = RP
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    381.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = R4
Structure Type     = Stand Pipe
-----------------------------------
# of Openings      =         1
Invert Elev.       =    381.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CV
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         1
Barrel Diameter   =    2.0000 ft
Upstream Invert   =    374.00 ft
Dnstream Invert   =    373.50 ft
Horiz. Length     =     47.17 ft
Barrel Length     =     47.17 ft
Barrel Slope      =    .01060 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .012411  (per ft of full flow)
Kr                =     .5000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0078
Inlet Control M   =    2.0000
Inlet Control c   =    .03790
Inlet Control Y   =     .6900
T1 ratio (HW/D)   =     1.130
T2 ratio (HW/D)   =     1.291
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    376.26 ft  --->  Flow =     15.55 cfs
At T2 Elev =    376.58 ft  --->  Flow =     17.77 cfs
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = TW
Structure Type     = TW SETUP, DS Channel
-----------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID:   Chn-Cir - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID: Chn-Cir - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

CIRCULAR CROSS SECTION

Slope = .014000 ft/ft
Mannings n = 0.01300
Invert Elev. = 373.00 ft
Top of Channel = 375.00 ft
Diameter = 2.0000 ft

Type.... Pond E-V-Q Table
Name.... BIORETENTION3
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\
Inflow HYG file = NONE STORED - BIORETENTION3IN 100
Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3
Pond Volume Data = BIORETENTION3
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 379.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
379.00	.00	0	5050	.00	.00	.00
379.05	.00	182	5050	.06	.06	6.12
379.10	.00	364	5050	.06	.06	12.18
379.15	.00	545	5050	.06	.06	18.24
379.20	.00	727	5050	.06	.06	24.30
379.25	.00	909	5050	.06	.06	30.36
379.30	.00	1091	5050	.06	.06	36.42
379.35	.00	1273	5050	.06	.06	42.48
379.40	.00	1454	5050	.06	.06	48.54
379.45	.00	1636	5050	.06	.06	54.60
379.50	.00	1818	5050	.06	.06	60.66
379.55	.00	2000	5050	.06	.06	66.72
379.60	.00	2182	5050	.06	.06	72.78
379.65	.00	2363	5050	.06	.06	78.84
379.70	.00	2545	5050	.06	.06	84.90
379.75	.00	2727	5050	.06	.06	90.96
379.80	.00	2909	5050	.06	.06	97.02
379.85	.00	3091	5050	.06	.06	103.08
379.90	.00	3272	5050	.06	.06	109.14
379.95	.00	3454	5050	.06	.06	115.20

S/N:
PondPack Ver: Compute Time: Date:

Name.... BIORETENTION3
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\
Inflow HYG file = NONE STORED - BIORETENTION3IN 100
Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3
Pond Volume Data = BIORETENTION3
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 379.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
380.00	.00	3636	5050	.06	.06	121.26
380.05	.00	3818	5050	.06	.06	127.32
380.10	.00	4000	5050	.06	.06	133.38
380.15	.00	4181	5050	.06	.06	139.44
380.20	.00	4363	5050	.06	.06	145.50
380.25	.00	4545	5050	.06	.06	151.56
380.30	.00	4727	5050	.06	.06	157.62
380.35	.00	4909	5050	.06	.06	163.68
380.40	.00	5090	5050	.06	.06	169.74
380.45	.00	5272	5050	.06	.06	175.80
380.50	.00	5454	5050	.06	.06	181.86
380.55	.00	5637	5094	.06	.06	187.94
380.60	.00	5821	5138	.06	.06	194.09
380.65	.00	6007	5183	.06	.06	200.28
380.70	.00	6194	5228	.06	.06	206.53
380.75	.00	6383	5273	.06	.06	212.83
380.80	.00	6574	5318	.06	.06	219.18
380.85	.00	6766	5363	.06	.06	225.59
380.90	.00	6960	5408	.06	.06	232.05
380.95	.00	7155	5454	.06	.06	238.57

S/N:
PondPack Ver: Compute Time: Date:

Name.... BIORETENTION3
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\
Inflow HYG file = NONE STORED - BIORETENTION3IN 100
Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3
Pond Volume Data = BIORETENTION3
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 379.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
381.00	.00	7352	5500	.06	.06	245.14
381.05	.00	7551	5548	.06	.06	251.77
381.10	.00	7752	5596	.06	.06	258.46
381.15	.00	7954	5645	.07	.07	265.20
381.20	.00	8158	5693	.07	.07	272.01
381.25	.00	8364	5742	.07	.07	278.87
381.30	.44	8572	5791	.07	.50	286.22
381.35	1.23	8781	5841	.07	1.30	294.00
381.40	2.27	8992	5890	.07	2.33	302.07
381.45	3.38	9205	5940	.07	3.45	310.29
381.50	3.78	9420	5990	.07	3.85	317.85
381.55	4.14	9636	6040	.07	4.21	325.42
381.60	4.47	9855	6090	.07	4.54	333.04
381.65	4.78	10075	6140	.07	4.86	340.69
381.70	5.07	10297	6191	.07	5.14	348.37
381.75	5.35	10521	6242	.07	5.42	356.11
381.80	5.61	10746	6293	.07	5.68	363.89
381.85	5.86	10974	6345	.07	5.93	371.72
381.90	6.10	11203	6396	.07	6.17	379.61
381.95	6.32	11434	6448	.07	6.40	387.54

Name.... BIORETENTION3
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

LEVEL POOL ROUTING DATA

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 3\
Inflow  HYG file = NONE STORED - BIORETENTION3IN  100
Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node   Data = BIORETENTION3
Pond Volume Data = BIORETENTION3
Pond Outlet Data = Outlet 1

Infiltration =    .5000 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   379.00 ft
Starting Volume    =        0 cu.ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =     1.00 min
```

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
382.00	6.55	11667	6500	.08	6.62	395.53

S/N:
PondPack Ver: Compute Time: Date:

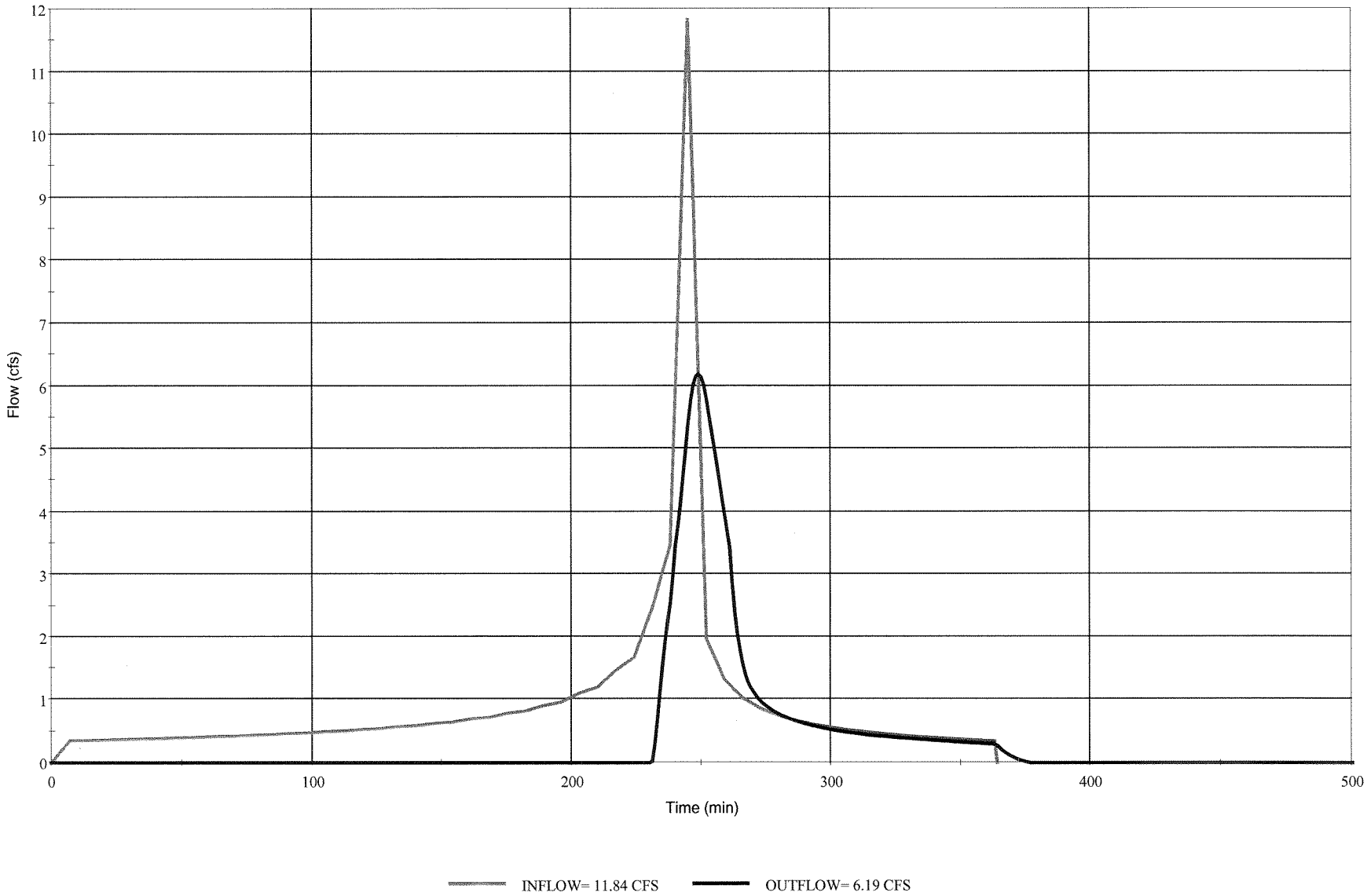
LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\
Inflow  HYG file = NONE STORED - BIORETENTION3IN  100
Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node   Data = BIORETENTION3
Pond Volume Data = BIORETENTION3
Pond Outlet Data = Outlet 1

Infiltration =    .5000 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   379.00 ft
Starting Volume    =        0 cu.ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =     1.00 min


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =     11.84 cfs    at    245.00 min
Peak Outflow      =      6.19 cfs    at    249.00 min
Peak Infiltration =       .07 cfs    at    249.00 min
-----------------------------------------------------
Peak Elevation    =    381.92 ft
Peak Storage =          11291 cu.ft
=====================================================


MASS BALANCE (cu.ft)
--------------------------
+ Initial Vol  =           0
+ HYG Vol IN   =       20884
- Infiltration =        7258
- HYG Vol OUT  =       11136
- Retained Vol =        2489
                   ----------
Unrouted Vol = -            cu.ft  (.000% of Inflow Volume)
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 3\
Inflow  HYG file = NONE STORED - BIORETENTION3IN  100
Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node   Data = BIORETENTION3
Pond Volume Data = BIORETENTION3
Pond Outlet Data = Outlet 1

Infiltration =    .5000 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------
Tp, Outflow + Infilt.   =    249.00 min
Tp, Total Inflow        =    245.00 min
Peak to Peak            =      4.00 min

Qout+Infilt. Centroid   =    549.99 min
Inflow Centroid         =    212.13 min
Centroid to Centroid    =    337.86 min

Weighted Avg. Plug Time =    526.38 min
Max.Plug Vol. Plug Time =    414.91 min
Max.Inflow Plug Volume  =       675 cu.ft   (From 244.00 to 245.00 min)
--------------------------------------
```

NODE 80.2 - BIORETENTION - BMP 3
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



Bio-Retention Pond-4

Bio-Retention Pond-4

100-year Development Conditions

```
        San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/13/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH
 100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
 BIO-RETENTION POND 4
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       82.100 to Point/Station       82.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.100
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.484
Initial subarea total flow distance  =  674.140(Ft.)
Highest elevation =  436.000(Ft.)
Lowest elevation =  413.000(Ft.)
Elevation difference =   23.000(Ft.) Slope =  3.412 %
Top of Initial Area Slope adjusted by User to  7.000 %
Bottom of Initial Area Slope adjusted by User to  2.270 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   7.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.80 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4840)*( 100.000^.5)/(   7.000^(1/3)]=   5.80
The initial area total distance of  674.14 (Ft.) entered leaves a
remaining distance of  574.14 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.47 minutes
for a distance of 574.14 (Ft.) and a slope of  2.27 %
with an elevation difference of  13.03(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.467 Minutes
Tt=[(11.9*0.1087^3)/( 13.03)]^.385=  4.47
Total initial area Ti =   5.80 minutes from Figure 3-3 formula plus
  4.47 minutes from the Figure 3-4 formula =  10.26 minutes
Rainfall intensity (I) =      5.799(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.484
Subarea runoff =      2.891(CFS)
Total initial stream area =        1.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       82.200 to Point/Station       64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   408.000(Ft.)
Downstream point/station elevation =   399.500(Ft.)
Pipe length  =   347.44(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.891(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.891(CFS)
Normal flow depth in pipe =    4.98(In.)
Flow top width inside pipe =   19.47(In.)
Critical Depth =    7.11(In.)
Pipe flow velocity =      6.14(Ft/s)
Travel time through pipe =    0.94 min.
Time of concentration (TC) =    11.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       82.200 to Point/Station       64.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.030(Ac.)
Runoff from this stream =      2.891(CFS)
Time of concentration =   11.21 min.
Rainfall intensity =     5.479(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       83.100 to Point/Station       83.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  781.000(Ft.)
Highest elevation =  420.000(Ft.)
Lowest elevation =  405.000(Ft.)
```

```
Elevation difference =   15.000(Ft.) Slope =  1.921 %
Top of Initial Area Slope adjusted by User to  1.330 %
Bottom of Initial Area Slope adjusted by User to  2.420 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.33 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.92 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  60.000^.5)/(   1.330^(1/3)]=   2.92
The initial area total distance of  781.00 (Ft.) entered leaves a
remaining distance of  721.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.19 minutes
for a distance of 721.00 (Ft.) and a slope of  2.42 %
with an elevation difference of  17.45(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.193 Minutes
Tt=[(11.9*0.1366^3)/( 17.45)]^.385=  5.19
Total initial area Ti =   2.92 minutes from Figure 3-3 formula plus
  5.19 minutes from the Figure 3-4 formula =   8.11 minutes
Rainfall intensity (I) =      6.751(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      2.467(CFS)
Total initial stream area =        0.420(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       83.200 to Point/Station       64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   400.000(Ft.)
Downstream point/station elevation =   399.500(Ft.)
Pipe length  =    27.53(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.467(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.467(CFS)
Normal flow depth in pipe =    4.95(In.)
Flow top width inside pipe =   19.43(In.)
Critical Depth =    6.54(In.)
Pipe flow velocity =      5.27(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     8.20 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       83.200 to Point/Station       64.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.420(Ac.)
Runoff from this stream =      2.467(CFS)
Time of concentration =    8.20 min.
Rainfall intensity =     6.704(In/Hr)
Program is now starting with Main Stream No. 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       84.100 to Point/Station       84.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  777.000(Ft.)
Highest elevation =  414.000(Ft.)
Lowest elevation =  405.000(Ft.)
Elevation difference =    9.000(Ft.) Slope =  1.158 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  2.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.21 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  60.000^.5)/(   1.000^(1/3)]=   3.21
The initial area total distance of  777.00 (Ft.) entered leaves a
remaining distance of  717.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.19 minutes
for a distance of 717.00 (Ft.) and a slope of  2.40 %
with an elevation difference of  17.21(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.188 Minutes
Tt=[(11.9*0.1358^3)/( 17.21)]^.385=  5.19
Total initial area Ti =   3.21 minutes from Figure 3-3 formula plus
  5.19 minutes from the Figure 3-4 formula =   8.39 minutes
Rainfall intensity (I) =      6.602(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      3.159(CFS)
Total initial stream area =        0.550(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       84.200 to Point/Station       64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   400.000(Ft.)
Downstream point/station elevation =   399.500(Ft.)
Pipe length  =     5.77(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.159(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.159(CFS)
Normal flow depth in pipe =    3.81(In.)
Flow top width inside pipe =   17.55(In.)
Critical Depth =    7.44(In.)
Pipe flow velocity =      9.84(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     8.40 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       84.200 to Point/Station       64.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.550(Ac.)
Runoff from this stream =      3.159(CFS)
Time of concentration =    8.40 min.
Rainfall intensity =     6.597(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        2.891     11.21           5.479
2        2.467      8.20           6.704
3        3.159      8.40           6.597
Qmax(1) =
            1.000 *    1.000 *     2.891) +
            0.817 *    1.000 *     2.467) +
            0.831 *    1.000 *     3.159) + =       7.531
Qmax(2) =
            1.000 *    0.731 *     2.891) +
            1.000 *    1.000 *     2.467) +
            1.000 *    0.975 *     3.159) + =       7.662
Qmax(3) =
            1.000 *    0.750 *     2.891) +
            0.984 *    1.000 *     2.467) +
            1.000 *    1.000 *     3.159) + =       7.754

Total of 3 main streams to confluence:
Flow rates before confluence point:
       2.891       2.467       3.159
Maximum flow rates at confluence using above data:
        7.531       7.662       7.754
Area of streams before confluence:
        1.030       0.420       0.550


Results of confluence:
Total flow rate =      7.754(CFS)
Time of concentration =     8.404 min.
Effective stream area after confluence  =      2.000(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       66.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   399.500(Ft.)
Downstream point/station elevation =   397.500(Ft.)
Pipe length  =    50.16(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.754(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.754(CFS)
Normal flow depth in pipe =    7.24(In.)
Flow top width inside pipe =   22.03(In.)
Critical Depth =   11.87(In.)
Pipe flow velocity =      9.70(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     8.49 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       66.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.000(Ac.)
Runoff from this stream =      7.754(CFS)
Time of concentration =    8.49 min.
Rainfall intensity =     6.554(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.100 to Point/Station       85.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less       )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.678
Initial subarea total flow distance  =  551.750(Ft.)
Highest elevation =  406.000(Ft.)
Lowest elevation =  404.000(Ft.)
Elevation difference =    2.000(Ft.) Slope =  0.362 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.36 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.54 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6780)*(  50.000^.5)/(   0.362^(1/3)]=   7.54
The initial area total distance of  551.75 (Ft.) entered leaves a
remaining distance of  501.75 (Ft.)
Using Figure 3-4, the travel time for this distance is   8.16 minutes
for a distance of 501.75 (Ft.) and a slope of  0.36 %
with an elevation difference of   1.82(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    8.163 Minutes
Tt=[(11.9*0.0950^3)/(  1.82)]^.385=  8.16
Total initial area Ti =   7.54 minutes from Figure 3-3 formula plus
  8.16 minutes from the Figure 3-4 formula =  15.70 minutes
Rainfall intensity (I) =      4.408(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.678
Subarea runoff =      8.070(CFS)
Total initial stream area =        2.700(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.200 to Point/Station       65.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   399.000(Ft.)
Downstream point/station elevation =   398.500(Ft.)
Pipe length  =     6.06(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.070(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.070(CFS)
Normal flow depth in pipe =    6.14(In.)
Flow top width inside pipe =   20.94(In.)
Critical Depth =   12.13(In.)
Pipe flow velocity =     12.73(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    15.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.200 to Point/Station       65.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.700(Ac.)
Runoff from this stream =      8.070(CFS)
Time of concentration =   15.71 min.
Rainfall intensity =     4.407(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       86.100 to Point/Station       86.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.100
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less       )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.692
Initial subarea total flow distance  =  555.000(Ft.)
Highest elevation =  406.000(Ft.)
Lowest elevation =  404.000(Ft.)
Elevation difference =    2.000(Ft.) Slope =  0.360 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.36 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.30 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6920)*(  50.000^.5)/(   0.360^(1/3)]=   7.30
The initial area total distance of  555.00 (Ft.) entered leaves a
remaining distance of  505.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   8.22 minutes
for a distance of 505.00 (Ft.) and a slope of  0.36 %
with an elevation difference of   1.82(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    8.222 Minutes
Tt=[(11.9*0.0956^3)/(  1.82)]^.385=  8.22
Total initial area Ti =   7.30 minutes from Figure 3-3 formula plus
  8.22 minutes from the Figure 3-4 formula =  15.52 minutes
Rainfall intensity (I) =      4.441(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.692
Subarea runoff =      7.407(CFS)
Total initial stream area =        2.410(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       86.200 to Point/Station       65.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   399.000(Ft.)
Downstream point/station elevation =   398.500(Ft.)
Pipe length  =    27.07(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.407(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.407(CFS)
Normal flow depth in pipe =    8.65(In.)
Flow top width inside pipe =   23.04(In.)
Critical Depth =   11.61(In.)
Pipe flow velocity =      7.26(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    15.58 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       86.200 to Point/Station       65.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.410(Ac.)
Runoff from this stream =      7.407(CFS)
Time of concentration =   15.58 min.
Rainfall intensity =     4.430(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        8.070     15.71           4.407
2        7.407     15.58           4.430
Qmax(1) =
            1.000 *    1.000 *     8.070) +
            0.995 *    1.000 *     7.407) + =      15.439
Qmax(2) =
            1.000 *    0.992 *     8.070) +
            1.000 *    1.000 *     7.407) + =      15.413

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.070       7.407
Maximum flow rates at confluence using above data:
       15.439       15.413
```

```
Area of streams before confluence:
        2.700        2.410
Results of confluence:
Total flow rate =     15.439(CFS)
Time of concentration =    15.708 min.
Effective stream area after confluence =      5.110(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       65.000 to Point/Station       66.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   398.500(Ft.)
Downstream point/station elevation =   397.500(Ft.)
Pipe length  =    53.18(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    15.439(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    15.439(CFS)
Normal flow depth in pipe =   13.04(In.)
Flow top width inside pipe =   23.91(In.)
Critical Depth =   17.01(In.)
Pipe flow velocity =      8.85(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    15.81 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       65.000 to Point/Station       66.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.110(Ac.)
Runoff from this stream =     15.439(CFS)
Time of concentration =   15.81 min.
Rainfall intensity =     4.389(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        7.754      8.49           6.554
2       15.439     15.81           4.389
Qmax(1) =
           1.000 *    1.000 *     7.754) +
           1.000 *    0.537 *    15.439) + =      16.046
Qmax(2) =
           0.670 *    1.000 *     7.754) +
           1.000 *    1.000 *    15.439) + =      20.632

Total of 2 main streams to confluence:
Flow rates before confluence point:
       7.754      15.439
Maximum flow rates at confluence using above data:
      16.046      20.632
Area of streams before confluence:
        2.000        5.110
```

```
Results of confluence:
Total flow rate =     20.632(CFS)
Time of concentration =    15.808 min.
Effective stream area after confluence  =      7.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.000 to Point/Station       67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   397.500(Ft.)
Downstream point/station elevation =   391.500(Ft.)
Pipe length  =   253.65(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    20.632(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    20.632(CFS)
Normal flow depth in pipe =   14.58(In.)
Flow top width inside pipe =   23.44(In.)
Critical Depth =   19.56(In.)
Pipe flow velocity =     10.34(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    16.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.000 to Point/Station       67.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.110(Ac.)
Runoff from this stream =     20.632(CFS)
Time of concentration =   16.22 min.
Rainfall intensity =     4.317(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       87.100 to Point/Station       87.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(Neighborhod Commercial )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.780
Initial subarea total flow distance  =  113.150(Ft.)
Highest elevation =  404.000(Ft.)
Lowest elevation =  401.000(Ft.)
Elevation difference =    3.000(Ft.) Slope =  2.651 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   2.65 %, in a development type of
```

```
 Neighborhod Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.84 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7800)*(  85.000^.5)/(   2.651^(1/3)]=   3.84
The initial area total distance of  113.15 (Ft.) entered leaves a
remaining distance of   28.15 (Ft.)
Using Figure 3-4, the travel time for this distance is   0.41 minutes
for a distance of  28.15 (Ft.) and a slope of  2.65 %
with an elevation difference of   0.75(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    0.413 Minutes
Tt=[(11.9*0.0053^3)/(  0.75)]^.385=  0.41
Total initial area Ti =   3.84 minutes from Figure 3-3 formula plus
  0.41 minutes from the Figure 3-4 formula =   4.25 minutes
Rainfall intensity (I) =     10.241(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.780
Subarea runoff =      1.757(CFS)
Total initial stream area =        0.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       87.200 to Point/Station       88.200
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   396.000(Ft.)
Downstream point/station elevation =   394.000(Ft.)
Pipe length  =   102.37(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.757(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.757(CFS)
Normal flow depth in pipe =    4.12(In.)
Flow top width inside pipe =   18.10(In.)
Critical Depth =    5.49(In.)
Pipe flow velocity =      4.89(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =     4.60 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       87.200 to Point/Station       88.200
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.220(Ac.)
Runoff from this stream =      1.757(CFS)
Time of concentration =    4.60 min.
Rainfall intensity =     9.733(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       88.100 to Point/Station       88.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(Neighborhod Commercial )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.780
Initial subarea total flow distance  =  150.040(Ft.)
Highest elevation =  401.000(Ft.)
Lowest elevation =  399.000(Ft.)
Elevation difference =    2.000(Ft.) Slope =  1.333 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.33 %, in a development type of
 Neighborhod Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.05 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7800)*(  60.000^.5)/(   1.333^(1/3)]=   4.05
The initial area total distance of  150.04 (Ft.) entered leaves a
remaining distance of   90.04 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.32 minutes
for a distance of  90.04 (Ft.) and a slope of  1.33 %
with an elevation difference of   1.20(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.317 Minutes
Tt=[(11.9*0.0171^3)/(  1.20)]^.385=  1.32
Total initial area Ti =   4.05 minutes from Figure 3-3 formula plus
  1.32 minutes from the Figure 3-4 formula =   5.37 minutes
Rainfall intensity (I) =      8.806(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.780
Subarea runoff =      2.129(CFS)
Total initial stream area =        0.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       88.100 to Point/Station       88.200
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.310(Ac.)
Runoff from this stream =      2.129(CFS)
Time of concentration =    5.37 min.
Rainfall intensity =     8.806(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        1.757      4.60           9.733
2        2.129      5.37           8.806
Qmax(1) =
           1.000 *    1.000 *     1.757) +
           1.000 *    0.856 *     2.129) + =       3.580
Qmax(2) =
           0.905 *    1.000 *     1.757) +
           1.000 *    1.000 *     2.129) + =       3.719
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       1.757       2.129
Maximum flow rates at confluence using above data:
        3.580        3.719
Area of streams before confluence:
        0.220        0.310
Results of confluence:
Total flow rate =      3.719(CFS)
Time of concentration =     5.371 min.
Effective stream area after confluence =      0.530(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       88.200 to Point/Station       67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   394.000(Ft.)
Downstream point/station elevation =   391.500(Ft.)
Pipe length  =   252.20(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.719(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.719(CFS)
Normal flow depth in pipe =    7.10(In.)
Flow top width inside pipe =   21.91(In.)
Critical Depth =    8.10(In.)
Pipe flow velocity =      4.79(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =     6.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       88.200 to Point/Station       67.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.530(Ac.)
Runoff from this stream =      3.719(CFS)
Time of concentration =    6.25 min.
Rainfall intensity =     7.986(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       20.632     16.22           4.317
2        3.719      6.25           7.986
Qmax(1) =
            1.000 *    1.000 *    20.632) +
            0.541 *    1.000 *     3.719) + =      22.642
Qmax(2) =
            1.000 *    0.385 *    20.632) +
            1.000 *    1.000 *     3.719) + =      11.669
```

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
      20.632       3.719
Maximum flow rates at confluence using above data:
       22.642       11.669
Area of streams before confluence:
        7.110        0.530


Results of confluence:
Total flow rate =     22.642(CFS)
Time of concentration =    16.217 min.
Effective stream area after confluence  =      7.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.000 to Point/Station       68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   391.500(Ft.)
Downstream point/station elevation =   389.500(Ft.)
Pipe length  =    89.84(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    22.642(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    22.642(CFS)
Normal flow depth in pipe =   15.86(In.)
Flow top width inside pipe =   22.73(In.)
Critical Depth =   20.34(In.)
Pipe flow velocity =     10.28(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    16.36 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.000 to Point/Station       68.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.640(Ac.)
Runoff from this stream =     22.642(CFS)
Time of concentration =   16.36 min.
Rainfall intensity =     4.292(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       89.100 to Point/Station       89.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.700
[COMMERCIAL area type                        ]
(Neighborhod Commercial )
Impervious value, Ai = 0.800
```

```
Sub-Area C Value = 0.786
Initial subarea total flow distance  =  522.000(Ft.)
Highest elevation =  402.000(Ft.)
Lowest elevation =  395.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.341 %
Bottom of Initial Area Slope adjusted by User to  2.440 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.34 %, in a development type of
 Neighborhod Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.97 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7860)*(  60.000^.5)/(   1.341^(1/3)]=   3.97
The initial area total distance of  522.00 (Ft.) entered leaves a
remaining distance of  462.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.67 minutes
for a distance of 462.00 (Ft.) and a slope of  2.44 %
with an elevation difference of  11.27(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.675 Minutes
Tt=[(11.9*0.0875^3)/( 11.27)]^.385=  3.67
Total initial area Ti =   3.97 minutes from Figure 3-3 formula plus
  3.67 minutes from the Figure 3-4 formula =   7.64 minutes
Rainfall intensity (I) =      7.012(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.786
Subarea runoff =      7.716(CFS)
Total initial stream area =        1.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       89.200 to Point/Station       68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   390.000(Ft.)
Downstream point/station elevation =   389.500(Ft.)
Pipe length  =     7.78(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.716(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.716(CFS)
Normal flow depth in pipe =    6.39(In.)
Flow top width inside pipe =   21.22(In.)
Critical Depth =   11.86(In.)
Pipe flow velocity =     11.49(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     7.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       89.200 to Point/Station       68.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.400(Ac.)
Runoff from this stream =      7.716(CFS)
Time of concentration =    7.66 min.
Rainfall intensity =     7.006(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       22.642     16.36           4.292
2        7.716      7.66           7.006
Qmax(1) =
           1.000 *    1.000 *    22.642) +
           0.613 *    1.000 *     7.716) + =      27.370
Qmax(2) =
           1.000 *    0.468 *    22.642) +
           1.000 *    1.000 *     7.716) + =      18.311

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.642       7.716
Maximum flow rates at confluence using above data:
       27.370       18.311
Area of streams before confluence:
        7.640        1.400


Results of confluence:
Total flow rate =     27.370(CFS)
Time of concentration =    16.362 min.
Effective stream area after confluence  =      9.040(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       68.000 to Point/Station       69.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   389.500(Ft.)
Downstream point/station elevation =   379.000(Ft.)
Pipe length  =    98.03(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    27.370(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    27.370(CFS)
Normal flow depth in pipe =   10.95(In.)
Flow top width inside pipe =   23.91(In.)
Critical Depth =   21.79(In.)
Pipe flow velocity =     19.61(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    16.45 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       69.000 to Point/Station       90.200
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   379.000(Ft.)
Downstream point elevation =   374.000(Ft.)
Channel length thru subarea  =   354.500(Ft.)
Channel base width        =   10.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
```

```
Estimated mean flow rate at midpoint of channel =     27.406(CFS)
Manning's 'N'    = 0.220
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =     27.406(CFS)
Depth of flow =   1.835(Ft.), Average velocity =   0.964(Ft/s)
Channel flow top width =   21.007(Ft.)
Flow Velocity =    0.96(Ft/s)
Travel time  =    6.13 min.
Time of concentration =   22.58 min.
Critical depth =      0.578(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.200 given for subarea
The area added to the existing stream causes a
a lower flow rate of Q =      6.571(CFS)
therefore the upstream flow rate of Q =     27.370(CFS) is being used
Rainfall intensity =      3.488(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      1.884
Subarea runoff =      0.000(CFS) for      0.380(Ac.)
Total runoff =     27.370(CFS)    Total area =       9.420(Ac.)
Depth of flow =   1.833(Ft.), Average velocity =   0.963(Ft/s)
Critical depth =      0.578(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       69.000 to Point/Station       90.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.420(Ac.)
Runoff from this stream =     27.370(CFS)
Time of concentration =   22.58 min.
Rainfall intensity =     3.488(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       91.100 to Point/Station       90.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  507.140(Ft.)
Highest elevation =  396.000(Ft.)
Lowest elevation =  374.000(Ft.)
Elevation difference =   22.000(Ft.) Slope =  4.338 %
Top of Initial Area Slope adjusted by User to  2.430 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   2.43 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.58 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  70.000^.5)/(   2.430^(1/3)]=   2.58
The initial area total distance of  507.14 (Ft.) entered leaves a
remaining distance of  437.14 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.82 minutes
for a distance of 437.14 (Ft.) and a slope of  4.34 %
with an elevation difference of  18.96(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.822 Minutes
Tt=[(11.9*0.0828^3)/( 18.96)]^.385=  2.82
Total initial area Ti =   2.58 minutes from Figure 3-3 formula plus
  2.82 minutes from the Figure 3-4 formula =   5.40 minutes
Rainfall intensity (I) =      8.777(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      3.436(CFS)
Total initial stream area =        0.450(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       91.100 to Point/Station       90.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.450(Ac.)
Runoff from this stream =      3.436(CFS)
Time of concentration =    5.40 min.
Rainfall intensity =     8.777(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       27.370     22.58           3.488
2        3.436      5.40           8.777
Qmax(1) =
            1.000 *    1.000 *    27.370) +
            0.397 *    1.000 *     3.436) + =      28.736
Qmax(2) =
            1.000 *    0.239 *    27.370) +
            1.000 *    1.000 *     3.436) + =       9.980

Total of 2 main streams to confluence:
Flow rates before confluence point:
      27.370       3.436
Maximum flow rates at confluence using above data:
       28.736        9.980
Area of streams before confluence:
        9.420        0.450


Results of confluence:
Total flow rate =     28.736(CFS)
Time of concentration =    22.577 min.
Effective stream area after confluence  =      9.870(Ac.)
End of computations, total study area =          9.870 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/13/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH
 100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
 BIO-RETENTION POND 4
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       92.100 to Point/Station       92.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.710
Initial subarea total flow distance  =  533.840(Ft.)
Highest elevation =  396.000(Ft.)
Lowest elevation =  387.000(Ft.)
Elevation difference =    9.000(Ft.) Slope =  1.686 %
Top of Initial Area Slope adjusted by User to  3.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 90.00 (Ft)
for the top area slope value of   3.00 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.62 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7100)*(  90.000^.5)/(   3.000^(1/3)]=   4.62
The initial area total distance of  533.84 (Ft.) entered leaves a
remaining distance of  443.84 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.02 minutes
for a distance of 443.84 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.44(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.023 Minutes
Tt=[(11.9*0.0841^3)/(  4.44)]^.385=  5.02
Total initial area Ti =   4.62 minutes from Figure 3-3 formula plus
  5.02 minutes from the Figure 3-4 formula =   9.64 minutes
Rainfall intensity (I) =      6.038(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.710
Subarea runoff =      6.173(CFS)
Total initial stream area =        1.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       92.200 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   382.000(Ft.)
Downstream point/station elevation =   381.500(Ft.)
Pipe length  =    28.18(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     6.173(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     6.173(CFS)
Normal flow depth in pipe =    7.94(In.)
Flow top width inside pipe =   22.58(In.)
Critical Depth =   10.56(In.)
Pipe flow velocity =      6.80(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     9.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       92.200 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.440(Ac.)
Runoff from this stream =      6.173(CFS)
Time of concentration =    9.71 min.
Rainfall intensity =     6.010(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       93.100 to Point/Station       93.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.710
Initial subarea total flow distance  =  820.600(Ft.)
Highest elevation =  404.000(Ft.)
Lowest elevation =  387.000(Ft.)
```

```
Elevation difference =   17.000(Ft.) Slope =  2.072 %
Top of Initial Area Slope adjusted by User to  2.300 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.30 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.61 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7100)*(  75.000^.5)/(   2.300^(1/3)]=   4.61
The initial area total distance of  820.60 (Ft.) entered leaves a
remaining distance of  745.60 (Ft.)
Using Figure 3-4, the travel time for this distance is   7.49 minutes
for a distance of 745.60 (Ft.) and a slope of  1.00 %
with an elevation difference of   7.46(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    7.489 Minutes
Tt=[(11.9*0.1412^3)/(  7.46)]^.385=  7.49
Total initial area Ti =   4.61 minutes from Figure 3-3 formula plus
  7.49 minutes from the Figure 3-4 formula =  12.09 minutes
Rainfall intensity (I) =      5.216(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.710
Subarea runoff =      5.926(CFS)
Total initial stream area =        1.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       93.200 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   382.000(Ft.)
Downstream point/station elevation =   381.500(Ft.)
Pipe length  =     9.91(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.926(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.926(CFS)
Normal flow depth in pipe =    5.95(In.)
Flow top width inside pipe =   20.72(In.)
Critical Depth =   10.33(In.)
Pipe flow velocity =      9.77(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       93.200 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.600(Ac.)
Runoff from this stream =      5.926(CFS)
Time of concentration =   12.11 min.
Rainfall intensity =     5.212(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        6.173      9.71           6.010
2        5.926     12.11           5.212
Qmax(1) =
           1.000 *    1.000 *     6.173) +
           1.000 *    0.802 *     5.926) + =      10.924
Qmax(2) =
           0.867 *    1.000 *     6.173) +
           1.000 *    1.000 *     5.926) + =      11.279

Total of 2 main streams to confluence:
Flow rates before confluence point:
       6.173       5.926
Maximum flow rates at confluence using above data:
       10.924       11.279
Area of streams before confluence:
        1.440        1.600


Results of confluence:
Total flow rate =     11.279(CFS)
Time of concentration =    12.112 min.
Effective stream area after confluence  =      3.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       71.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   381.500(Ft.)
Downstream point/station elevation =   377.000(Ft.)
Pipe length  =    77.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    11.279(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.279(CFS)
Normal flow depth in pipe =    7.99(In.)
Flow top width inside pipe =   22.62(In.)
Critical Depth =   14.46(In.)
Pipe flow velocity =     12.32(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    12.22 min.
End of computations, total study area =           3.040 (Ac.)
```

```
      San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/13/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 4
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.200 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.290
Initial subarea total flow distance  =  403.500(Ft.)
Highest elevation =  374.000(Ft.)
Lowest elevation =  372.000(Ft.)
Elevation difference =    2.000(Ft.) Slope =  0.496 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.50 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =  13.02 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2900)*(  50.000^.5)/(   0.496^(1/3)]=  13.02
The initial area total distance of  403.50 (Ft.) entered leaves a
remaining distance of  353.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.52 minutes
for a distance of 353.50 (Ft.) and a slope of  0.50 %
with an elevation difference of   1.75(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.522 Minutes
Tt=[(11.9*0.0670^3)/(  1.75)]^.385=  5.52
Total initial area Ti =  13.02 minutes from Figure 3-3 formula plus
  5.52 minutes from the Figure 3-4 formula =  18.55 minutes
Rainfall intensity (I) =      3.959(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.290
Subarea runoff =      1.286(CFS)
Total initial stream area =        1.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.200 to Point/Station       72.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.120(Ac.)
Runoff from this stream =      1.286(CFS)
Time of concentration =   18.55 min.
Rainfall intensity =     3.959(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.200 to Point/Station       72.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.280
Decimal fraction soil group C = 0.510
Decimal fraction soil group D = 0.210
[MEDIUM DENSITY RESIDENTIAL                     ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Rainfall intensity (I) =      3.488(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  22.58 min.  Rain intensity =       3.49(In/Hr)
Total area =        9.870(Ac.)  Total runoff =    28.736(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.200 to Point/Station       72.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.870(Ac.)
Runoff from this stream =     28.736(CFS)
Time of concentration =   22.58 min.
Rainfall intensity =     3.488(In/Hr)
Program is now starting with Main Stream No. 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.000 to Point/Station       72.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less       )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.710
Rainfall intensity (I) =      5.182(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  12.22 min.  Rain intensity =       5.18(In/Hr)
Total area =        3.040(Ac.)  Total runoff =    11.279(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.000 to Point/Station       72.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      3.040(Ac.)
Runoff from this stream =     11.279(CFS)
Time of concentration =   12.22 min.
Rainfall intensity =     5.182(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        1.286     18.55           3.959
2       28.736     22.58           3.488
3       11.279     12.22           5.182
Qmax(1) =
           1.000 *    1.000 *     1.286) +
           1.000 *    0.821 *    28.736) +
           0.764 *    1.000 *    11.279) + =      33.509
Qmax(2) =
           0.881 *    1.000 *     1.286) +
           1.000 *    1.000 *    28.736) +
           0.673 *    1.000 *    11.279) + =      37.460
Qmax(3) =
           1.000 *    0.659 *     1.286) +
           1.000 *    0.541 *    28.736) +
           1.000 *    1.000 *    11.279) + =      27.680

Total of 3 main streams to confluence:
Flow rates before confluence point:
       1.286      28.736      11.279
Maximum flow rates at confluence using above data:
       33.509       37.460       27.680
Area of streams before confluence:
        1.120        9.870        3.040

Results of confluence:
Total flow rate =     37.460(CFS)
Time of concentration =    22.577 min.
Effective stream area after confluence  =     14.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.000 to Point/Station       72.000
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =  22.58
Basin Area =    14.03 Acres
6 Hour Rainfall =  3.500 Inches
Runoff Coefficient =  0.515
Peak Discharge =    37.46 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       22               1.491
       44               1.620
       66               1.697
       88               1.882
       110               1.996
       132               2.288
       154               2.480
       176               3.032
       198               3.453
       220               5.070
       242               7.144
       264              37.460
       286               4.067
       308               2.721
       330               2.129
       352               1.783
       374               1.552
```

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: **NODE 72**
5508rpl4 - Detention Pond - BMP 4

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01

********** RUNOFF HYDROGRAPHS **********

HYD 4..... 100
Read HYG 3.01

********** POND VOLUMES **********

DETENTION 4..... Vol: Elev-Area 4.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 5.01

********** POND ROUTING **********

DETENTION 4..... Pond E-V-Q Table 6.01

Table of Contents (continued)

DETENTION 4 OUT 100
Pond Routing Summary 6.02
Detention Time 6.03

S/N:
PondPack Ver: Compute Time: Date:

Type.... Master Network Summary
Name.... Watershed
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
DETENTION 4 IN	POND	100	106991		264.00	37.46		
DETENTION 4 OUT	POND	100	99589	R	279.00	15.09	375.77	72952
HYD 4	HYG	100	107038	R	264.00	37.46		
*OUT 4 - N82	JCT	100	99589	R	279.00	15.09		

S/N:
PondPack Ver: Compute Time: Date:

Type.... Executive Summary (Nodes) Page 2.01
Name.... Watershed Event: 100 yr
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\
Storm... 100 Tag: 100

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
DETENTION 4 IN	POND	106991		264.00	37.46	
DETENTION 4 OUT	POND	99589	R	279.00	15.09	375.77
HYD 4	HYG	107038	R	264.00	37.46	
Outfall OUT 4 - N82	JCT	99589	R	279.00	15.09	

S/N:
PondPack Ver: Compute Time: Date:

```
HYG file =
HYG ID   = HYG 4
HYG Tag  = N-72
-----------------------------------
Peak Discharge =        37.46 cfs
Time to Peak   =       264.00 min
HYG Volume     =       107038 cu.ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 22.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	1.49	1.62	1.70	1.88
110.00	2.00	2.29	2.48	3.03	3.45
220.00	5.07	7.14	37.46	4.07	2.72
330.00	2.13	1.78	1.55		

Type.... Vol: Elev-Area
Name.... DETENTION 4

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
373.00	-----	21200	0	0	0
374.00	-----	24750	68856	22952	22952
376.00	-----	32700	85899	57266	80218
378.00	-----	42250	112120	74746	154964

S/N:
PondPack Ver: Compute Time: Date:

Name.... Outlet 1

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 373.00 ft
Increment = .50 ft
Max. Elev.= 378.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Circular	O0	--->	CV	375.000	378.000
Stand Pipe	RP	--->	CV	375.750	378.000
Orifice-Circular	O1	--->	CV	373.000	378.000
Culvert-Circular	CV	--->	TW	363.000	378.000
TW SETUP, DS Channel					

S/N:
PondPack Ver: Compute Time: Date:

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = O0
Structure Type    = Orifice-Circular
-----------------------------------
# of Openings     =         8
Invert Elev.      =    375.00 ft
Diameter          =    1.0000 ft
Orifice Coeff.    =      .600


Structure ID      = RP
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    375.75 ft
Diameter          =    4.0000 ft
Orifice Area      =   12.5664 sq.ft
Orifice Coeff.    =      .600
Weir Length       =     12.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No


Structure ID      = O1
Structure Type    = Orifice-Circular
-----------------------------------
# of Openings     =         4
Invert Elev.      =    373.00 ft
Diameter          =     .2080 ft
Orifice Coeff.    =      .600
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = CV
Structure Type     = Culvert-Circular
-----------------------------------
No. Barrels        =         1
Barrel Diameter    =    3.0000 ft
Upstream Invert    =    363.00 ft
Dnstream Invert    =    355.01 ft
Horiz. Length      =    184.84 ft
Barrel Length      =    185.01 ft
Barrel Slope       =    .04323 ft/ft

OUTLET CONTROL DATA...
Mannings n         =     .0130
Ke                 =     .5000  (forward entrance loss)
Kb                 =   .007228  (per ft of full flow)
Kr                 =     .5000  (reverse entrance loss)
HW Convergence     =      .001  +/- ft

INLET CONTROL DATA...
Equation form      =         1
Inlet Control K    =     .0078
Inlet Control M    =    2.0000
Inlet Control c    =    .03790
Inlet Control Y    =     .6900
T1 ratio (HW/D)    =     1.114
T2 ratio (HW/D)    =     1.275
Slope Factor       =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    366.34 ft  --->  Flow =     42.85 cfs
At T2 Elev =    366.82 ft  --->  Flow =     48.97 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
-----------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID:   Chn-Cir - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID: Chn-Cir - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

CIRCULAR CROSS SECTION

Slope = .005200 ft/ft
Mannings n = 0.01300
Invert Elev. = 353.91 ft
Top of Channel = 359.41 ft
Diameter = 5.5000 ft

Type.... Pond E-V-Q Table
Name.... DETENTION 4
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\
Inflow HYG file = NONE STORED - DETENTION 4 IN 100
Outflow HYG file = NONE STORED - DETENTION 4 OUT 100

Pond Node Data = DETENTION 4
Pond Volume Data = DETENTION 4
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 373.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
373.00	.00	0	21200	.00	.00	.00
373.50	.41	11032	22941	.05	.46	368.21
374.00	.62	22952	24750	.06	.68	765.74
374.50	.77	35795	26634	.06	.83	1194.00
375.00	.90	49597	28587	.07	.97	1654.21
375.50	7.11	64394	30609	.07	7.18	2153.63
375.75	13.75	72175	31646	.07	13.82	2419.65
376.00	27.38	80218	32700	.08	27.46	2701.38
376.50	56.74	97133	34973	.08	56.82	3294.58
377.00	92.70	115204	37322	.09	92.78	3932.90
377.50	119.61	134468	39748	.09	119.70	4601.96
378.00	124.66	154964	42250	.10	124.76	5290.22

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW
Storm... 100 Tag: 100

LEVEL POOL ROUTING SUMMARY

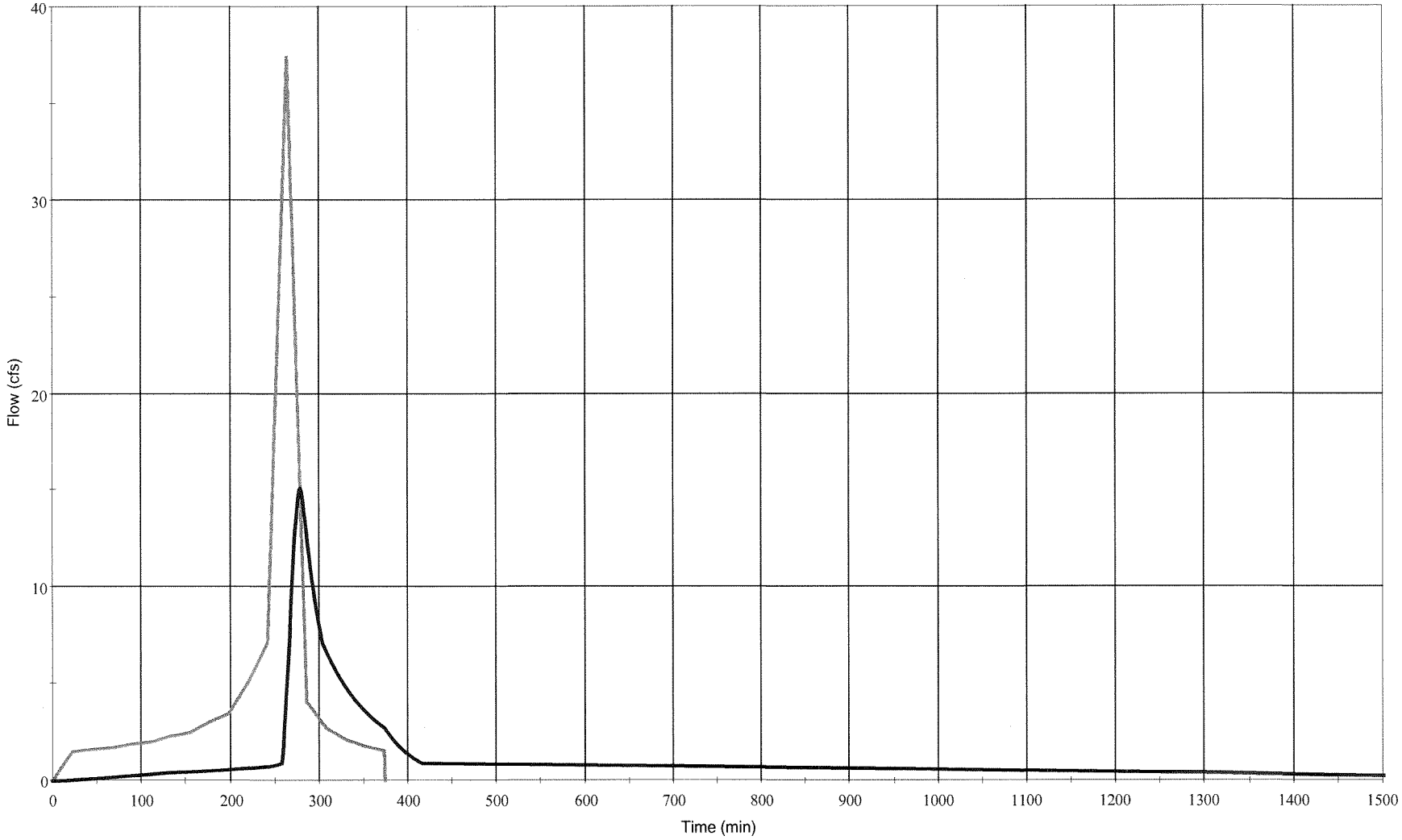
```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 4\
Inflow  HYG file = NONE STORED - DETENTION 4  IN  100
Outflow HYG file = NONE STORED - DETENTION 4  OUT 100

Pond Node   Data = DETENTION 4
Pond Volume Data = DETENTION 4
Pond Outlet Data = Outlet 1

Infiltration =    .1000 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   373.00 ft
Starting Volume    =        0 cu.ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =     1.00 min


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =     37.46 cfs    at    264.00 min
Peak Outflow      =     15.09 cfs    at    279.00 min
Peak Infiltration =       .07 cfs    at    279.00 min
-----------------------------------------------------
Peak Elevation    =    375.77 ft
Peak Storage =          72952 cu.ft
=====================================================


MASS BALANCE (cu.ft)
--------------------------
+ Initial Vol  =           0
+ HYG Vol IN   =      106991
- Infiltration =        5477
- HYG Vol OUT  =       99589
- Retained Vol =        1863
                  ----------
Unrouted Vol =         -62 cu.ft  (.058% of Inflow Volume)


WARNING: Outflow hydrograph truncated on right side.
```

S/N:
PondPack Ver: Compute Time: Date:

DETENTION TIMES SUMMARY

```
 HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 4\
 Inflow  HYG file = NONE STORED - DETENTION 4  IN  100
 Outflow HYG file = NONE STORED - DETENTION 4  OUT 100

 Pond Node   Data = DETENTION 4
 Pond Volume Data = DETENTION 4
 Pond Outlet Data = Outlet 1

 Infiltration =    .1000 in/hr

 APPROXIMATE DETENTION TIME
 --------------------------------------
 Tp, Outflow + Infilt.   =    279.00 min
 Tp, Total Inflow        =    264.00 min
 Peak to Peak            =     15.00 min

 Qout+Infilt. Centroid   =    593.64 min
 Inflow Centroid         =    232.43 min
 Centroid to Centroid    =    361.22 min

 Weighted Avg. Plug Time =    393.59 min
 Max.Plug Vol. Plug Time =    329.15 min
 Max.Inflow Plug Volume  =      2206 cu.ft   (From 263.00 to 264.00 min)
 --------------------------------------
```

NODE 72 - DETENTION POND - BMP 4
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



INFLOW= 37.46 CFS OUTFLOW= 15.09 CFS

Bio-Retention Pond-5

Bio-Retention Pond-5

100-year Development Conditions

```
        San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/12/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH
 100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
 BIO-RETENTION POND 5
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.100 to Point/Station       46.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.453
Initial subarea total flow distance  =  881.700(Ft.)
Highest elevation =  402.000(Ft.)
Lowest elevation =  378.000(Ft.)
Elevation difference =   24.000(Ft.) Slope =  2.722 %
Top of Initial Area Slope adjusted by User to  4.000 %
Bottom of Initial Area Slope adjusted by User to  2.250 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   4.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.34 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4530)*( 100.000^.5)/(   4.000^(1/3)]=   7.34
The initial area total distance of  881.70 (Ft.) entered leaves a
remaining distance of  781.70 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.68 minutes
for a distance of 781.70 (Ft.) and a slope of  2.25 %
with an elevation difference of  17.59(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.684 Minutes
Tt=[(11.9*0.1480^3)/( 17.59)]^.385=  5.68
Total initial area Ti =   7.34 minutes from Figure 3-3 formula plus
  5.68 minutes from the Figure 3-4 formula =  13.02 minutes
Rainfall intensity (I) =      4.974(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.453
Subarea runoff =      3.740(CFS)
Total initial stream area =        1.660(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.100 to Point/Station       46.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.660(Ac.)
Runoff from this stream =      3.740(CFS)
Time of concentration =   13.02 min.
Rainfall intensity =     4.974(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.100 to Point/Station       45.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.050
[UNDISTURBED NATURAL TERRAIN                   ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.258
Initial subarea total flow distance  =  902.000(Ft.)
Highest elevation =  685.000(Ft.)
Lowest elevation =  381.000(Ft.)
Elevation difference =  304.000(Ft.) Slope = 33.703 %
Top of Initial Area Slope adjusted by User to 30.000 %
Bottom of Initial Area Slope adjusted by User to 30.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  30.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.88 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2575)*( 100.000^.5)/(  30.000^(1/3)]=   4.88
The initial area total distance of  902.00 (Ft.) entered leaves a
remaining distance of  802.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.14 minutes
for a distance of 802.00 (Ft.) and a slope of 30.00 %
with an elevation difference of 240.60(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.139 Minutes
Tt=[(11.9*0.1519^3)/(240.60)]^.385=  2.14
Total initial area Ti =   4.88 minutes from Figure 3-3 formula plus
```

```
  2.14 minutes from the Figure 3-4 formula =   7.02 minutes
Rainfall intensity (I) =      7.410(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.258
Subarea runoff =      9.406(CFS)
Total initial stream area =        4.930(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.200 to Point/Station       46.200
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   374.000(Ft.)
Downstream point/station elevation =   373.000(Ft.)
Pipe length  =    24.55(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     9.406(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     9.406(CFS)
Normal flow depth in pipe =    7.96(In.)
Flow top width inside pipe =   22.60(In.)
Critical Depth =   13.14(In.)
Pipe flow velocity =     10.32(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.06 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.200 to Point/Station       46.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.930(Ac.)
Runoff from this stream =      9.406(CFS)
Time of concentration =    7.06 min.
Rainfall intensity =     7.383(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        3.740     13.02           4.974
2        9.406      7.06           7.383
Qmax(1) =
           1.000 *    1.000 *     3.740) +
           0.674 *    1.000 *     9.406) + =      10.078
Qmax(2) =
           1.000 *    0.542 *     3.740) +
           1.000 *    1.000 *     9.406) + =      11.434

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.740       9.406
Maximum flow rates at confluence using above data:
       10.078       11.434
Area of streams before confluence:
        1.660        4.930
```

```
Results of confluence:
Total flow rate =     11.434(CFS)
Time of concentration =     7.059 min.
Effective stream area after confluence  =      6.590(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.200 to Point/Station       39.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   373.000(Ft.)
Downstream point/station elevation =   372.500(Ft.)
Pipe length  =    27.65(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    11.434(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.434(CFS)
Normal flow depth in pipe =   11.05(In.)
Flow top width inside pipe =   23.92(In.)
Critical Depth =   14.57(In.)
Pipe flow velocity =      8.09(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.12 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.200 to Point/Station       39.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.590(Ac.)
Runoff from this stream =     11.434(CFS)
Time of concentration =    7.12 min.
Rainfall intensity =     7.344(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       47.100 to Point/Station       47.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  607.200(Ft.)
Highest elevation =  392.000(Ft.)
Lowest elevation =  378.000(Ft.)
Elevation difference =   14.000(Ft.) Slope =  2.306 %
Top of Initial Area Slope adjusted by User to  2.790 %
Bottom of Initial Area Slope adjusted by User to  2.470 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
```

```
for the top area slope value of   2.79 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.10 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  95.000^.5)/(   2.790^(1/3)]=   8.10
The initial area total distance of  607.20 (Ft.) entered leaves a
remaining distance of  512.20 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.96 minutes
for a distance of 512.20 (Ft.) and a slope of  2.47 %
with an elevation difference of  12.65(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.960 Minutes
Tt=[(11.9*0.0970^3)/( 12.65)]^.385=  3.96
Total initial area Ti =   8.10 minutes from Figure 3-3 formula plus
  3.96 minutes from the Figure 3-4 formula =  12.06 minutes
Rainfall intensity (I) =      5.226(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      3.316(CFS)
Total initial stream area =        1.410(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       47.200 to Point/Station       39.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   373.000(Ft.)
Downstream point/station elevation =   372.500(Ft.)
Pipe length  =     7.40(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.316(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.316(CFS)
Normal flow depth in pipe =    4.15(In.)
Flow top width inside pipe =   18.15(In.)
Critical Depth =    7.63(In.)
Pipe flow velocity =      9.14(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    12.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       47.200 to Point/Station       39.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.410(Ac.)
Runoff from this stream =      3.316(CFS)
Time of concentration =   12.07 min.
Rainfall intensity =     5.222(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       11.434      7.12           7.344
2        3.316     12.07           5.222

Qmax(1) =
          1.000 *    1.000 *    11.434) +
          1.000 *    0.589 *     3.316) + =      13.388
Qmax(2) =
          0.711 *    1.000 *    11.434) +
          1.000 *    1.000 *     3.316) + =      11.446

Total of 2 main streams to confluence:
Flow rates before confluence point:
     11.434       3.316
Maximum flow rates at confluence using above data:
      13.388       11.446
Area of streams before confluence:
       6.590        1.410


Results of confluence:
Total flow rate =     13.388(CFS)
Time of concentration =     7.116 min.
Effective stream area after confluence  =      8.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   372.500(Ft.)
Downstream point/station elevation =   370.500(Ft.)
Pipe length  =    91.91(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    13.388(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    13.388(CFS)
Normal flow depth in pipe =   11.47(In.)
Flow top width inside pipe =   23.98(In.)
Critical Depth =   15.81(In.)
Pipe flow velocity =      9.03(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =     7.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       40.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.000(Ac.)
Runoff from this stream =     13.388(CFS)
Time of concentration =    7.29 min.
Rainfall intensity =     7.234(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       48.100 to Point/Station       48.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.478
Initial subarea total flow distance  =  340.280(Ft.)
Highest elevation =  386.000(Ft.)
Lowest elevation =  381.000(Ft.)
Elevation difference =    5.000(Ft.) Slope =  1.469 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  2.620 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.95 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4780)*(  80.000^.5)/(   2.000^(1/3)]=   7.95
The initial area total distance of  340.28 (Ft.) entered leaves a
remaining distance of  260.28 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.30 minutes
for a distance of 260.28 (Ft.) and a slope of  2.62 %
with an elevation difference of   6.82(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.298 Minutes
Tt=[(11.9*0.0493^3)/(  6.82)]^.385=  2.30
Total initial area Ti =   7.95 minutes from Figure 3-3 formula plus
  2.30 minutes from the Figure 3-4 formula =  10.25 minutes
Rainfall intensity (I) =      5.805(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.478
Subarea runoff =      3.580(CFS)
Total initial stream area =        1.290(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       48.200 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   376.000(Ft.)
Downstream point/station elevation =   370.500(Ft.)
Pipe length  =   130.72(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.580(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.580(CFS)
Normal flow depth in pipe =    4.84(In.)
Flow top width inside pipe =   19.26(In.)
Critical Depth =    7.93(In.)
Pipe flow velocity =      7.91(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    10.52 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       48.200 to Point/Station       40.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.290(Ac.)
Runoff from this stream =      3.580(CFS)
Time of concentration =   10.52 min.
Rainfall intensity =     5.707(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       13.388      7.29           7.234
2        3.580     10.52           5.707
Qmax(1) =
           1.000 *    1.000 *    13.388) +
           1.000 *    0.692 *     3.580) + =      15.867
Qmax(2) =
           0.789 *    1.000 *    13.388) +
           1.000 *    1.000 *     3.580) + =      14.142

Total of 2 main streams to confluence:
Flow rates before confluence point:
      13.388       3.580
Maximum flow rates at confluence using above data:
       15.867       14.142
Area of streams before confluence:
        8.000        1.290


Results of confluence:
Total flow rate =     15.867(CFS)
Time of concentration =     7.285 min.
Effective stream area after confluence  =      9.290(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       41.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   370.500(Ft.)
Downstream point/station elevation =   367.500(Ft.)
Pipe length  =   321.84(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    15.867(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    15.867(CFS)
Normal flow depth in pipe =   16.80(In.)
Flow top width inside pipe =   21.99(In.)
Critical Depth =   17.23(In.)
Pipe flow velocity =      6.75(Ft/s)
Travel time through pipe =    0.79 min.
Time of concentration (TC) =     8.08 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       41.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.290(Ac.)
Runoff from this stream =      15.867(CFS)
Time of concentration =    8.08 min.
Rainfall intensity =     6.766(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       49.100 to Point/Station       49.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.499
Initial subarea total flow distance  =  714.500(Ft.)
Highest elevation =  382.000(Ft.)
Lowest elevation =  373.000(Ft.)
Elevation difference =    9.000(Ft.) Slope =  1.260 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.68 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4990)*(  80.000^.5)/(   2.000^(1/3)]=   7.68
The initial area total distance of  714.50 (Ft.) entered leaves a
remaining distance of  634.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   6.61 minutes
for a distance of 634.50 (Ft.) and a slope of  1.00 %
with an elevation difference of   6.34(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    6.614 Minutes
Tt=[(11.9*0.1202^3)/(  6.34)]^.385=  6.61
Total initial area Ti =   7.68 minutes from Figure 3-3 formula plus
  6.61 minutes from the Figure 3-4 formula =  14.29 minutes
Rainfall intensity (I) =      4.683(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.499
Subarea runoff =      5.025(CFS)
Total initial stream area =        2.150(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       49.200 to Point/Station       41.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   368.000(Ft.)
Downstream point/station elevation =   367.500(Ft.)
Pipe length  =    29.61(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.025(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.025(CFS)
Normal flow depth in pipe =    7.22(In.)
Flow top width inside pipe =   22.02(In.)
Critical Depth =    9.47(In.)
Pipe flow velocity =      6.31(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.37 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       49.200 to Point/Station       41.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.150(Ac.)
Runoff from this stream =      5.025(CFS)
Time of concentration =   14.37 min.
Rainfall intensity =     4.667(In/Hr)
Program is now starting with Main Stream No. 3

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.100 to Point/Station       50.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.478
Initial subarea total flow distance  =  462.000(Ft.)
Highest elevation =  381.000(Ft.)
Lowest elevation =  373.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.732 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.95 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4780)*(  80.000^.5)/(   2.000^(1/3)]=   7.95
The initial area total distance of  462.00 (Ft.) entered leaves a
remaining distance of  382.00 (Ft.)
```

```
Using Figure 3-4, the travel time for this distance is   4.47 minutes
for a distance of 382.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.82(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.475 Minutes
Tt=[(11.9*0.0723^3)/(  3.82)]^.385=  4.47
Total initial area Ti =   7.95 minutes from Figure 3-3 formula plus
  4.47 minutes from the Figure 3-4 formula =  12.42 minutes
Rainfall intensity (I) =      5.127(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.478
Subarea runoff =      1.912(CFS)
Total initial stream area =        0.780(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.200 to Point/Station       41.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   368.000(Ft.)
Downstream point/station elevation =   367.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.912(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.912(CFS)
Normal flow depth in pipe =    3.41(In.)
Flow top width inside pipe =   16.75(In.)
Critical Depth =    5.74(In.)
Pipe flow velocity =      7.01(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.45 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.200 to Point/Station       41.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.780(Ac.)
Runoff from this stream =      1.912(CFS)
Time of concentration =   12.45 min.
Rainfall intensity =     5.121(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       15.867      8.08           6.766
2        5.025     14.37           4.667
3        1.912     12.45           5.121
Qmax(1) =
           1.000 *    1.000 *    15.867) +
           1.000 *    0.562 *     5.025) +
           1.000 *    0.649 *     1.912) + =      19.933
Qmax(2) =
           0.690 *    1.000 *    15.867) +
           1.000 *    1.000 *     5.025) +
           0.911 *    1.000 *     1.912) + =      17.711
Qmax(3) =
           0.757 *    1.000 *    15.867) +
           1.000 *    0.866 *     5.025) +
           1.000 *    1.000 *     1.912) + =      18.271

Total of 3 main streams to confluence:
Flow rates before confluence point:
      15.867       5.025       1.912
Maximum flow rates at confluence using above data:
       19.933       17.711       18.271
Area of streams before confluence:
        9.290        2.150        0.780


Results of confluence:
Total flow rate =     19.933(CFS)
Time of concentration =     8.080 min.
Effective stream area after confluence  =     12.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   367.500(Ft.)
Downstream point/station elevation =   364.500(Ft.)
Pipe length  =   362.82(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    19.933(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    19.933(CFS)
Normal flow depth in pipe =   15.38(In.)
Flow top width inside pipe =   35.62(In.)
Critical Depth =   17.18(In.)
Pipe flow velocity =      6.93(Ft/s)
Travel time through pipe =    0.87 min.
Time of concentration (TC) =     8.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.220(Ac.)
Runoff from this stream =     19.933(CFS)
Time of concentration =    8.95 min.
Rainfall intensity =     6.333(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.100 to Point/Station       51.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.499
Initial subarea total flow distance  =  431.000(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  370.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.856 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.68 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4990)*(  80.000^.5)/(   2.000^(1/3)]=   7.68
The initial area total distance of  431.00 (Ft.) entered leaves a
remaining distance of  351.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.19 minutes
for a distance of 351.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.51(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.193 Minutes
Tt=[(11.9*0.0665^3)/(  3.51)]^.385=  4.19
Total initial area Ti =   7.68 minutes from Figure 3-3 formula plus
  4.19 minutes from the Figure 3-4 formula =  11.87 minutes
Rainfall intensity (I) =      5.279(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.499
Subarea runoff =      2.186(CFS)
Total initial stream area =        0.830(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.200 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   365.000(Ft.)
Downstream point/station elevation =   364.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.186(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.186(CFS)
Normal flow depth in pipe =    3.64(In.)
Flow top width inside pipe =   17.21(In.)
Critical Depth =    6.15(In.)
Pipe flow velocity =      7.29(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    11.89 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.200 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.830(Ac.)
Runoff from this stream =      2.186(CFS)
Time of concentration =   11.89 min.
Rainfall intensity =     5.273(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       19.933      8.95           6.333
2        2.186     11.89           5.273
Qmax(1) =
           1.000 *    1.000 *    19.933) +
           1.000 *    0.753 *     2.186) + =      21.578
Qmax(2) =
           0.833 *    1.000 *    19.933) +
           1.000 *    1.000 *     2.186) + =      18.782

Total of 2 main streams to confluence:
Flow rates before confluence point:
      19.933       2.186
Maximum flow rates at confluence using above data:
       21.578       18.782
Area of streams before confluence:
       12.220        0.830


Results of confluence:
Total flow rate =     21.578(CFS)
Time of concentration =     8.953 min.
Effective stream area after confluence  =     13.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       49.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   364.500(Ft.)
Downstream point/station elevation =   362.500(Ft.)
Pipe length  =   171.10(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    21.578(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    21.578(CFS)
Normal flow depth in pipe =   14.59(In.)
Flow top width inside pipe =   35.35(In.)
Critical Depth =   17.92(In.)
Pipe flow velocity =      8.03(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =     9.31 min.
End of computations, total study area =          13.050 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/12/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 5
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.100 to Point/Station       53.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  481.520(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  371.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.454 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  481.52 (Ft.) entered leaves a
remaining distance of  401.52 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.65 minutes
for a distance of 401.52 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.02(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.650 Minutes
Tt=[(11.9*0.0760^3)/(  4.02)]^.385=  4.65
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  4.65 minutes from the Figure 3-4 formula =  12.96 minutes
Rainfall intensity (I) =      4.990(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.178(CFS)
Total initial stream area =        0.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.200 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   366.000(Ft.)
Downstream point/station elevation =   365.500(Ft.)
Pipe length  =     9.22(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.178(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.178(CFS)
Normal flow depth in pipe =    3.57(In.)
Flow top width inside pipe =   17.08(In.)
Critical Depth =    6.15(In.)
Pipe flow velocity =      7.47(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.200 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.970(Ac.)
Runoff from this stream =      2.178(CFS)
Time of concentration =   12.98 min.
Rainfall intensity =     4.985(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.100 to Point/Station       54.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  465.520(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  371.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.504 %
```

```
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  465.52 (Ft.) entered leaves a
remaining distance of  385.52 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.51 minutes
for a distance of 385.52 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.86(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.507 Minutes
Tt=[(11.9*0.0730^3)/(  3.86)]^.385=  4.51
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  4.51 minutes from the Figure 3-4 formula =  12.81 minutes
Rainfall intensity (I) =      5.026(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.488(CFS)
Total initial stream area =        1.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.200 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   366.000(Ft.)
Downstream point/station elevation =   365.500(Ft.)
Pipe length  =    25.26(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.488(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.488(CFS)
Normal flow depth in pipe =    4.87(In.)
Flow top width inside pipe =   19.30(In.)
Critical Depth =    6.58(In.)
Pipe flow velocity =      5.45(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    12.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.200 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      2.488(CFS)
Time of concentration =   12.89 min.
Rainfall intensity =     5.006(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.178     12.98           4.985
2        2.488     12.89           5.006
Qmax(1) =
           1.000 *    1.000 *     2.178) +
           0.996 *    1.000 *     2.488) + =       4.655
Qmax(2) =
           1.000 *    0.993 *     2.178) +
           1.000 *    1.000 *     2.488) + =       4.651

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.178       2.488
Maximum flow rates at confluence using above data:
        4.655       4.651
Area of streams before confluence:
        0.970       1.100


Results of confluence:
Total flow rate =      4.655(CFS)
Time of concentration =    12.976 min.
Effective stream area after confluence  =      2.070(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       45.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   365.500(Ft.)
Downstream point/station elevation =   365.000(Ft.)
Pipe length  =   283.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.655(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.655(CFS)
Normal flow depth in pipe =   12.91(In.)
Flow top width inside pipe =   23.93(In.)
Critical Depth =    9.09(In.)
Pipe flow velocity =      2.70(Ft/s)
Travel time through pipe =    1.74 min.
Time of concentration (TC) =    14.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       45.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.070(Ac.)
Runoff from this stream =      4.655(CFS)
Time of concentration =   14.72 min.
Rainfall intensity =     4.595(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.100 to Point/Station       55.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  556.500(Ft.)
Highest elevation =  382.000(Ft.)
Lowest elevation =  374.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.438 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  2.110 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  556.50 (Ft.) entered leaves a
remaining distance of  476.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.98 minutes
for a distance of 476.50 (Ft.) and a slope of  2.11 %
with an elevation difference of  10.05(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.980 Minutes
Tt=[(11.9*0.0902^3)/( 10.05)]^.385=  3.98
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  3.98 minutes from the Figure 3-4 formula =  12.29 minutes
Rainfall intensity (I) =      5.164(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.579(CFS)
Total initial stream area =        1.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.200 to Point/Station       44.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   369.000(Ft.)
Downstream point/station elevation =   365.500(Ft.)
Pipe length  =   307.24(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.579(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.579(CFS)
Normal flow depth in pipe =    5.69(In.)
Flow top width inside pipe =   20.41(In.)
Critical Depth =    6.69(In.)
Pipe flow velocity =      4.53(Ft/s)
Travel time through pipe =    1.13 min.
Time of concentration (TC) =    13.42 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.200 to Point/Station       44.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.110(Ac.)
Runoff from this stream =      2.579(CFS)
Time of concentration =   13.42 min.
Rainfall intensity =     4.879(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.100 to Point/Station       56.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  467.800(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  371.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.496 %
Top of Initial Area Slope adjusted by User to  2.950 %
Bottom of Initial Area Slope adjusted by User to  1.050 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   2.95 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.95 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  95.000^.5)/(   2.950^(1/3)]=   7.95
The initial area total distance of  467.80 (Ft.) entered leaves a
remaining distance of  372.80 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.31 minutes
for a distance of 372.80 (Ft.) and a slope of  1.05 %
with an elevation difference of   3.91(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.310 Minutes
Tt=[(11.9*0.0706^3)/(  3.91)]^.385=  4.31
Total initial area Ti =   7.95 minutes from Figure 3-3 formula plus
  4.31 minutes from the Figure 3-4 formula =  12.26 minutes
Rainfall intensity (I) =      5.171(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.164(CFS)
Total initial stream area =        0.930(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.200 to Point/Station       44.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   366.000(Ft.)
Downstream point/station elevation =   365.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.164(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.164(CFS)
Normal flow depth in pipe =    3.54(In.)
Flow top width inside pipe =   17.01(In.)
Critical Depth =    6.13(In.)
Pipe flow velocity =      7.52(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.200 to Point/Station       44.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      2.164(CFS)
Time of concentration =   12.28 min.
Rainfall intensity =     5.165(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.579     13.42           4.879
2        2.164     12.28           5.165
Qmax(1) =
           1.000 *    1.000 *     2.579) +
           0.945 *    1.000 *     2.164) + =       4.623
Qmax(2) =
           1.000 *    0.915 *     2.579) +
           1.000 *    1.000 *     2.164) + =       4.525

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.579       2.164
Maximum flow rates at confluence using above data:
       4.623       4.525
Area of streams before confluence:
       1.110       0.930
Results of confluence:
Total flow rate =      4.623(CFS)
Time of concentration =    13.417 min.
Effective stream area after confluence =      2.040(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       44.000 to Point/Station       45.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   365.500(Ft.)
Downstream point/station elevation =   365.000(Ft.)
Pipe length  =   106.76(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.623(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.623(CFS)
Normal flow depth in pipe =    9.71(In.)
Flow top width inside pipe =   23.56(In.)
Critical Depth =    9.08(In.)
Pipe flow velocity =      3.88(Ft/s)
Travel time through pipe =    0.46 min.
Time of concentration (TC) =    13.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       44.000 to Point/Station       45.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.040(Ac.)
Runoff from this stream =      4.623(CFS)
Time of concentration =   13.88 min.
Rainfall intensity =     4.774(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        4.655     14.72           4.595
2        4.623     13.88           4.774
Qmax(1) =
           1.000 *    1.000 *     4.655) +
           0.963 *    1.000 *     4.623) + =       9.105
Qmax(2) =
           1.000 *    0.943 *     4.655) +
           1.000 *    1.000 *     4.623) + =       9.011

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.655       4.623
Maximum flow rates at confluence using above data:
       9.105       9.011
Area of streams before confluence:
       2.070       2.040


Results of confluence:
Total flow rate =      9.105(CFS)
Time of concentration =    14.721 min.
Effective stream area after confluence  =      4.110(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       46.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   365.000(Ft.)
Downstream point/station elevation =   364.500(Ft.)
Pipe length  =    83.23(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     9.105(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     9.105(CFS)
Normal flow depth in pipe =   13.38(In.)
Flow top width inside pipe =   23.84(In.)
Critical Depth =   12.92(In.)
Pipe flow velocity =      5.05(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    15.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       46.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.110(Ac.)
Runoff from this stream =      9.105(CFS)
Time of concentration =   15.00 min.
Rainfall intensity =     4.541(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.100 to Point/Station       57.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  502.750(Ft.)
Highest elevation =  374.000(Ft.)
Lowest elevation =  370.000(Ft.)
Elevation difference =    4.000(Ft.) Slope =  0.796 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  502.75 (Ft.) entered leaves a
remaining distance of  422.75 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.84 minutes
for a distance of 422.75 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.23(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.838 Minutes
Tt=[(11.9*0.0801^3)/(  4.23)]^.385=  4.84
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  4.84 minutes from the Figure 3-4 formula =  13.14 minutes
Rainfall intensity (I) =      4.944(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.736(CFS)
Total initial stream area =        1.230(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.200 to Point/Station       46.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   365.000(Ft.)
Downstream point/station elevation =   364.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.736(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.736(CFS)
Normal flow depth in pipe =    3.96(In.)
Flow top width inside pipe =   17.82(In.)
Critical Depth =    6.90(In.)
Pipe flow velocity =      8.06(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    13.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.200 to Point/Station       46.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.230(Ac.)
Runoff from this stream =      2.736(CFS)
Time of concentration =   13.16 min.
Rainfall intensity =     4.939(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        9.105     15.00           4.541
2        2.736     13.16           4.939
Qmax(1) =
           1.000 *    1.000 *     9.105) +
           0.919 *    1.000 *     2.736) + =      11.621
```

```
Qmax(2) =
          1.000 *    0.878 *     9.105) +
          1.000 *    1.000 *     2.736) + =      10.729

Total of 2 main streams to confluence:
Flow rates before confluence point:
      9.105       2.736
Maximum flow rates at confluence using above data:
     11.621      10.729
Area of streams before confluence:
       4.110       1.230


Results of confluence:
Total flow rate =     11.621(CFS)
Time of concentration =    14.996 min.
Effective stream area after confluence  =      5.340(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.000 to Point/Station       47.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   364.500(Ft.)
Downstream point/station elevation =   363.500(Ft.)
Pipe length  =   116.88(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    11.621(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.621(CFS)
Normal flow depth in pipe =   13.97(In.)
Flow top width inside pipe =   23.67(In.)
Critical Depth =   14.68(In.)
Pipe flow velocity =      6.13(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =    15.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.000 to Point/Station       47.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.340(Ac.)
Runoff from this stream =     11.621(CFS)
Time of concentration =   15.31 min.
Rainfall intensity =     4.480(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       58.100 to Point/Station       58.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  464.240(Ft.)
Highest elevation =  382.000(Ft.)
Lowest elevation =  370.000(Ft.)
Elevation difference =   12.000(Ft.) Slope =  2.585 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  464.24 (Ft.) entered leaves a
remaining distance of  384.24 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.50 minutes
for a distance of 384.24 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.84(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.495 Minutes
Tt=[(11.9*0.0728^3)/(  3.84)]^.385=  4.50
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  4.50 minutes from the Figure 3-4 formula =  12.80 minutes
Rainfall intensity (I) =      5.029(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.512(CFS)
Total initial stream area =        1.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       58.200 to Point/Station       47.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   365.000(Ft.)
Downstream point/station elevation =   363.500(Ft.)
Pipe length  =    76.70(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.512(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.512(CFS)
Normal flow depth in pipe =    4.91(In.)
Flow top width inside pipe =   19.36(In.)
Critical Depth =    6.62(In.)
Pipe flow velocity =      5.44(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    13.04 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       58.200 to Point/Station       47.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.110(Ac.)
Runoff from this stream =      2.512(CFS)
Time of concentration =   13.04 min.
Rainfall intensity =     4.970(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       11.621     15.31          4.480
2        2.512     13.04          4.970
Qmax(1) =
           1.000 *    1.000 *    11.621) +
           0.901 *    1.000 *     2.512) + =      13.885
Qmax(2) =
           1.000 *    0.851 *    11.621) +
           1.000 *    1.000 *     2.512) + =      12.405

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.621       2.512
Maximum flow rates at confluence using above data:
       13.885       12.405
Area of streams before confluence:
        5.340        1.110


Results of confluence:
Total flow rate =     13.885(CFS)
Time of concentration =    15.314 min.
Effective stream area after confluence  =      6.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       47.000 to Point/Station       48.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   363.500(Ft.)
Downstream point/station elevation =   363.000(Ft.)
Pipe length  =    88.95(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    13.885(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    13.885(CFS)
Normal flow depth in pipe =   18.56(In.)
Flow top width inside pipe =   20.09(In.)
Critical Depth =   16.11(In.)
Pipe flow velocity =      5.32(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    15.59 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       47.000 to Point/Station       48.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.450(Ac.)
Runoff from this stream =     13.885(CFS)
Time of concentration =   15.59 min.
Rainfall intensity =     4.428(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       59.100 to Point/Station       59.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.200
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.464
Initial subarea total flow distance  =  549.400(Ft.)
Highest elevation =  382.000(Ft.)
Lowest elevation =  368.000(Ft.)
Elevation difference =   14.000(Ft.) Slope =  2.548 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.13 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4640)*(  80.000^.5)/(   2.000^(1/3)]=   8.13
The initial area total distance of  549.40 (Ft.) entered leaves a
remaining distance of  469.40 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.24 minutes
for a distance of 469.40 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.69(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.244 Minutes
Tt=[(11.9*0.0889^3)/(  4.69)]^.385=  5.24
Total initial area Ti =   8.13 minutes from Figure 3-3 formula plus
  5.24 minutes from the Figure 3-4 formula =  13.37 minutes
Rainfall intensity (I) =      4.889(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.464
Subarea runoff =      3.380(CFS)
Total initial stream area =        1.490(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       59.200 to Point/Station       48.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   363.500(Ft.)
Downstream point/station elevation =   363.000(Ft.)
Pipe length  =     8.35(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.380(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.380(CFS)
Normal flow depth in pipe =    4.31(In.)
Flow top width inside pipe =   18.43(In.)
Critical Depth =    7.71(In.)
Pipe flow velocity =      8.81(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    13.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       59.200 to Point/Station       48.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.490(Ac.)
Runoff from this stream =      3.380(CFS)
Time of concentration =   13.39 min.
Rainfall intensity =     4.886(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.100 to Point/Station       60.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.300
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.471
Initial subarea total flow distance  =  371.380(Ft.)
Highest elevation =  371.000(Ft.)
Lowest elevation =  368.000(Ft.)
Elevation difference =    3.000(Ft.) Slope =  0.808 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.47 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4710)*(  70.000^.5)/(   1.000^(1/3)]=   9.47
The initial area total distance of  371.38 (Ft.) entered leaves a
remaining distance of  301.38 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.73 minutes
for a distance of 301.38 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.01(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.728 Minutes
Tt=[(11.9*0.0571^3)/(  3.01)]^.385=  3.73
Total initial area Ti =   9.47 minutes from Figure 3-3 formula plus
  3.73 minutes from the Figure 3-4 formula =  13.20 minutes
Rainfall intensity (I) =      4.930(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.471
Subarea runoff =      2.090(CFS)
Total initial stream area =        0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.200 to Point/Station       48.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   363.500(Ft.)
Downstream point/station elevation =   363.000(Ft.)
Pipe length  =    25.27(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.090(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.090(CFS)
Normal flow depth in pipe =    4.47(In.)
Flow top width inside pipe =   18.69(In.)
Critical depth could not be calculated.
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    13.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.200 to Point/Station       48.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.900(Ac.)
Runoff from this stream =      2.090(CFS)
Time of concentration =   13.28 min.
Rainfall intensity =     4.911(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       13.885     15.59           4.428
2        3.380     13.39           4.886
3        2.090     13.28           4.911
Qmax(1) =
            1.000 *    1.000 *    13.885) +
            0.906 *    1.000 *     3.380) +
            0.902 *    1.000 *     2.090) + =      18.833
```

```
Qmax(2) =
          1.000 *    0.859 *    13.885) +
          1.000 *    1.000 *     3.380) +
          0.995 *    1.000 *     2.090) + =      17.381
Qmax(3) =
          1.000 *    0.852 *    13.885) +
          1.000 *    0.992 *     3.380) +
          1.000 *    1.000 *     2.090) + =      17.272

Total of 3 main streams to confluence:
Flow rates before confluence point:
     13.885       3.380       2.090
Maximum flow rates at confluence using above data:
      18.833       17.381       17.272
Area of streams before confluence:
       6.450        1.490        0.900


Results of confluence:
Total flow rate =      18.833(CFS)
Time of concentration =     15.592 min.
Effective stream area after confluence  =       8.840(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       48.000 to Point/Station       49.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   363.000(Ft.)
Downstream point/station elevation =   362.500(Ft.)
Pipe length  =   113.18(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.833(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    18.833(CFS)
Normal flow depth in pipe =   17.79(In.)
Flow top width inside pipe =   36.00(In.)
Critical Depth =   16.68(In.)
Pipe flow velocity =      5.41(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    15.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       48.000 to Point/Station       49.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       8.840(Ac.)
Runoff from this stream =     18.833(CFS)
Time of concentration =   15.94 min.
Rainfall intensity =     4.365(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.100 to Point/Station       52.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.520
Initial subarea total flow distance  =  620.180(Ft.)
Highest elevation =  372.000(Ft.)
Lowest elevation =  368.000(Ft.)
Elevation difference =    4.000(Ft.) Slope =  0.645 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.73 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5200)*(  70.000^.5)/(   1.000^(1/3)]=   8.73
The initial area total distance of  620.18 (Ft.) entered leaves a
remaining distance of  550.18 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.93 minutes
for a distance of 550.18 (Ft.) and a slope of  1.00 %
with an elevation difference of   5.50(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.926 Minutes
Tt=[(11.9*0.1042^3)/(  5.50)]^.385=  5.93
Total initial area Ti =   8.73 minutes from Figure 3-3 formula plus
  5.93 minutes from the Figure 3-4 formula =  14.66 minutes
Rainfall intensity (I) =      4.607(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.520
Subarea runoff =      2.995(CFS)
Total initial stream area =        1.250(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.200 to Point/Station       49.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   363.000(Ft.)
Downstream point/station elevation =   362.500(Ft.)
Pipe length  =    27.37(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.995(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.995(CFS)
Normal flow depth in pipe =    5.45(In.)
Flow top width inside pipe =   20.11(In.)
Critical Depth =    7.24(In.)
Pipe flow velocity =      5.59(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.74 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.200 to Point/Station       49.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.250(Ac.)
Runoff from this stream =      2.995(CFS)
Time of concentration =   14.74 min.
Rainfall intensity =     4.591(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       49.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.660
Decimal fraction soil group C = 0.020
Decimal fraction soil group D = 0.320
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.473
Rainfall intensity (I) =      6.175(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   9.31 min.  Rain intensity =       6.18(In/Hr)
Total area =       13.050(Ac.)  Total runoff =    21.578(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       49.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     13.050(Ac.)
Runoff from this stream =     21.578(CFS)
Time of concentration =    9.31 min.
Rainfall intensity =     6.175(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       18.833     15.94           4.365
2        2.995     14.74           4.591
3       21.578      9.31           6.175
Qmax(1) =
           1.000 *    1.000 *    18.833) +
           0.951 *    1.000 *     2.995) +
           0.707 *    1.000 *    21.578) + =      36.934
Qmax(2) =
           1.000 *    0.925 *    18.833) +
           1.000 *    1.000 *     2.995) +
           0.743 *    1.000 *    21.578) + =      36.454
Qmax(3) =
           1.000 *    0.584 *    18.833) +
           1.000 *    0.632 *     2.995) +
           1.000 *    1.000 *    21.578) + =      34.468

Total of 3 main streams to confluence:
Flow rates before confluence point:
      18.833       2.995      21.578
Maximum flow rates at confluence using above data:
       36.934       36.454       34.468
Area of streams before confluence:
        8.840        1.250       13.050


Results of confluence:
Total flow rate =     36.934(CFS)
Time of concentration =    15.941 min.
Effective stream area after confluence  =     23.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       49.000 to Point/Station       50.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   362.500(Ft.)
Downstream point/station elevation =   361.500(Ft.)
Pipe length  =    86.45(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    36.934(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    36.934(CFS)
Normal flow depth in pipe =   19.97(In.)
Flow top width inside pipe =   35.78(In.)
Critical Depth =   23.71(In.)
Pipe flow velocity =      9.17(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =    16.10 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       49.000 to Point/Station       50.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     23.140(Ac.)
Runoff from this stream =     36.934(CFS)
Time of concentration =   16.10 min.
Rainfall intensity =     4.338(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.100 to Point/Station       61.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.520
Initial subarea total flow distance  =  323.190(Ft.)
Highest elevation =  371.000(Ft.)
Lowest elevation =  367.000(Ft.)
Elevation difference =    4.000(Ft.) Slope =  1.238 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.73 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5200)*(  70.000^.5)/(   1.000^(1/3)]=   8.73
The initial area total distance of  323.19 (Ft.) entered leaves a
remaining distance of  253.19 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.26 minutes
for a distance of 253.19 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.53(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.260 Minutes
Tt=[(11.9*0.0480^3)/(  2.53)]^.385=  3.26
Total initial area Ti =   8.73 minutes from Figure 3-3 formula plus
  3.26 minutes from the Figure 3-4 formula =  11.99 minutes
Rainfall intensity (I) =      5.244(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.520
Subarea runoff =      2.073(CFS)
Total initial stream area =        0.760(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.200 to Point/Station       50.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   362.000(Ft.)
Downstream point/station elevation =   361.500(Ft.)
Pipe length  =    11.16(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.073(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.073(CFS)
Normal flow depth in pipe =    3.65(In.)
Flow top width inside pipe =   17.23(In.)
Critical Depth =    5.98(In.)
Pipe flow velocity =      6.88(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    12.02 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.200 to Point/Station       50.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.760(Ac.)
Runoff from this stream =      2.073(CFS)
Time of concentration =   12.02 min.
Rainfall intensity =     5.237(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       36.934     16.10           4.338
2        2.073     12.02           5.237
Qmax(1) =
            1.000 *    1.000 *    36.934) +
            0.828 *    1.000 *     2.073) + =      38.651
Qmax(2) =
            1.000 *    0.747 *    36.934) +
            1.000 *    1.000 *     2.073) + =      29.655

Total of 2 main streams to confluence:
Flow rates before confluence point:
      36.934       2.073
Maximum flow rates at confluence using above data:
       38.651       29.655
Area of streams before confluence:
       23.140        0.760


Results of confluence:
Total flow rate =     38.651(CFS)
Time of concentration =    16.098 min.
Effective stream area after confluence  =     23.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       52.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   361.500(Ft.)
Downstream point/station elevation =   359.500(Ft.)
Pipe length  =   118.86(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    38.651(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    38.651(CFS)
Normal flow depth in pipe =   18.33(In.)
Flow top width inside pipe =   35.99(In.)
Critical Depth =   24.27(In.)
Pipe flow velocity =     10.69(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    16.28 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       52.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      23.900(Ac.)
Runoff from this stream =      38.651(CFS)
Time of concentration =   16.28 min.
Rainfall intensity =     4.306(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.100 to Point/Station       62.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.478
Initial subarea total flow distance  =  454.750(Ft.)
Highest elevation =  372.000(Ft.)
Lowest elevation =  366.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  1.319 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.37 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4780)*(  70.000^.5)/(   1.000^(1/3)]=   9.37
The initial area total distance of  454.75 (Ft.) entered leaves a
remaining distance of  384.75 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.50 minutes
for a distance of 384.75 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.85(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.500 Minutes
Tt=[(11.9*0.0729^3)/(  3.85)]^.385=  4.50
Total initial area Ti =   9.37 minutes from Figure 3-3 formula plus
  4.50 minutes from the Figure 3-4 formula =  13.87 minutes
Rainfall intensity (I) =      4.776(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.478
Subarea runoff =      2.260(CFS)
Total initial stream area =        0.990(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.200 to Point/Station       51.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   361.000(Ft.)
Downstream point/station elevation =   360.500(Ft.)
Pipe length  =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.260(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.260(CFS)
Normal flow depth in pipe =    3.69(In.)
Flow top width inside pipe =   17.32(In.)
Critical Depth =    6.26(In.)
Pipe flow velocity =      7.36(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    13.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.200 to Point/Station       51.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.990(Ac.)
Runoff from this stream =      2.260(CFS)
Time of concentration =   13.89 min.
Rainfall intensity =     4.771(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.100 to Point/Station       63.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.478
Initial subarea total flow distance  =  455.230(Ft.)
Highest elevation =  370.000(Ft.)
Lowest elevation =  366.000(Ft.)
Elevation difference =    4.000(Ft.) Slope =  0.879 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.37 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4780)*(  70.000^.5)/(   1.000^(1/3)]=   9.37
The initial area total distance of  455.23 (Ft.) entered leaves a
remaining distance of  385.23 (Ft.)
```

```
Using Figure 3-4, the travel time for this distance is   4.50 minutes
for a distance of 385.23 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.85(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.504 Minutes
Tt=[(11.9*0.0730^3)/(  3.85)]^.385=  4.50
Total initial area Ti =   9.37 minutes from Figure 3-3 formula plus
  4.50 minutes from the Figure 3-4 formula =  13.87 minutes
Rainfall intensity (I) =      4.775(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.478
Subarea runoff =      2.237(CFS)
Total initial stream area =        0.980(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.200 to Point/Station       51.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   361.000(Ft.)
Downstream point/station elevation =   360.500(Ft.)
Pipe length  =    25.71(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.237(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.237(CFS)
Normal flow depth in pipe =    4.64(In.)
Flow top width inside pipe =   18.96(In.)
Critical Depth =    6.22(In.)
Pipe flow velocity =      5.25(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    13.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.200 to Point/Station       51.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.980(Ac.)
Runoff from this stream =      2.237(CFS)
Time of concentration =  13.95 min.
Rainfall intensity =     4.757(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        2.260     13.89           4.771
2        2.237     13.95           4.757
Qmax(1) =
            1.000 *    1.000 *     2.260) +
            1.000 *    0.995 *     2.237) + =       4.487
Qmax(2) =
            0.997 *    1.000 *     2.260) +
            1.000 *    1.000 *     2.237) + =       4.490
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       2.260       2.237
Maximum flow rates at confluence using above data:
        4.487       4.490
Area of streams before confluence:
        0.990       0.980
Results of confluence:
Total flow rate =      4.490(CFS)
Time of concentration =    13.953 min.
Effective stream area after confluence =      1.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station       52.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   360.500(Ft.)
Downstream point/station elevation =   359.500(Ft.)
Pipe length  =   111.10(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.490(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.490(CFS)
Normal flow depth in pipe =    8.03(In.)
Flow top width inside pipe =   22.65(In.)
Critical Depth =    8.92(In.)
Pipe flow velocity =      4.87(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =    14.33 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station       52.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.970(Ac.)
Runoff from this stream =      4.490(CFS)
Time of concentration =   14.33 min.
Rainfall intensity =     4.675(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       38.651     16.28           4.306
2        4.490     14.33           4.675
Qmax(1) =
            1.000 *    1.000 *    38.651) +
            0.921 *    1.000 *     4.490) + =      42.787
Qmax(2) =
            1.000 *    0.880 *    38.651) +
            1.000 *    1.000 *     4.490) + =      38.511
```

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
      38.651       4.490
Maximum flow rates at confluence using above data:
       42.787       38.511
Area of streams before confluence:
       23.900        1.970


Results of confluence:
Total flow rate =      42.787(CFS)
Time of concentration =    16.284 min.
Effective stream area after confluence  =      25.870(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   359.500(Ft.)
Downstream point/station elevation =   358.500(Ft.)
Pipe length  =   217.50(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    42.787(CFS)
Given pipe size =     36.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.476(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      1.191(Ft.)
 Minor friction loss =      0.284(Ft.)     K-factor =   0.50
Pipe flow velocity =      6.05(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =    16.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       53.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     25.870(Ac.)
Runoff from this stream =     42.787(CFS)
Time of concentration =   16.88 min.
Rainfall intensity =     4.207(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.100 to Point/Station       64.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less        )
```

```
Impervious value, Ai = 0.300
Sub-Area C Value = 0.520
Initial subarea total flow distance  =  393.000(Ft.)
Highest elevation =  369.000(Ft.)
Lowest elevation =  363.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  1.527 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.41 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5200)*(  80.000^.5)/(   2.000^(1/3)]=   7.41
The initial area total distance of  393.00 (Ft.) entered leaves a
remaining distance of  313.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.84 minutes
for a distance of 313.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.13(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.839 Minutes
Tt=[(11.9*0.0593^3)/(  3.13)]^.385=  3.84
Total initial area Ti =   7.41 minutes from Figure 3-3 formula plus
  3.84 minutes from the Figure 3-4 formula =  11.25 minutes
Rainfall intensity (I) =      5.466(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.520
Subarea runoff =      2.075(CFS)
Total initial stream area =        0.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.200 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   359.000(Ft.)
Downstream point/station elevation =   358.500(Ft.)
Pipe length  =     9.25(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.075(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.075(CFS)
Normal flow depth in pipe =    3.49(In.)
Flow top width inside pipe =   16.91(In.)
Critical Depth =    6.00(In.)
Pipe flow velocity =      7.35(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    11.27 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.200 to Point/Station       53.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.730(Ac.)
Runoff from this stream =      2.075(CFS)
Time of concentration =   11.27 min.
Rainfall intensity =     5.459(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       42.787     16.88           4.207
2        2.075     11.27           5.459
Qmax(1) =
           1.000 *    1.000 *    42.787) +
           0.771 *    1.000 *     2.075) + =      44.385
Qmax(2) =
           1.000 *    0.668 *    42.787) +
           1.000 *    1.000 *     2.075) + =      30.640

Total of 2 main streams to confluence:
Flow rates before confluence point:
     42.787       2.075
Maximum flow rates at confluence using above data:
       44.385       30.640
Area of streams before confluence:
       25.870        0.730


Results of confluence:
Total flow rate =     44.385(CFS)
Time of concentration =    16.882 min.
Effective stream area after confluence  =     26.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       57.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   358.500(Ft.)
Downstream point/station elevation =   358.000(Ft.)
Pipe length  =    77.87(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    44.385(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    44.385(CFS)
Normal flow depth in pipe =   28.22(In.)
Flow top width inside pipe =   29.64(In.)
Critical Depth =   26.04(In.)
Pipe flow velocity =      7.46(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    17.06 min.
End of computations, total study area =          26.600 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/12/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 5
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       65.100 to Point/Station       65.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  667.650(Ft.)
Highest elevation =  376.000(Ft.)
Lowest elevation =  368.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.198 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.79 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  70.000^.5)/(   1.000^(1/3)]=   9.79
The initial area total distance of  667.65 (Ft.) entered leaves a
remaining distance of  597.65 (Ft.)
Using Figure 3-4, the travel time for this distance is   6.32 minutes
for a distance of 597.65 (Ft.) and a slope of  1.00 %
with an elevation difference of   5.98(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    6.316 Minutes
Tt=[(11.9*0.1132^3)/(  5.98)]^.385=  6.32
Total initial area Ti =   9.79 minutes from Figure 3-3 formula plus
  6.32 minutes from the Figure 3-4 formula =  16.11 minutes
Rainfall intensity (I) =      4.337(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      4.371(CFS)
Total initial stream area =        2.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       65.200 to Point/Station       54.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   363.000(Ft.)
Downstream point/station elevation =   362.500(Ft.)
Pipe length  =    36.84(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.371(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.371(CFS)
Normal flow depth in pipe =    7.11(In.)
Flow top width inside pipe =   21.92(In.)
Critical Depth =    8.81(In.)
Pipe flow velocity =      5.61(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    16.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       65.200 to Point/Station       54.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.240(Ac.)
Runoff from this stream =      4.371(CFS)
Time of concentration =   16.21 min.
Rainfall intensity =     4.318(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.100 to Point/Station       66.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.100
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.457
Initial subarea total flow distance  =  667.510(Ft.)
Highest elevation =  380.000(Ft.)
Lowest elevation =  368.000(Ft.)
Elevation difference =   12.000(Ft.) Slope =  1.798 %
```

```
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.68 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4570)*(  70.000^.5)/(   1.000^(1/3)]=   9.68
The initial area total distance of  667.51 (Ft.) entered leaves a
remaining distance of  597.51 (Ft.)
Using Figure 3-4, the travel time for this distance is   6.32 minutes
for a distance of 597.51 (Ft.) and a slope of  1.00 %
with an elevation difference of   5.98(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    6.315 Minutes
Tt=[(11.9*0.1132^3)/(  5.98)]^.385=  6.32
Total initial area Ti =   9.68 minutes from Figure 3-3 formula plus
  6.32 minutes from the Figure 3-4 formula =  16.00 minutes
Rainfall intensity (I) =      4.355(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.457
Subarea runoff =      2.667(CFS)
Total initial stream area =        1.340(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.200 to Point/Station       54.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   363.000(Ft.)
Downstream point/station elevation =   362.500(Ft.)
Pipe length  =    11.40(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.667(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.667(CFS)
Normal flow depth in pipe =    4.15(In.)
Flow top width inside pipe =   18.14(In.)
Critical Depth =    6.82(In.)
Pipe flow velocity =      7.36(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    16.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.200 to Point/Station       54.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.340(Ac.)
Runoff from this stream =      2.667(CFS)
Time of concentration =   16.02 min.
Rainfall intensity =     4.351(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        4.371     16.21           4.318
2        2.667     16.02           4.351
Qmax(1) =
           1.000 *    1.000 *     4.371) +
           0.992 *    1.000 *     2.667) + =       7.018
Qmax(2) =
           1.000 *    0.988 *     4.371) +
           1.000 *    1.000 *     2.667) + =       6.987

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.371       2.667
Maximum flow rates at confluence using above data:
        7.018        6.987
Area of streams before confluence:
        2.240        1.340


Results of confluence:
Total flow rate =      7.018(CFS)
Time of concentration =    16.215 min.
Effective stream area after confluence  =      3.580(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.000 to Point/Station       55.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   362.500(Ft.)
Downstream point/station elevation =   362.000(Ft.)
Pipe length  =   189.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.018(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.018(CFS)
Normal flow depth in pipe =   14.74(In.)
Flow top width inside pipe =   23.36(In.)
Critical Depth =   11.27(In.)
Pipe flow velocity =      3.47(Ft/s)
Travel time through pipe =    0.91 min.
Time of concentration (TC) =    17.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.000 to Point/Station       55.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.580(Ac.)
Runoff from this stream =      7.018(CFS)
Time of concentration =   17.12 min.
Rainfall intensity =     4.169(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.100 to Point/Station       67.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  269.000(Ft.)
Highest elevation =  370.000(Ft.)
Lowest elevation =  367.000(Ft.)
Elevation difference =    3.000(Ft.) Slope =  1.115 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.79 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  70.000^.5)/(   1.000^(1/3)]=   9.79
The initial area total distance of  269.00 (Ft.) entered leaves a
remaining distance of  199.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.71 minutes
for a distance of 199.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   1.99(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.708 Minutes
Tt=[(11.9*0.0377^3)/(  1.99)]^.385=  2.71
Total initial area Ti =   9.79 minutes from Figure 3-3 formula plus
  2.71 minutes from the Figure 3-4 formula =  12.50 minutes
Rainfall intensity (I) =      5.107(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.667(CFS)
Total initial stream area =        0.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.100 to Point/Station       67.200
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.290(Ac.)
Runoff from this stream =      0.667(CFS)
Time of concentration =   12.50 min.
Rainfall intensity =     5.107(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.100 to Point/Station       67.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.410
Initial subarea total flow distance  =  337.660(Ft.)
Highest elevation =  370.000(Ft.)
Lowest elevation =  367.000(Ft.)
Elevation difference =    3.000(Ft.) Slope =  0.888 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =  10.39 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4100)*(  70.000^.5)/(   1.000^(1/3)]=  10.39
The initial area total distance of  337.66 (Ft.) entered leaves a
remaining distance of  267.66 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.40 minutes
for a distance of 267.66 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.68(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.403 Minutes
Tt=[(11.9*0.0507^3)/(  2.68)]^.385=  3.40
Total initial area Ti =  10.39 minutes from Figure 3-3 formula plus
  3.40 minutes from the Figure 3-4 formula =  13.79 minutes
Rainfall intensity (I) =      4.792(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff =      1.297(CFS)
Total initial stream area =        0.660(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.100 to Point/Station       67.200
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.660(Ac.)
Runoff from this stream =      1.297(CFS)
Time of concentration =   13.79 min.
Rainfall intensity =     4.792(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.667     12.50           5.107
2        1.297     13.79           4.792
Qmax(1) =
           1.000 *    1.000 *     0.667) +
           1.000 *    0.906 *     1.297) + =       1.841
Qmax(2) =
           0.938 *    1.000 *     0.667) +
           1.000 *    1.000 *     1.297) + =       1.922

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.667       1.297
Maximum flow rates at confluence using above data:
        1.841        1.922
Area of streams before confluence:
        0.290        0.660
Results of confluence:
Total flow rate =      1.922(CFS)
Time of concentration =    13.794 min.
Effective stream area after confluence =      0.950(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.200 to Point/Station       55.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   362.500(Ft.)
Downstream point/station elevation =   362.000(Ft.)
Pipe length  =     8.52(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.922(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.922(CFS)
Normal flow depth in pipe =    3.30(In.)
Flow top width inside pipe =   16.52(In.)
Critical Depth =    5.76(In.)
Pipe flow velocity =      7.40(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    13.81 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.200 to Point/Station       55.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.950(Ac.)
Runoff from this stream =      1.922(CFS)
Time of concentration =   13.81 min.
Rainfall intensity =     4.788(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       68.100 to Point/Station       68.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  539.260(Ft.)
Highest elevation =  372.000(Ft.)
Lowest elevation =  367.000(Ft.)
Elevation difference =    5.000(Ft.) Slope =  0.927 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.79 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  70.000^.5)/(   1.000^(1/3)]=   9.79
The initial area total distance of  539.26 (Ft.) entered leaves a
remaining distance of  469.26 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.24 minutes
for a distance of 469.26 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.69(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.243 Minutes
Tt=[(11.9*0.0889^3)/(  4.69)]^.385=  5.24
Total initial area Ti =   9.79 minutes from Figure 3-3 formula plus
  5.24 minutes from the Figure 3-4 formula =  15.03 minutes
Rainfall intensity (I) =      4.534(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      3.530(CFS)
Total initial stream area =        1.730(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       68.100 to Point/Station       68.200
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      1.730(Ac.)
Runoff from this stream =      3.530(CFS)
Time of concentration =   15.03 min.
Rainfall intensity =     4.534(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       69.100 to Point/Station       68.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.434
Initial subarea total flow distance  =  314.000(Ft.)
Highest elevation =  370.000(Ft.)
Lowest elevation =  367.000(Ft.)
Elevation difference =    3.000(Ft.) Slope =  0.955 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =  10.03 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4340)*(  70.000^.5)/(   1.000^(1/3)]=  10.03
The initial area total distance of  314.00 (Ft.) entered leaves a
remaining distance of  244.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.17 minutes
for a distance of 244.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.44(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.169 Minutes
Tt=[(11.9*0.0462^3)/(  2.44)]^.385=  3.17
Total initial area Ti =  10.03 minutes from Figure 3-3 formula plus
  3.17 minutes from the Figure 3-4 formula =  13.20 minutes
Rainfall intensity (I) =      4.931(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.434
Subarea runoff =      0.942(CFS)
Total initial stream area =        0.440(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       69.100 to Point/Station       68.200
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      0.440(Ac.)
Runoff from this stream =      0.942(CFS)
Time of concentration =   13.20 min.
Rainfall intensity =     4.931(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        3.530     15.03           4.534
2        0.942     13.20           4.931
Qmax(1) =
           1.000 *    1.000 *     3.530) +
           0.920 *    1.000 *     0.942) + =       4.395
Qmax(2) =
           1.000 *    0.878 *     3.530) +
           1.000 *    1.000 *     0.942) + =       4.041

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.530       0.942
Maximum flow rates at confluence using above data:
        4.395        4.041
Area of streams before confluence:
        1.730        0.440
Results of confluence:
Total flow rate =      4.395(CFS)
Time of concentration =    15.032 min.
Effective stream area after confluence =      2.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       68.200 to Point/Station       55.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   362.500(Ft.)
Downstream point/station elevation =   362.000(Ft.)
Pipe length  =    27.07(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.395(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.395(CFS)
Normal flow depth in pipe =    6.59(In.)
Flow top width inside pipe =   21.42(In.)
Critical Depth =    8.83(In.)
Pipe flow velocity =      6.27(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    15.10 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       68.200 to Point/Station       55.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =       2.170(Ac.)
Runoff from this stream =       4.395(CFS)
Time of concentration =   15.10 min.
Rainfall intensity =     4.520(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        7.018     17.12           4.169
2        1.922     13.81           4.788
3        4.395     15.10           4.520
Qmax(1) =
           1.000 *    1.000 *     7.018) +
           0.871 *    1.000 *     1.922) +
           0.922 *    1.000 *     4.395) + =      12.745
Qmax(2) =
           1.000 *    0.807 *     7.018) +
           1.000 *    1.000 *     1.922) +
           1.000 *    0.915 *     4.395) + =      11.604
Qmax(3) =
           1.000 *    0.882 *     7.018) +
           0.944 *    1.000 *     1.922) +
           1.000 *    1.000 *     4.395) + =      12.401

Total of 3 main streams to confluence:
Flow rates before confluence point:
       7.018       1.922       4.395
Maximum flow rates at confluence using above data:
       12.745       11.604       12.401
Area of streams before confluence:
        3.580        0.950        2.170


Results of confluence:
Total flow rate =      12.745(CFS)
Time of concentration =     17.123 min.
Effective stream area after confluence  =       6.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.000 to Point/Station       56.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   362.000(Ft.)
Downstream point/station elevation =   358.500(Ft.)
Pipe length  =   727.30(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    12.745(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    12.745(CFS)
Normal flow depth in pipe =   18.45(In.)
Flow top width inside pipe =   20.24(In.)
Critical Depth =   15.39(In.)
Pipe flow velocity =      4.92(Ft/s)
Travel time through pipe =    2.46 min.
Time of concentration (TC) =    19.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.000 to Point/Station       56.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       6.700(Ac.)
Runoff from this stream =      12.745(CFS)
Time of concentration =   19.59 min.
Rainfall intensity =     3.822(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.100 to Point/Station       71.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.100
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.449
Initial subarea total flow distance  =  534.000(Ft.)
Highest elevation =  370.000(Ft.)
Lowest elevation =  364.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  1.124 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.80 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4490)*(  70.000^.5)/(   1.000^(1/3)]=   9.80
The initial area total distance of  534.00 (Ft.) entered leaves a
remaining distance of  464.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.20 minutes
for a distance of 464.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.64(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.198 Minutes
Tt=[(11.9*0.0879^3)/(  4.64)]^.385=  5.20
Total initial area Ti =   9.80 minutes from Figure 3-3 formula plus
  5.20 minutes from the Figure 3-4 formula =  15.00 minutes
```

```
Rainfall intensity (I) =      4.540(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.449
Subarea runoff =      2.324(CFS)
Total initial stream area =        1.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.200 to Point/Station       56.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   359.000(Ft.)
Downstream point/station elevation =   358.500(Ft.)
Pipe length  =     9.63(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.324(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.324(CFS)
Normal flow depth in pipe =    3.72(In.)
Flow top width inside pipe =   17.37(In.)
Critical Depth =    6.36(In.)
Pipe flow velocity =      7.50(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    15.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.200 to Point/Station       56.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.140(Ac.)
Runoff from this stream =      2.324(CFS)
Time of concentration =   15.02 min.
Rainfall intensity =     4.536(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.100 to Point/Station       72.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.100
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.453
Initial subarea total flow distance  =  524.630(Ft.)
Highest elevation =  370.000(Ft.)
Lowest elevation =  365.500(Ft.)
Elevation difference =    4.500(Ft.) Slope =  0.858 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.74 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4530)*(  70.000^.5)/(   1.000^(1/3)]=   9.74
The initial area total distance of  524.63 (Ft.) entered leaves a
remaining distance of  454.63 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.12 minutes
for a distance of 454.63 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.55(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.117 Minutes
Tt=[(11.9*0.0861^3)/(  4.55)]^.385=  5.12
Total initial area Ti =   9.74 minutes from Figure 3-3 formula plus
  5.12 minutes from the Figure 3-4 formula =  14.86 minutes
Rainfall intensity (I) =      4.568(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.453
Subarea runoff =      2.421(CFS)
Total initial stream area =        1.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.200 to Point/Station       56.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   360.500(Ft.)
Downstream point/station elevation =   358.500(Ft.)
Pipe length  =    38.18(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.421(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.421(CFS)
Normal flow depth in pipe =    3.79(In.)
Flow top width inside pipe =   17.49(In.)
Critical Depth =    6.49(In.)
Pipe flow velocity =      7.61(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.94 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.200 to Point/Station       56.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =       1.170(Ac.)
Runoff from this stream =       2.421(CFS)
Time of concentration =   14.94 min.
Rainfall intensity =     4.551(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       12.745     19.59           3.822
2        2.324     15.02           4.536
3        2.421     14.94           4.551
Qmax(1) =
           1.000 *    1.000 *    12.745) +
           0.843 *    1.000 *     2.324) +
           0.840 *    1.000 *     2.421) + =      16.737
Qmax(2) =
           1.000 *    0.767 *    12.745) +
           1.000 *    1.000 *     2.324) +
           0.997 *    1.000 *     2.421) + =      14.512
Qmax(3) =
           1.000 *    0.763 *    12.745) +
           1.000 *    0.995 *     2.324) +
           1.000 *    1.000 *     2.421) + =      14.457

Total of 3 main streams to confluence:
Flow rates before confluence point:
      12.745       2.324       2.421
Maximum flow rates at confluence using above data:
       16.737       14.512       14.457
Area of streams before confluence:
        6.700        1.140        1.170


Results of confluence:
Total flow rate =     16.737(CFS)
Time of concentration =    19.586 min.
Effective stream area after confluence  =      9.010(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.000 to Point/Station       57.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   358.500(Ft.)
Downstream point/station elevation =   358.000(Ft.)
Pipe length  =   145.83(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    16.737(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    16.737(CFS)
Normal flow depth in pipe =   17.88(In.)
Flow top width inside pipe =   36.00(In.)
Critical Depth =   15.67(In.)
Pipe flow velocity =      4.78(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =    20.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.010(Ac.)
Runoff from this stream =     16.737(CFS)
Time of concentration =   20.09 min.
Rainfall intensity =     3.760(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       57.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.670
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.330
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.473
Rainfall intensity (I) =      4.178(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  17.06 min.  Rain intensity =       4.18(In/Hr)
Total area =       26.600(Ac.)  Total runoff =    44.385(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      26.600(Ac.)
Runoff from this stream =      44.385(CFS)
Time of concentration =   17.06 min.
Rainfall intensity =     4.178(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.737     20.09           3.760
2       44.385     17.06           4.178
Qmax(1) =
            1.000 *    1.000 *    16.737) +
            0.900 *    1.000 *    44.385) + =      56.674
Qmax(2) =
            1.000 *    0.849 *    16.737) +
            1.000 *    1.000 *    44.385) + =      58.594

Total of 2 main streams to confluence:
Flow rates before confluence point:
      16.737      44.385
Maximum flow rates at confluence using above data:
       56.674       58.594
Area of streams before confluence:
        9.010       26.600


Results of confluence:
Total flow rate =      58.594(CFS)
Time of concentration =    17.060 min.
Effective stream area after confluence  =      35.610(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       58.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   358.000(Ft.)
Downstream point/station elevation =   356.000(Ft.)
Pipe length  =   138.81(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    58.594(CFS)
Given pipe size =      36.00(In.)
Calculated individual pipe flow  =    58.594(CFS)
Normal flow depth in pipe =   25.36(In.)
Flow top width inside pipe =   32.85(In.)
Critical Depth =   29.73(In.)
Pipe flow velocity =     11.01(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    17.27 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       58.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      35.610(Ac.)
Runoff from this stream =      58.594(CFS)
Time of concentration =   17.27 min.
Rainfall intensity =     4.146(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.100 to Point/Station       73.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.520
Initial subarea total flow distance  =  397.310(Ft.)
Highest elevation =  366.000(Ft.)
Lowest elevation =  361.000(Ft.)
Elevation difference =    5.000(Ft.) Slope =  1.258 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.73 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5200)*(  70.000^.5)/(   1.000^(1/3)]=   8.73
The initial area total distance of  397.31 (Ft.) entered leaves a
remaining distance of  327.31 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.97 minutes
for a distance of 327.31 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.27(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.973 Minutes
Tt=[(11.9*0.0620^3)/(  3.27)]^.385=  3.97
Total initial area Ti =   8.73 minutes from Figure 3-3 formula plus
  3.97 minutes from the Figure 3-4 formula =  12.71 minutes
Rainfall intensity (I) =      5.053(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.520
Subarea runoff =      2.470(CFS)
Total initial stream area =        0.940(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.200 to Point/Station       58.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   356.500(Ft.)
Downstream point/station elevation =   356.000(Ft.)
Pipe length  =     9.88(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.470(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.470(CFS)
Normal flow depth in pipe =    3.86(In.)
Flow top width inside pipe =   17.63(In.)
Critical Depth =    6.56(In.)
Pipe flow velocity =      7.57(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.200 to Point/Station       58.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.940(Ac.)
Runoff from this stream =      2.470(CFS)
Time of concentration =   12.73 min.
Rainfall intensity =     5.047(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       74.100 to Point/Station       74.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.520
Initial subarea total flow distance  =  706.460(Ft.)
Highest elevation =  368.000(Ft.)
Lowest elevation =  361.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  0.991 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.73 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5200)*(  70.000^.5)/(   1.000^(1/3)]=   8.73
The initial area total distance of  706.46 (Ft.) entered leaves a
remaining distance of  636.46 (Ft.)
Using Figure 3-4, the travel time for this distance is   6.63 minutes
for a distance of 636.46 (Ft.) and a slope of  1.00 %
with an elevation difference of   6.36(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    6.630 Minutes
Tt=[(11.9*0.1205^3)/(  6.36)]^.385=  6.63
Total initial area Ti =   8.73 minutes from Figure 3-3 formula plus
  6.63 minutes from the Figure 3-4 formula =  15.36 minutes
Rainfall intensity (I) =      4.470(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.520
Subarea runoff =      1.139(CFS)
Total initial stream area =        0.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       74.200 to Point/Station       58.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   356.500(Ft.)
Downstream point/station elevation =   356.000(Ft.)
Pipe length  =    28.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.139(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.139(CFS)
Normal flow depth in pipe =    3.41(In.)
Flow top width inside pipe =   16.76(In.)
Critical Depth =    4.41(In.)
Pipe flow velocity =      4.17(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    15.48 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       74.200 to Point/Station       58.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =       0.490(Ac.)
Runoff from this stream =       1.139(CFS)
Time of concentration =   15.48 min.
Rainfall intensity =     4.449(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       58.594     17.27           4.146
2        2.470     12.73           5.047
3        1.139     15.48           4.449
Qmax(1) =
            1.000 *    1.000 *    58.594) +
            0.821 *    1.000 *     2.470) +
            0.932 *    1.000 *     1.139) + =      61.684
Qmax(2) =
            1.000 *    0.737 *    58.594) +
            1.000 *    1.000 *     2.470) +
            1.000 *    0.823 *     1.139) + =      46.595
Qmax(3) =
            1.000 *    0.896 *    58.594) +
            0.882 *    1.000 *     2.470) +
            1.000 *    1.000 *     1.139) + =      55.825

Total of 3 main streams to confluence:
Flow rates before confluence point:
      58.594       2.470       1.139
Maximum flow rates at confluence using above data:
       61.684       46.595       55.825
Area of streams before confluence:
       35.610        0.940        0.490


Results of confluence:
Total flow rate =     61.684(CFS)
Time of concentration =    17.270 min.
Effective stream area after confluence  =     37.040(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       58.000 to Point/Station       59.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   356.000(Ft.)
Downstream point/station elevation =   355.000(Ft.)
Pipe length  =    36.84(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    61.684(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    61.684(CFS)
Normal flow depth in pipe =   21.09(In.)
Flow top width inside pipe =   35.46(In.)
Critical Depth =   30.37(In.)
Pipe flow velocity =     14.33(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    17.31 min.
End of computations, total study area =          37.040 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/12/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH
 100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
 BIO-RETENTION POND 5
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.100 to Point/Station       75.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.500
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.469
Initial subarea total flow distance  =  334.000(Ft.)
Highest elevation =  362.000(Ft.)
Lowest elevation =  359.000(Ft.)
Elevation difference =    3.000(Ft.) Slope =  0.898 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.50 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4690)*(  70.000^.5)/(   1.000^(1/3)]=   9.50
The initial area total distance of  334.00 (Ft.) entered leaves a
remaining distance of  264.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.37 minutes
for a distance of 264.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.64(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.367 Minutes
Tt=[(11.9*0.0500^3)/(  2.64)]^.385=  3.37
Total initial area Ti =   9.50 minutes from Figure 3-3 formula plus
  3.37 minutes from the Figure 3-4 formula =  12.87 minutes
Rainfall intensity (I) =      5.012(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.469
Subarea runoff =      1.716(CFS)
Total initial stream area =        0.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.200 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   356.000(Ft.)
Downstream point/station elevation =   355.500(Ft.)
Pipe length  =    25.15(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.716(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.716(CFS)
Normal flow depth in pipe =    4.05(In.)
Flow top width inside pipe =   17.99(In.)
Critical Depth =    5.44(In.)
Pipe flow velocity =      4.89(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    12.96 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.200 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.730(Ac.)
Runoff from this stream =      1.716(CFS)
Time of concentration =   12.96 min.
Rainfall intensity =     4.990(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.100 to Point/Station       76.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.500
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  339.340(Ft.)
Highest elevation =  361.000(Ft.)
Lowest elevation =  359.000(Ft.)
Elevation difference =    2.000(Ft.) Slope =  0.589 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.21 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  60.000^.5)/(   1.000^(1/3)]=   3.21
The initial area total distance of  339.34 (Ft.) entered leaves a
remaining distance of  279.34 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.52 minutes
for a distance of 279.34 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.79(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.517 Minutes
Tt=[(11.9*0.0529^3)/(  2.79)]^.385=  3.52
Total initial area Ti =   3.21 minutes from Figure 3-3 formula plus
  3.52 minutes from the Figure 3-4 formula =   6.72 minutes
Rainfall intensity (I) =      7.618(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      1.326(CFS)
Total initial stream area =        0.200(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.200 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   360.000(Ft.)
Downstream point/station elevation =   355.500(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.326(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.326(CFS)
Normal flow depth in pipe =    2.09(In.)
Flow top width inside pipe =   13.54(In.)
Critical Depth =    4.76(In.)
Pipe flow velocity =      9.93(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.76 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.200 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.200(Ac.)
Runoff from this stream =      1.326(CFS)
Time of concentration =    6.76 min.
Rainfall intensity =     7.589(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        1.716     12.96           4.990
2        1.326      6.76           7.589
Qmax(1) =
           1.000 *    1.000 *     1.716) +
           0.658 *    1.000 *     1.326) + =       2.587
Qmax(2) =
           1.000 *    0.522 *     1.716) +
           1.000 *    1.000 *     1.326) + =       2.221

Total of 2 main streams to confluence:
Flow rates before confluence point:
       1.716       1.326
Maximum flow rates at confluence using above data:
       2.587       2.221
Area of streams before confluence:
       0.730       0.200


Results of confluence:
Total flow rate =      2.587(CFS)
Time of concentration =    12.955 min.
Effective stream area after confluence  =      0.930(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       61.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   355.500(Ft.)
Downstream point/station elevation =   355.000(Ft.)
Pipe length  =    36.78(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.587(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.587(CFS)
Normal flow depth in pipe =    5.45(In.)
Flow top width inside pipe =   20.11(In.)
Critical Depth =    6.71(In.)
Pipe flow velocity =      4.82(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    13.08 min.
End of computations, total study area =          0.930 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/12/12
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH (FIRE STATION)
 100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
 BIO-RETENTION POND 5
------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       77.100 to Point/Station       77.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.700
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(Neighborhod Commercial )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.763
Initial subarea total flow distance  =  207.750(Ft.)
Highest elevation =  368.000(Ft.)
Lowest elevation =  365.000(Ft.)
Elevation difference =    3.000(Ft.) Slope =  1.444 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 Neighborhod Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.17 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7630)*(  75.000^.5)/(   2.000^(1/3)]=   4.17
The initial area total distance of  207.75 (Ft.) entered leaves a
remaining distance of  132.75 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.52 minutes
for a distance of 132.75 (Ft.) and a slope of  2.00 %
with an elevation difference of   2.66(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.519 Minutes
Tt=[(11.9*0.0251^3)/(  2.66)]^.385=  1.52
Total initial area Ti =   4.17 minutes from Figure 3-3 formula plus
  1.52 minutes from the Figure 3-4 formula =   5.69 minutes
Rainfall intensity (I) =      8.486(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.763
Subarea runoff =      2.914(CFS)
Total initial stream area =        0.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       77.200 to Point/Station       62.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   362.000(Ft.)
Downstream point/station elevation =   361.500(Ft.)
Pipe length  =   246.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.914(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.914(CFS)
Normal flow depth in pipe =   11.20(In.)
Flow top width inside pipe =   17.45(In.)
Critical Depth =    7.78(In.)
Pipe flow velocity =      2.52(Ft/s)
Travel time through pipe =    1.63 min.
Time of concentration (TC) =     7.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       77.200 to Point/Station       62.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.450(Ac.)
Runoff from this stream =      2.914(CFS)
Time of concentration =    7.31 min.
Rainfall intensity =     7.215(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.100 to Point/Station       78.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(Neighborhod Commercial )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.760
Initial subarea total flow distance  =  154.200(Ft.)
Highest elevation =  366.000(Ft.)
Lowest elevation =  364.000(Ft.)
```

```
Elevation difference =    2.000(Ft.) Slope =  1.297 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 Neighborhod Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.74 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7600)*(  60.000^.5)/(   1.000^(1/3)]=   4.74
The initial area total distance of  154.20 (Ft.) entered leaves a
remaining distance of   94.20 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.52 minutes
for a distance of  94.20 (Ft.) and a slope of  1.00 %
with an elevation difference of   0.94(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.523 Minutes
Tt=[(11.9*0.0178^3)/(  0.94)]^.385=  1.52
Total initial area Ti =   4.74 minutes from Figure 3-3 formula plus
  1.52 minutes from the Figure 3-4 formula =   6.26 minutes
Rainfall intensity (I) =      7.975(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
Subarea runoff =      1.758(CFS)
Total initial stream area =        0.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.200 to Point/Station       62.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   362.000(Ft.)
Downstream point/station elevation =   361.500(Ft.)
Pipe length  =    15.06(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.758(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.758(CFS)
Normal flow depth in pipe =    4.61(In.)
Flow top width inside pipe =   11.67(In.)
Critical Depth =    6.77(In.)
Pipe flow velocity =      6.33(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.200 to Point/Station       62.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.290(Ac.)
Runoff from this stream =      1.758(CFS)
Time of concentration =    6.30 min.
Rainfall intensity =     7.942(In/Hr)
```

```
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.914      7.31           7.215
2        1.758      6.30           7.942
Qmax(1) =
           1.000 *    1.000 *     2.914) +
           0.908 *    1.000 *     1.758) + =       4.510
Qmax(2) =
           1.000 *    0.862 *     2.914) +
           1.000 *    1.000 *     1.758) + =       4.268

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.914       1.758
Maximum flow rates at confluence using above data:
       4.510       4.268
Area of streams before confluence:
       0.450       0.290


Results of confluence:
Total flow rate =      4.510(CFS)
Time of concentration =     7.315 min.
Effective stream area after confluence  =      0.740(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.000 to Point/Station       63.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   361.500(Ft.)
Downstream point/station elevation =   361.000(Ft.)
Pipe length  =    49.01(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.510(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.510(CFS)
Normal flow depth in pipe =    8.89(In.)
Flow top width inside pipe =   18.00(In.)
Critical Depth =    9.77(In.)
Pipe flow velocity =      5.18(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =     7.47 min.
End of computations, total study area =           0.740 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/12/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH
 100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
 BIO-RETENTION POND 5
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       79.200 to Point/Station       64.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.700
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.100
[UNDISTURBED NATURAL TERRAIN                    ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.225
Initial subarea total flow distance  =  715.730(Ft.)
Highest elevation =  368.000(Ft.)
Lowest elevation =  355.000(Ft.)
Elevation difference =   13.000(Ft.) Slope =  1.816 %
Top of Initial Area Slope adjusted by User to  3.000 %
Bottom of Initial Area Slope adjusted by User to  0.300 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   3.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =  10.92 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2250)*( 100.000^.5)/(   3.000^(1/3)]=  10.92
The initial area total distance of  715.73 (Ft.) entered leaves a
remaining distance of  615.73 (Ft.)
Using Figure 3-4, the travel time for this distance is  10.27 minutes
for a distance of 615.73 (Ft.) and a slope of  0.30 %
with an elevation difference of   1.85(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =   10.274 Minutes
Tt=[(11.9*0.1166^3)/(  1.85)]^.385= 10.27
Total initial area Ti =  10.92 minutes from Figure 3-3 formula plus
 10.27 minutes from the Figure 3-4 formula =  21.19 minutes
Rainfall intensity (I) =      3.633(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.225
Subarea runoff =      1.741(CFS)
Total initial stream area =        2.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       79.200 to Point/Station       64.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.130(Ac.)
Runoff from this stream =      1.741(CFS)
Time of concentration =   21.19 min.
Rainfall intensity =     3.633(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       64.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.850
Decimal fraction soil group B = 0.150
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                         ]
(Neighborhod Commercial )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.762
Rainfall intensity (I) =      7.118(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   7.47 min.  Rain intensity =       7.12(In/Hr)
Total area =        0.740(Ac.)  Total runoff =     4.510(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       64.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.740(Ac.)
Runoff from this stream =      4.510(CFS)
Time of concentration =    7.47 min.
Rainfall intensity =     7.118(In/Hr)
Program is now starting with Main Stream No. 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       64.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.270
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.330
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.457
Rainfall intensity (I) =      4.959(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  13.08 min.  Rain intensity =       4.96(In/Hr)
Total area =        0.930(Ac.)  Total runoff =     2.587(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       64.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.930(Ac.)
Runoff from this stream =      2.587(CFS)
Time of concentration =   13.08 min.
Rainfall intensity =     4.959(In/Hr)
Program is now starting with Main Stream No. 4


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       59.000 to Point/Station       64.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.160
Decimal fraction soil group B = 0.610
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.230
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.460
Rainfall intensity (I) =      4.139(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  17.31 min.  Rain intensity =       4.14(In/Hr)
Total area =       37.040(Ac.)  Total runoff =    61.684(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       59.000 to Point/Station       64.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 4
Stream flow area =     37.040(Ac.)
Runoff from this stream =     61.684(CFS)
Time of concentration =   17.31 min.
Rainfall intensity =     4.139(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        1.741     21.19           3.633
2        4.510      7.47           7.118
3        2.587     13.08           4.959
4       61.684     17.31           4.139
Qmax(1) =
           1.000 *    1.000 *     1.741) +
           0.510 *    1.000 *     4.510) +
           0.732 *    1.000 *     2.587) +
           0.878 *    1.000 *    61.684) + =      60.071
Qmax(2) =
           1.000 *    0.352 *     1.741) +
           1.000 *    1.000 *     4.510) +
           1.000 *    0.571 *     2.587) +
           1.000 *    0.432 *    61.684) + =      33.220
Qmax(3) =

           1.000 *    0.617 *     1.741) +
           0.697 *    1.000 *     4.510) +
           1.000 *    1.000 *     2.587) +
           1.000 *    0.756 *    61.684) + =      53.414
Qmax(4) =
           1.000 *    0.817 *     1.741) +
           0.582 *    1.000 *     4.510) +
           0.835 *    1.000 *     2.587) +
           1.000 *    1.000 *    61.684) + =      67.888

Total of 4 main streams to confluence:
Flow rates before confluence point:
       1.741       4.510       2.587      61.684
Maximum flow rates at confluence using above data:
       60.071      33.220      53.414      67.888
Area of streams before confluence:
        2.130       0.740       0.930      37.040


Results of confluence:
Total flow rate =     67.888(CFS)
Time of concentration =    17.310 min.
Effective stream area after confluence  =     40.840(Ac.)
```

++
Process from Point/Station 64.000 to Point/Station 64.000
**** 6 HOUR HYDROGRAPH ****

++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration = 17.31
Basin Area = 40.84 Acres
6 Hour Rainfall = 3.500 Inches
Runoff Coefficient = 0.453
Peak Discharge = 67.89 CFS

Time (Min)	Discharge (CFS)
0	0.000
17	3.920
34	4.048
51	4.341
68	4.509
85	4.901
102	5.132
119	5.692
136	6.037
153	6.920
170	7.503
187	9.170
204	10.445
221	15.337
238	21.609
255	67.888
272	12.301
289	8.230
306	6.440
323	5.394
340	4.695
357	4.188
374	3.801

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\5508RPL4-100 YR-BMP 5.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: **NODE 64**
5508rpl4 - Detention Pond - BMP 5

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01

********** RUNOFF HYDROGRAPHS **********

HYD 5..... 100
Read HYG 3.01

********** POND VOLUMES **********

DETENTION 5..... Vol: Elev-Area 4.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 5.01

********** POND ROUTING **********

DETENTION 5..... Pond E-V-Q Table 6.01

Table of Contents (continued)

DETENTION 5 OUT 100
Pond Routing Summary 6.04
Detention Time 6.05

S/N:
PondPack Ver: Compute Time: Date:

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
DETENTION 5 IN	POND	100	224899		255.00	67.89		
DETENTION 5 OUT	POND	100	205289	R	266.00	30.84	357.52	140623
HYD 5	HYG	100	225013	R	255.00	67.89		
*OUT 1 - N89	JCT	100	205288	R	266.00	30.84		

S/N:
PondPack Ver: Compute Time: Date:

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID		Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
DETENTION 5	IN	POND	224899		255.00	67.89	
DETENTION 5	OUT	POND	205289	R	266.00	30.84	357.52
HYD 5		HYG	225013	R	255.00	67.89	
Outfall OUT 1 - N89		JCT	205288	R	266.00	30.84	

S/N:
PondPack Ver: Compute Time: Date:

```
HYG file =
HYG ID   = HYG 5
HYG Tag  = N-64
-----------------------------------
Peak Discharge =        67.89 cfs
Time to Peak   =       255.00 min
HYG Volume     =       225013 cu.ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 17.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	3.92	4.05	4.34	4.51
85.00	4.90	5.13	5.69	6.04	6.92
170.00	7.50	9.17	10.45	15.34	21.61
255.00	67.89	12.30	8.23	6.44	5.39
340.00	4.70	4.19	3.80		

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\5508RPL4-100 YR-BMP 5.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
355.00	-----	50800	0	0	0
356.00	-----	54650	158140	52713	52713
358.00	-----	62800	176033	117356	170069
360.00	-----	71600	201456	134304	304373

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\5508RPL4-100 YR-BMP 5.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 355.00 ft
Increment = .10 ft
Max. Elev.= 360.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Circular	O0	--->	CV	356.250	360.000
Stand Pipe	RP	--->	CV	357.150	360.000
Orifice-Circular	O1	--->	CV	355.000	360.000
Culvert-Circular	CV	--->	TW	350.800	360.000
TW SETUP, DS Channel					

S/N:
PondPack Ver: Compute Time: Date:

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = O0
Structure Type    = Orifice-Circular
-----------------------------------
# of Openings     =         5
Invert Elev.      =    356.25 ft
Diameter          =    1.0000 ft
Orifice Coeff.    =      .600


Structure ID      = RP
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    357.15 ft
Diameter          =    5.5000 ft
Orifice Area      =   23.7583 sq.ft
Orifice Coeff.    =      .600
Weir Length       =     17.28 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No


Structure ID      = O1
Structure Type    = Orifice-Circular
-----------------------------------
# of Openings     =         3
Invert Elev.      =    355.00 ft
Diameter          =     .3330 ft
Orifice Coeff.    =      .600
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\5508RPL4-100 YR-BMP 5.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CV
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         1
Barrel Diameter   =    3.0000 ft
Upstream Invert   =    350.80 ft
Dnstream Invert   =    350.00 ft
Horiz. Length     =    108.83 ft
Barrel Length     =    108.83 ft
Barrel Slope      =    .00735 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .007228  (per ft of full flow)
Kr                =     .5000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0078
Inlet Control M   =    2.0000
Inlet Control c   =    .03790
Inlet Control Y   =     .6900
T1 ratio (HW/D)   =     1.132
T2 ratio (HW/D)   =     1.293
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    354.20 ft  --->  Flow =     42.85 cfs
At T2 Elev =    354.68 ft  --->  Flow =     48.97 cfs
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = TW
Structure Type     = TW SETUP, DS Channel
-----------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID:   Chn-Trapz - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\5508RPL4-100 YR-BMP 5.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID: Chn-Trapz - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

TRAPEZOIDAL CROSS SECTION

Slope = .003300 ft/ft
Mannings n = 0.02200
Invert Elev. = 349.00 ft
Top of Channel = 352.50 ft
Base width = 12.00 ft
Rt Side slope = 3.000 horizontal :1 vert.
Lt Side slope = 3.000 horizontal :1 vert.

Name.... DETENTION 5
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\5508RPL4-100 YR-BMP 5.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\
Inflow HYG file = NONE STORED - DETENTION 5 IN 100
Outflow HYG file = NONE STORED - DETENTION 5 OUT 100

Pond Node Data = DETENTION 5
Pond Volume Data = DETENTION 5
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 355.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
355.00	.00	0	50800	.00	.00	.00
355.10	.06	5099	51179	.12	.18	170.15
355.20	.20	10236	51559	.12	.32	341.54
355.30	.42	15410	51940	.12	.54	514.20
355.40	.61	20624	52323	.12	.73	688.18
355.50	.72	25875	52707	.12	.85	863.36
355.60	.83	31166	53093	.12	.95	1039.81
355.70	.92	36495	53480	.12	1.04	1217.53
355.80	1.00	41861	53869	.12	1.13	1396.48
355.90	1.08	47268	54259	.13	1.20	1576.78
356.00	1.15	52713	54650	.13	1.27	1758.38
356.10	1.21	58198	55044	.13	1.34	1941.28
356.20	1.28	63723	55440	.13	1.41	2125.50
356.25	1.31	66499	55638	.13	1.44	2218.07
356.30	1.38	69285	55836	.13	1.51	2311.01
356.40	1.77	74889	56235	.13	1.90	2498.20
356.50	2.47	80533	56634	.13	2.60	2687.03
356.60	3.47	86217	57036	.13	3.60	2877.48
356.70	4.69	91941	57438	.13	4.82	3069.51
356.80	6.15	97703	57842	.13	6.29	3263.06

S/N:
PondPack Ver: Compute Time: Date:

Name.... DETENTION 5
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\5508RPL4-100 YR-BMP 5.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\
Inflow HYG file = NONE STORED - DETENTION 5 IN 100
Outflow HYG file = NONE STORED - DETENTION 5 OUT 100

Pond Node Data = DETENTION 5
Pond Volume Data = DETENTION 5
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 355.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
356.90	7.81	103508	58247	.13	7.94	3458.21
357.00	9.64	109354	58654	.14	9.77	3654.89
357.10	11.61	115240	59062	.14	11.75	3853.07
357.15	12.62	118197	59267	.14	12.76	3952.66
357.20	14.26	121167	59472	.14	14.40	4053.28
357.30	18.96	127133	59883	.14	19.10	4256.86
357.40	23.82	133142	60296	.14	23.96	4462.03
357.50	29.39	139193	60709	.14	29.53	4669.29
357.60	35.58	145285	61125	.14	35.72	4878.54
357.70	42.27	151419	61541	.14	42.42	5089.70
357.80	49.46	157592	61959	.14	49.60	5302.67
357.90	57.03	163810	62379	.14	57.17	5517.48
358.00	64.80	170069	62800	.15	64.95	5733.90
358.10	72.34	176371	63226	.15	72.48	5951.49
358.20	76.63	182715	63654	.15	76.78	6167.26
358.30	80.54	189100	64083	.15	80.69	6384.02
358.40	83.90	195531	64514	.15	84.05	6601.72
358.50	86.14	202004	64946	.15	86.29	6819.74
358.60	86.99	208521	65379	.15	87.14	7037.81
358.70	87.75	215081	65814	.15	87.90	7257.24

Name.... DETENTION 5
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\5508RPL4-100 YR-BMP 5.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\
Inflow HYG file = NONE STORED - DETENTION 5 IN 100
Outflow HYG file = NONE STORED - DETENTION 5 OUT 100

Pond Node Data = DETENTION 5
Pond Volume Data = DETENTION 5
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 355.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
358.80	88.50	221682	66251	.15	88.65	7478.05
358.90	89.24	228330	66689	.15	89.39	7700.37
359.00	89.98	235021	67128	.16	90.13	7924.15
359.10	90.71	241756	67569	.16	90.86	8149.38
359.20	91.43	248535	68011	.16	91.59	8376.09
359.30	92.15	255357	68454	.16	92.31	8604.19
359.40	92.86	262225	68899	.16	93.02	8833.84
359.50	93.57	269138	69346	.16	93.73	9064.97
359.60	94.27	276095	69794	.16	94.43	9297.59
359.70	94.96	283098	70243	.16	95.12	9531.69
359.80	95.65	290143	70694	.16	95.82	9767.22
359.90	96.34	297235	71146	.16	96.51	10004.33
360.00	97.02	304373	71600	.17	97.19	10242.93

S/N:
PondPack Ver: Compute Time: Date:

LEVEL POOL ROUTING SUMMARY

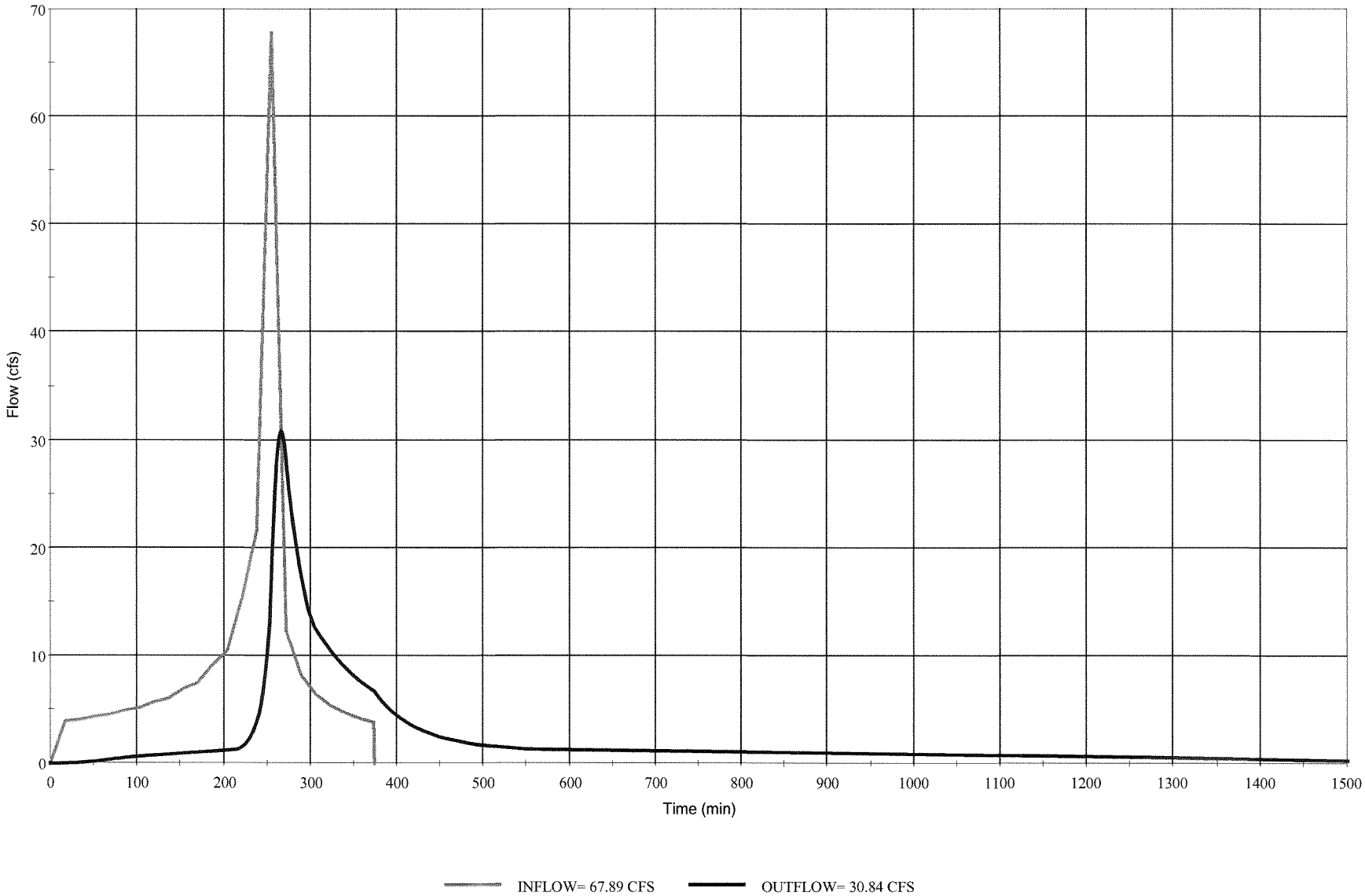
```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 5\
Inflow  HYG file = NONE STORED - DETENTION 5  IN  100
Outflow HYG file = NONE STORED - DETENTION 5  OUT 100

Pond Node   Data = DETENTION 5
Pond Volume Data = DETENTION 5
Pond Outlet Data = Outlet 1

Infiltration =    .1000 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   355.00 ft
Starting Volume    =        0 cu.ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =     1.00 min


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =     67.89 cfs    at    255.00 min
Peak Outflow      =     30.84 cfs    at    266.00 min
Peak Infiltration =       .14 cfs    at    266.00 min
-----------------------------------------------------
Peak Elevation    =    357.52 ft
Peak Storage =         140623 cu.ft
=====================================================


MASS BALANCE (cu.ft)
--------------------------
+ Initial Vol  =           0
+ HYG Vol IN   =      224899
- Infiltration =       14741
- HYG Vol OUT  =      205289
- Retained Vol =        4868
                  ----------
Unrouted Vol =          -1 cu.ft  (.000% of Inflow Volume)


WARNING: Outflow hydrograph truncated on right side.
```

S/N:
PondPack Ver: Compute Time: Date:

DETENTION TIMES SUMMARY

```
 HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 5\
 Inflow  HYG file = NONE STORED - DETENTION 5  IN  100
 Outflow HYG file = NONE STORED - DETENTION 5  OUT 100

 Pond Node   Data = DETENTION 5
 Pond Volume Data = DETENTION 5
 Pond Outlet Data = Outlet 1

 Infiltration =    .1000 in/hr

 APPROXIMATE DETENTION TIME
 --------------------------------------
 Tp, Outflow + Infilt.   =    266.00 min
 Tp, Total Inflow        =    255.00 min
 Peak to Peak            =     11.00 min

 Qout+Infilt. Centroid   =    524.94 min
 Inflow Centroid         =    219.43 min
 Centroid to Centroid    =    305.51 min

 Weighted Avg. Plug Time =    342.04 min
 Max.Plug Vol. Plug Time =    208.37 min
 Max.Inflow Plug Volume  =      3992 cu.ft   (From 254.00 to 255.00 min)
 --------------------------------------
```

NODE 64 - DETENTION POND - BMP 5
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



Bio-Retention Pond-6

Bio-Retention Pond-6

100-year Development Conditions

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/14/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH
 100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
 BIO-RETENTION POND 6
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       95.100 to Point/Station       95.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  666.240(Ft.)
Highest elevation =  382.000(Ft.)
Lowest elevation =  376.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  0.901 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  666.24 (Ft.) entered leaves a
remaining distance of  586.24 (Ft.)
Using Figure 3-4, the travel time for this distance is   6.22 minutes
for a distance of 586.24 (Ft.) and a slope of  1.00 %
with an elevation difference of   5.86(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    6.223 Minutes
Tt=[(11.9*0.1110^3)/(  5.86)]^.385=  6.22
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  6.22 minutes from the Figure 3-4 formula =  14.53 minutes
Rainfall intensity (I) =      4.634(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.899(CFS)
Total initial stream area =        1.390(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       95.200 to Point/Station       73.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   371.500(Ft.)
Downstream point/station elevation =   370.500(Ft.)
Pipe length  =   266.68(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.899(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.899(CFS)
Normal flow depth in pipe =    8.03(In.)
Flow top width inside pipe =   22.65(In.)
Critical Depth =    7.13(In.)
Pipe flow velocity =      3.15(Ft/s)
Travel time through pipe =    1.41 min.
Time of concentration (TC) =    15.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       95.200 to Point/Station       73.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.390(Ac.)
Runoff from this stream =      2.899(CFS)
Time of concentration =   15.94 min.
Rainfall intensity =     4.365(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       96.100 to Point/Station       96.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  413.050(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  374.000(Ft.)
```

```
Elevation difference =    4.000(Ft.) Slope =  0.968 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.79 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  70.000^.5)/(   1.000^(1/3)]=   9.79
The initial area total distance of  413.05 (Ft.) entered leaves a
remaining distance of  343.05 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.12 minutes
for a distance of 343.05 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.43(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.119 Minutes
Tt=[(11.9*0.0650^3)/(  3.43)]^.385=  4.12
Total initial area Ti =   9.79 minutes from Figure 3-3 formula plus
  4.12 minutes from the Figure 3-4 formula =  13.91 minutes
Rainfall intensity (I) =      4.767(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      1.888(CFS)
Total initial stream area =        0.880(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       96.200 to Point/Station       73.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   371.000(Ft.)
Downstream point/station elevation =   370.500(Ft.)
Pipe length  =    36.16(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     1.888(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     1.888(CFS)
Normal flow depth in pipe =    4.64(In.)
Flow top width inside pipe =   18.96(In.)
Critical Depth =    5.70(In.)
Pipe flow velocity =      4.43(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    14.04 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       96.200 to Point/Station       73.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.880(Ac.)
Runoff from this stream =      1.888(CFS)
Time of concentration =   14.04 min.
Rainfall intensity =     4.737(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station       97.100 to Point/Station       97.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.100
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.457
Initial subarea total flow distance  =  347.029(Ft.)
Highest elevation =  386.000(Ft.)
Lowest elevation =  374.000(Ft.)
Elevation difference =   12.000(Ft.) Slope =  3.458 %
Top of Initial Area Slope adjusted by User to  6.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.37 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4570)*( 100.000^.5)/(   6.000^(1/3)]=   6.37
The initial area total distance of  347.03 (Ft.) entered leaves a
remaining distance of  247.03 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.20 minutes
for a distance of 247.03 (Ft.) and a slope of  1.00 %
with an elevation difference of   2.47(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.199 Minutes
Tt=[(11.9*0.0468^3)/(  2.47)]^.385=  3.20
Total initial area Ti =   6.37 minutes from Figure 3-3 formula plus
  3.20 minutes from the Figure 3-4 formula =   9.57 minutes
Rainfall intensity (I) =      6.067(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.457
Subarea runoff =      2.773(CFS)
Total initial stream area =        1.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       97.200 to Point/Station       73.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   371.000(Ft.)
Downstream point/station elevation =   370.500(Ft.)
Pipe length  =     9.91(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.773(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.773(CFS)
Normal flow depth in pipe =    4.08(In.)
Flow top width inside pipe =   18.04(In.)
Critical Depth =    6.96(In.)
Pipe flow velocity =      7.82(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     9.59 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       97.200 to Point/Station       73.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =       1.000(Ac.)
Runoff from this stream =       2.773(CFS)
Time of concentration =     9.59 min.
Rainfall intensity =     6.059(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.899     15.94          4.365
2        1.888     14.04          4.737
3        2.773      9.59          6.059
Qmax(1) =
           1.000 *    1.000 *     2.899) +
           0.922 *    1.000 *     1.888) +
           0.720 *    1.000 *     2.773) + =       6.636
Qmax(2) =
           1.000 *    0.881 *     2.899) +
           1.000 *    1.000 *     1.888) +
           0.782 *    1.000 *     2.773) + =       6.609
Qmax(3) =
           1.000 *    0.602 *     2.899) +
           1.000 *    0.683 *     1.888) +
           1.000 *    1.000 *     2.773) + =       5.805

Total of 3 main streams to confluence:
Flow rates before confluence point:
      2.899       1.888       2.773
Maximum flow rates at confluence using above data:
       6.636       6.609       5.805
Area of streams before confluence:
       1.390       0.880       1.000


Results of confluence:
Total flow rate =       6.636(CFS)
Time of concentration =     15.942 min.
Effective stream area after confluence  =      3.270(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.000 to Point/Station       74.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   370.500(Ft.)
Downstream point/station elevation =   370.000(Ft.)
Pipe length  =   142.31(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     6.636(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     6.636(CFS)
Normal flow depth in pipe =   13.00(In.)
Flow top width inside pipe =   23.92(In.)
Critical Depth =   10.96(In.)
Pipe flow velocity =      3.82(Ft/s)
Travel time through pipe =    0.62 min.
Time of concentration (TC) =    16.56 min.
End of computations, total study area =           3.270 (Ac.)
```

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/14/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 WARNER RANCH
 100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
 BIO-RETENTION POND 6
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       98.100 to Point/Station       75.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.500
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  663.000(Ft.)
Highest elevation =  391.000(Ft.)
Lowest elevation =  370.000(Ft.)
Elevation difference =   21.000(Ft.) Slope =  3.167 %
Top of Initial Area Slope adjusted by User to  3.500 %
Bottom of Initial Area Slope adjusted by User to  2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   3.50 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.44 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  80.000^.5)/(   3.500^(1/3)]=   2.44
The initial area total distance of  663.00 (Ft.) entered leaves a
remaining distance of  583.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.75 minutes
for a distance of 583.00 (Ft.) and a slope of  2.00 %
with an elevation difference of  11.66(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.745 Minutes
Tt=[(11.9*0.1104^3)/( 11.66)]^.385=  4.75
Total initial area Ti =   2.44 minutes from Figure 3-3 formula plus
  4.75 minutes from the Figure 3-4 formula =   7.18 minutes
Rainfall intensity (I) =      7.299(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      5.398(CFS)
Total initial stream area =        0.850(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       98.100 to Point/Station       75.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.850(Ac.)
Runoff from this stream =      5.398(CFS)
Time of concentration =    7.18 min.
Rainfall intensity =     7.299(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       74.000 to Point/Station       75.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.950
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.050
[MEDIUM DENSITY RESIDENTIAL                  ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.454
Rainfall intensity (I) =      4.259(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  16.56 min.  Rain intensity =       4.26(In/Hr)
Total area =        3.270(Ac.)  Total runoff =     6.636(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       74.000 to Point/Station       75.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       3.270(Ac.)
Runoff from this stream =       6.636(CFS)
Time of concentration =   16.56 min.
Rainfall intensity =     4.259(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        5.398      7.18           7.299
2        6.636     16.56           4.259
Qmax(1) =
           1.000 *    1.000 *     5.398) +
           1.000 *    0.434 *     6.636) + =       8.277
Qmax(2) =
           0.584 *    1.000 *     5.398) +
           1.000 *    1.000 *     6.636) + =       9.786

Total of 2 main streams to confluence:
Flow rates before confluence point:
       5.398       6.636
Maximum flow rates at confluence using above data:
        8.277        9.786
Area of streams before confluence:
        0.850        3.270


Results of confluence:
Total flow rate =      9.786(CFS)
Time of concentration =    16.560 min.
Effective stream area after confluence  =      4.120(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       75.000
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =  16.56
Basin Area =     4.12 Acres
6 Hour Rainfall =  3.500 Inches
Runoff Coefficient =  0.539
Peak Discharge =     9.79 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       16               0.461
       32               0.490
       48               0.506
       64               0.542
       80               0.563
       96               0.612
       112               0.641
       128               0.711
       144               0.754
       160               0.865
       176               0.937
       192               1.146
       208               1.305
       224               1.916
       240               2.700
       256               9.786
       272               1.537
       288               1.028
       304               0.805
       320               0.674
       336               0.587
       352               0.523
       368               0.475
```

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: **NODE 75**
5508rpl4 - Bioretention - BMP 6

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01

********** RUNOFF HYDROGRAPHS **********

HYD 6..... 100
Read HYG 3.01

********** POND VOLUMES **********

BIORETENTION6... Vol: Elev-Area 4.01
Vol: Void Adjustments 4.02

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 5.01

********** POND ROUTING **********

BIORETENTION6... Pond E-V-Q Table 6.01

Table of Contents (continued)

BIORETENTION6OUT 100
Pond Routing Summary 6.05
Detention Time 6.06

S/N:
PondPack Ver: Compute Time: Date:

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
BIORETENTION6IN	POND	100	28139		256.00	9.79		
BIORETENTION6OUT	POND	100	15167		264.00	5.38	371.91	15623
HYD 6	HYG	100	28153	R	256.00	9.79		
*OUT 6 - N81	JCT	100	15167		264.00	5.38		

S/N:
PondPack Ver: Compute Time: Date:

Type.... Executive Summary (Nodes) Page 2.01
Name.... Watershed Event: 100 yr
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\
Storm... 100 Tag: 100

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
BIORETENTION6IN	POND	28139		256.00	9.79	
BIORETENTION6OUT	POND	15167		264.00	5.38	371.91
HYD 6	HYG	28153	R	256.00	9.79	
Outfall OUT 6 - N81	JCT	15167		264.00	5.38	

S/N:
PondPack Ver: Compute Time: Date:

HYG file =
HYG ID = HYG 6
HYG Tag = N-75

Peak Discharge = 9.79 cfs
Time to Peak = 256.00 min
HYG Volume = 28153 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 16.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	.46	.49	.51	.54
80.00	.56	.61	.64	.71	.75
160.00	.87	.94	1.15	1.31	1.92
240.00	2.70	9.79	1.54	1.03	.81
320.00	.67	.59	.52	.48	

S/N:
PondPack Ver: Compute Time: Date:

Name.... BIORETENTION6

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
369.00	-----	6200	0	0	0
370.50	-----	6200	18600	9300	9300
371.00	-----	7600	20664	3444	12744
372.00	-----	10500	27033	9011	21755

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

VOLUME COMPLETELY FILLED WITH MATERIAL
(Adjust Volumes for Voids)

Void Spaces = 75.00000 %

HW Elv, ft	Total, cu.ft	Adjusted,cu.ft
369.00	0	0
370.50	9300	6975
371.00	12744	9558
372.00	21755	16316

S/N:
PondPack Ver: Compute Time: Date:

Name.... Outlet 1

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 369.00 ft
Increment = .05 ft
Max. Elev.= 372.00 ft

```
*********************************************
                OUTLET CONNECTIVITY
*********************************************

 ---> Forward Flow Only (UpStream to DnStream)
<---  Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed
```

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	R2	--->	CV	371.250	372.000
Stand Pipe	R0	--->	CV	371.250	372.000
Stand Pipe	R3	--->	CV	371.250	372.000
Stand Pipe	RP	--->	CV	371.250	372.000
Stand Pipe	R1	--->	CV	371.250	372.000
Culvert-Circular	CV	--->	TW	365.000	372.000
Stand Pipe	R4	--->	TW	371.250	372.000
Stand Pipe	R5	--->	TW	371.250	372.000
TW SETUP, DS Channel					

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R2
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    371.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = R0
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    371.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = R3
Structure Type     = Stand Pipe
------------------------------------
# of Openings      =         1
Invert Elev.       =    371.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

```
Structure ID       = RP
Structure Type     = Stand Pipe
------------------------------------
# of Openings      =         1
Invert Elev.       =    371.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R1
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    371.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = CV
Structure Type     = Culvert-Circular
-----------------------------------
No. Barrels        =         1
Barrel Diameter    =    2.0000 ft
Upstream Invert    =    365.00 ft
Dnstream Invert    =    359.53 ft
Horiz. Length      =     54.78 ft
Barrel Length      =     55.05 ft
Barrel Slope       =    .09985 ft/ft

OUTLET CONTROL DATA...
Mannings n         =     .0130
Ke                 =     .5000  (forward entrance loss)
Kb                 =   .012411  (per ft of full flow)
Kr                 =     .5000  (reverse entrance loss)
HW Convergence     =      .001  +/- ft

INLET CONTROL DATA...
Equation form      =         1
Inlet Control K    =     .0078
Inlet Control M    =    2.0000
Inlet Control c    =    .03790
Inlet Control Y    =     .6900
T1 ratio (HW/D)    =     1.086
T2 ratio (HW/D)    =     1.246
Slope Factor       =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    367.17 ft  --->  Flow =     15.55 cfs
At T2 Elev =    367.49 ft  --->  Flow =     17.77 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R4
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    371.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
Orifice H to crest= Yes
```

```
Structure ID      = R5
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    371.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
Orifice H to crest= Yes
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
-----------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID:   Chn-Cir - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID: Chn-Cir - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

CIRCULAR CROSS SECTION

Slope = .014900 ft/ft
Mannings n = 0.01300
Invert Elev. = 359.53 ft
Top of Channel = 365.03 ft
Diameter = 5.5000 ft

Type.... Pond E-V-Q Table
Name.... BIORETENTION6
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\
Inflow HYG file = NONE STORED - BIORETENTION6IN 100
Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
Pond Volume Data = BIORETENTION6
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 369.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
369.00	.00	0	6200	.00	.00	.00
369.05	.00	232	6200	.07	.07	7.82
369.10	.00	465	6200	.07	.07	15.57
369.15	.00	697	6200	.07	.07	23.32
369.20	.00	930	6200	.07	.07	31.07
369.25	.00	1163	6200	.07	.07	38.82
369.30	.00	1395	6200	.07	.07	46.57
369.35	.00	1628	6200	.07	.07	54.32
369.40	.00	1860	6200	.07	.07	62.07
369.45	.00	2093	6200	.07	.07	69.82
369.50	.00	2325	6200	.07	.07	77.57
369.55	.00	2557	6200	.07	.07	85.32
369.60	.00	2790	6200	.07	.07	93.07
369.65	.00	3022	6200	.07	.07	100.82
369.70	.00	3255	6200	.07	.07	108.57
369.75	.00	3488	6200	.07	.07	116.32
369.80	.00	3720	6200	.07	.07	124.07
369.85	.00	3953	6200	.07	.07	131.82
369.90	.00	4185	6200	.07	.07	139.57
369.95	.00	4418	6200	.07	.07	147.32

S/N:
PondPack Ver: Compute Time: Date:

Name.... BIORETENTION6
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\
Inflow HYG file = NONE STORED - BIORETENTION6IN 100
Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
Pond Volume Data = BIORETENTION6
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 369.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
370.00	.00	4650	6200	.07	.07	155.07
370.05	.00	4882	6200	.07	.07	162.82
370.10	.00	5115	6200	.07	.07	170.57
370.15	.00	5347	6200	.07	.07	178.32
370.20	.00	5580	6200	.07	.07	186.07
370.25	.00	5813	6200	.07	.07	193.82
370.30	.00	6045	6200	.07	.07	201.57
370.35	.00	6278	6200	.07	.07	209.32
370.40	.00	6510	6200	.07	.07	217.07
370.45	.00	6743	6200	.07	.07	224.82
370.50	.00	6975	6200	.07	.07	232.57
370.55	.00	7210	6334	.07	.07	240.40
370.60	.00	7450	6469	.07	.07	248.41
370.65	.00	7695	6605	.08	.08	256.58
370.70	.00	7945	6743	.08	.08	264.93
370.75	.00	8201	6882	.08	.08	273.44
370.80	.00	8462	7023	.08	.08	282.13
370.85	.00	8728	7165	.08	.08	291.00
370.90	.00	8999	7309	.08	.08	300.05
370.95	.00	9276	7454	.09	.09	309.28

Name.... BIORETENTION6
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\
Inflow HYG file = NONE STORED - BIORETENTION6IN 100
Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
Pond Volume Data = BIORETENTION6
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 369.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
371.00	.00	9558	7600	.09	.09	318.69
371.05	.00	9845	7734	.09	.09	328.27
371.10	.00	10138	7869	.09	.09	338.03
371.15	.00	10436	8005	.09	.09	347.95
371.20	.00	10739	8143	.09	.09	358.05
371.25	.00	11046	8281	.10	.10	368.31
371.30	.38	11360	8421	.10	.48	379.13
371.35	1.08	11678	8562	.10	1.18	390.45
371.40	1.99	12002	8704	.10	2.09	402.14
371.45	2.96	12331	8847	.10	3.06	414.09
371.50	3.31	12665	8992	.10	3.41	425.59
371.55	3.62	13005	9137	.11	3.73	437.23
371.60	3.91	13351	9284	.11	4.02	449.04
371.65	4.18	13701	9432	.11	4.29	461.01
371.70	4.44	14058	9581	.11	4.55	473.15
371.75	4.68	14420	9731	.11	4.79	485.46
371.80	4.94	14788	9883	.11	5.05	497.97
371.85	5.13	15161	10035	.12	5.24	510.62
371.90	5.33	15540	10189	.12	5.45	523.46
371.95	5.53	15926	10344	.12	5.65	536.51

S/N:
PondPack Ver: Compute Time: Date:

Name.... BIORETENTION6
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\5508RPL4-100 YR-BMP 6.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\
Inflow HYG file = NONE STORED - BIORETENTION6IN 100
Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
Pond Volume Data = BIORETENTION6
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 369.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
372.00	5.73	16316	10500	.12	5.85	549.73

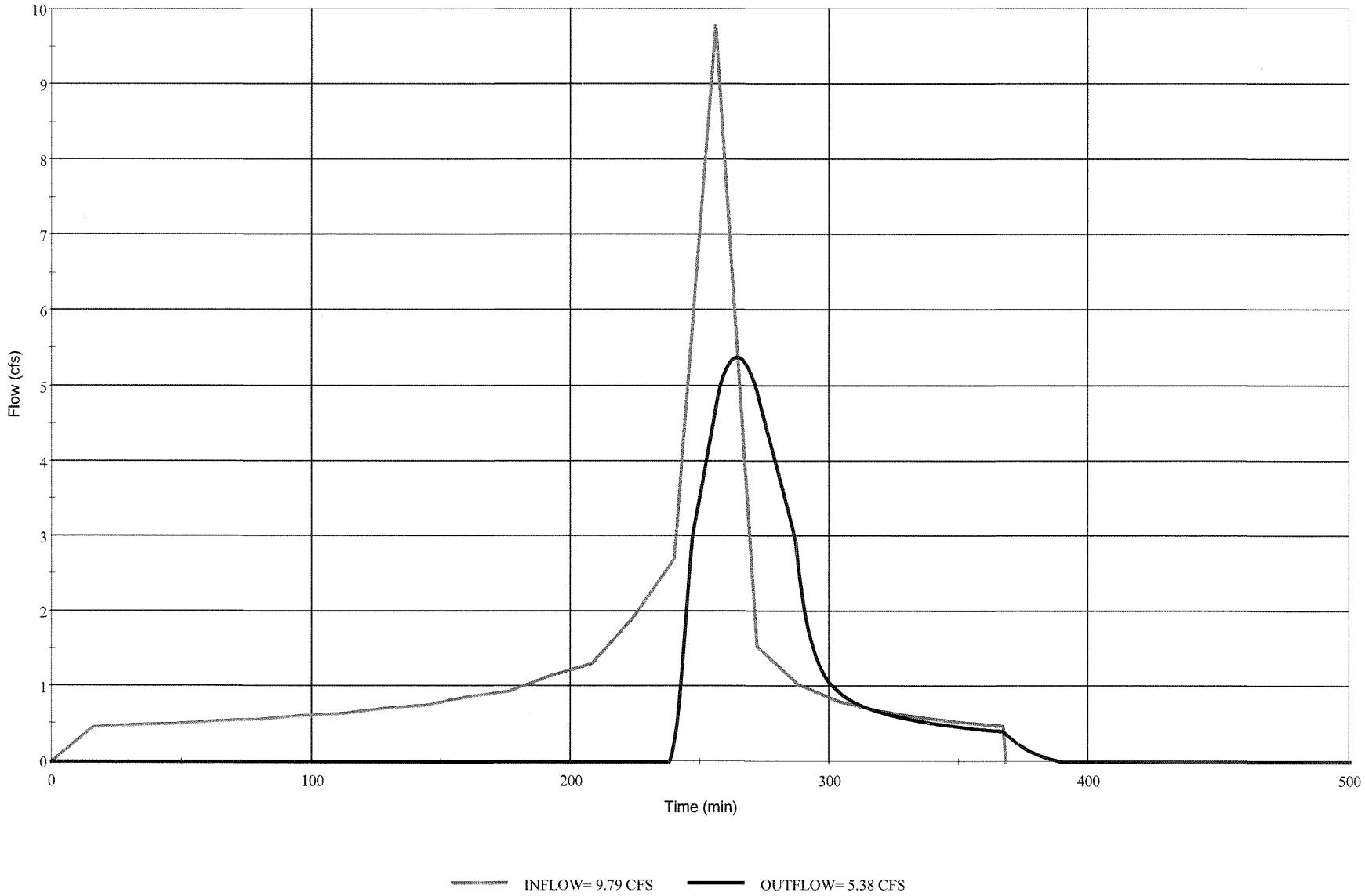
S/N:
PondPack Ver: Compute Time: Date:

```
   Type.... Pond Routing Summary                                    Page 6.05
   Name.... BIORETENTION6OUT   Tag: 100                         Event: 100 yr
   File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP
6\5508RPL4-100 YR-BMP 6.PPW
   Storm... 100   Tag: 100

                       LEVEL POOL ROUTING SUMMARY

    HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 6\
    Inflow  HYG file = NONE STORED - BIORETENTION6IN  100
    Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

    Pond Node   Data = BIORETENTION6
    Pond Volume Data = BIORETENTION6
    Pond Outlet Data = Outlet 1

    Infiltration =    .5000 in/hr

    INITIAL CONDITIONS
    ----------------------------------
    Starting WS Elev   =   369.00 ft
    Starting Volume    =        0 cu.ft
    Starting Outflow   =      .00 cfs
    Starting Infiltr.  =      .00 cfs
    Starting Total Qout=      .00 cfs
    Time Increment     =     1.00 min


    INFLOW/OUTFLOW HYDROGRAPH SUMMARY
    ====================================================
    Peak Inflow       =      9.79 cfs    at    256.00 min
    Peak Outflow      =      5.38 cfs    at    264.00 min
    Peak Infiltration =       .12 cfs    at    264.00 min
    ----------------------------------------------------
    Peak Elevation    =    371.91 ft
    Peak Storage =          15623 cu.ft
    ====================================================


    MASS BALANCE (cu.ft)
    --------------------------
  + Initial Vol  =           0
  + HYG Vol IN   =       28139
  - Infiltration =        9442
  - HYG Vol OUT  =       15167
  - Retained Vol =        3530
                    ----------
    Unrouted Vol = -            cu.ft  (.000% of Inflow Volume)


   S/N:
   PondPack Ver:                  Compute Time:             Date:
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 6\
Inflow  HYG file = NONE STORED - BIORETENTION6IN  100
Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node   Data = BIORETENTION6
Pond Volume Data = BIORETENTION6
Pond Outlet Data = Outlet 1

Infiltration =    .5000 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------
Tp, Outflow + Infilt.   =    264.00 min
Tp, Total Inflow        =    256.00 min
Peak to Peak            =      8.00 min

Qout+Infilt. Centroid   =    541.19 min
Inflow Centroid         =    220.76 min
Centroid to Centroid    =    320.43 min

Weighted Avg. Plug Time =    514.76 min
Max.Plug Vol. Plug Time =    347.34 min
Max.Inflow Plug Volume  =       574 cu.ft   (From 255.00 to 256.00 min)
--------------------------------------
```

NODE 75 - BIORETENTION - BMP 6
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



Bio-Retention Pond-7

100-year Development Conditions

```
        San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/14/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 7
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       99.100 to Point/Station       76.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.700
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[Park and Recreation]
Impervious value, Ai = 0.100
Sub-Area C Value = 0.285
Initial subarea total flow distance  =  785.000(Ft.)
Highest elevation =  374.000(Ft.)
Lowest elevation =  360.000(Ft.)
Elevation difference =   14.000(Ft.) Slope =  1.783 %
Top of Initial Area Slope adjusted by User to  1.430 %
Bottom of Initial Area Slope adjusted by User to  2.270 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.43 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =  10.89 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2850)*(  70.000^.5)/(   1.430^(1/3)]=  10.89
The initial area total distance of  785.00 (Ft.) entered leaves a
remaining distance of  715.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.29 minutes
for a distance of 715.00 (Ft.) and a slope of  2.27 %
with an elevation difference of  16.23(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.289 Minutes
Tt=[(11.9*0.1354^3)/( 16.23)]^.385=  5.29
Total initial area Ti =  10.89 minutes from Figure 3-3 formula plus
  5.29 minutes from the Figure 3-4 formula =  16.18 minutes
Rainfall intensity (I) =      4.323(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.285
Subarea runoff =      3.622(CFS)
Total initial stream area =        2.940(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       99.100 to Point/Station       76.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.940(Ac.)
Runoff from this stream =      3.622(CFS)
Time of concentration =   16.18 min.
Rainfall intensity =     4.323(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.100 to Point/Station      100.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.200
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  629.500(Ft.)
Highest elevation =  379.000(Ft.)
Lowest elevation =  360.000(Ft.)
Elevation difference =   19.000(Ft.) Slope =  3.018 %
Top of Initial Area Slope adjusted by User to  2.370 %
Bottom of Initial Area Slope adjusted by User to  1.140 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   2.37 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.60 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  70.000^.5)/(   2.370^(1/3)]=   2.60
The initial area total distance of  629.50 (Ft.) entered leaves a
remaining distance of  559.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.71 minutes
for a distance of 559.50 (Ft.) and a slope of  1.14 %
with an elevation difference of   6.38(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.708 Minutes
Tt=[(11.9*0.1060^3)/(  6.38)]^.385=  5.71
Total initial area Ti =   2.60 minutes from Figure 3-3 formula plus
  5.71 minutes from the Figure 3-4 formula =   8.31 minutes
Rainfall intensity (I) =      6.647(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
```

```
Subarea runoff =       7.055(CFS)
Total initial stream area =        1.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.100 to Point/Station      100.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       1.220(Ac.)
Runoff from this stream =       7.055(CFS)
Time of concentration =    8.31 min.
Rainfall intensity =     6.647(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        3.622     16.18           4.323
2        7.055      8.31           6.647
Qmax(1) =
            1.000 *    1.000 *     3.622) +
            0.650 *    1.000 *     7.055) + =       8.211
Qmax(2) =
            1.000 *    0.513 *     3.622) +
            1.000 *    1.000 *     7.055) + =       8.914

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.622       7.055
Maximum flow rates at confluence using above data:
        8.211        8.914
Area of streams before confluence:
        2.940        1.220


Results of confluence:
Total flow rate =       8.914(CFS)
Time of concentration =     8.306 min.
Effective stream area after confluence  =      4.160(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       76.000
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration =   8.31
Basin Area =     4.16 Acres
6 Hour Rainfall =  3.500 Inches
Runoff Coefficient =  0.457
Peak Discharge =     8.91 CFS
```

Time (Min)	Discharge (CFS)
0	0.000
8	0.397
16	0.403
24	0.415
32	0.422
40	0.436
48	0.443
56	0.459
64	0.468
72	0.486
80	0.496
88	0.518
96	0.529
104	0.555
112	0.569
120	0.599
128	0.616
136	0.655
144	0.676
152	0.725
160	0.753
168	0.818
176	0.857
184	0.951
192	1.008
200	1.155
208	1.253
216	1.531
224	1.744
232	2.561
240	3.608
248	8.914
256	2.054
264	1.374
272	1.075
280	0.901
288	0.784
296	0.699
304	0.635
312	0.583
320	0.542
328	0.507
336	0.477
344	0.451
352	0.429
360	0.409
368	0.391

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: **NODE 76**
5508rpl4 - Bioretention - BMP 7

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01

********** RUNOFF HYDROGRAPHS **********

HYD 7..... 100
Read HYG 3.01

********** POND VOLUMES **********

BIORETENTION7... Vol: Elev-Area 4.01
Vol: Void Adjustments 4.02

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 5.01

********** POND ROUTING **********

BIORETENTION7... Pond E-V-Q Table 6.01

Table of Contents (continued)

BIORETENTION7OUT 100
Pond Routing Summary 6.05
Detention Time 6.06

S/N:
PondPack Ver: Compute Time: Date:

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
BIORETENTION7IN	POND	100	22133		248.00	8.91		
BIORETENTION7OUT	POND	100	10945		253.00	4.39	361.85	12649
HYD 7	HYG	100	22145	R	248.00	8.91		
*OUT 7 - N90	JCT	100	10945		253.00	4.39		

S/N:
PondPack Ver: Compute Time: Date:

Type.... Executive Summary (Nodes) Page 2.01
Name.... Watershed Event: 100 yr
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\
Storm... 100 Tag: 100

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
BIORETENTION7IN	POND	22133		248.00	8.91	
BIORETENTION7OUT	POND	10945		253.00	4.39	361.85
HYD 7	HYG	22145	R	248.00	8.91	
Outfall OUT 7 - N90	JCT	10945		253.00	4.39	

S/N:
PondPack Ver: Compute Time: Date:

HYG file =
HYG ID = HYG 7
HYG Tag = N-76

Peak Discharge = 8.91 cfs
Time to Peak = 248.00 min
HYG Volume = 22145 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 8.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	.40	.40	.42	.42
40.00	.44	.44	.46	.47	.49
80.00	.50	.52	.53	.56	.57
120.00	.60	.62	.66	.68	.73
160.00	.75	.82	.86	.95	1.01
200.00	1.16	1.25	1.53	1.74	2.56
240.00	3.61	8.91	2.05	1.37	1.08
280.00	.90	.78	.70	.64	.58
320.00	.54	.51	.48	.45	.43
360.00	.41	.39			

S/N:
PondPack Ver: Compute Time: Date:

Type.... Vol: Elev-Area
Name.... BIORETENTION7

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
359.00	-----	5700	0	0	0
360.50	-----	5700	17100	8550	8550
361.00	-----	6450	18213	3036	11586
362.00	-----	7900	21488	7163	18748

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

VOLUME COMPLETELY FILLED WITH MATERIAL
(Adjust Volumes for Voids)

Void Spaces = 72.00000 %

HW Elv, ft	Total, cu.ft	Adjusted,cu.ft
359.00	0	0
360.50	8550	6156
361.00	11586	8342
362.00	18748	13499

Type.... Outlet Input Data
Name.... Outlet 1

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 359.00 ft
Increment = .05 ft
Max. Elev.= 362.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	R5	--->	CV	361.250	362.000
Stand Pipe	R2	--->	CV	361.250	362.000
Stand Pipe	R6	--->	CV	361.250	362.000
Stand Pipe	R1	--->	CV	370.500	372.000
Stand Pipe	R4	--->	CV	361.250	362.000
Stand Pipe	R0	--->	CV	370.500	372.000
Stand Pipe	R7	--->	CV	361.250	362.000
Stand Pipe	RP	--->	CV	370.500	372.000
Stand Pipe	R3	--->	CV	361.250	362.000
Culvert-Circular	CV	--->	TW	354.000	362.000
TW SETUP, DS Channel					

S/N:
PondPack Ver: Compute Time: Date:

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R5
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    361.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No


Structure ID      = R2
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    361.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = R6
Structure Type     = Stand Pipe
------------------------------------
# of Openings      =         1
Invert Elev.       =    361.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

```
Structure ID       = R1
Structure Type     = Stand Pipe
------------------------------------
# of Openings      =         1
Invert Elev.       =    361.25 ft
Diameter           =     .5000 ft
Orifice Area       =     .1963 sq.ft
Orifice Coeff.     =      .600
Weir Length        =      1.57 ft
Weir Coeff.        =     3.100
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R4
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    361.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = R0
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    361.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R7
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    361.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = RP
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    361.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R3
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    361.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = CV
Structure Type     = Culvert-Circular
-----------------------------------
No. Barrels        =         1
Barrel Diameter    =    2.0000 ft
Upstream Invert    =    354.00 ft
Dnstream Invert    =    353.00 ft
Horiz. Length      =    112.22 ft
Barrel Length      =    112.22 ft
Barrel Slope       =    .00891 ft/ft

OUTLET CONTROL DATA...
Mannings n         =     .0130
Ke                 =     .5000  (forward entrance loss)
Kb                 =   .012411  (per ft of full flow)
Kr                 =     .5000  (reverse entrance loss)
HW Convergence     =      .001  +/- ft

INLET CONTROL DATA...
Equation form      =         1
Inlet Control K    =     .0078
Inlet Control M    =    2.0000
Inlet Control c    =    .03790
Inlet Control Y    =     .6900
T1 ratio (HW/D)    =     1.131
T2 ratio (HW/D)    =     1.292
Slope Factor       =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    356.26 ft  --->  Flow =     15.55 cfs
At T2 Elev =    356.58 ft  --->  Flow =     17.77 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
-----------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID:   Chn-Trapz - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID: Chn-Trapz - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

TRAPEZOIDAL CROSS SECTION

Slope = .005000 ft/ft
Mannings n = 0.02200
Invert Elev. = 352.00 ft
Top of Channel = 355.00 ft
Base width = 12.00 ft
Rt Side slope = 3.000 horizontal :1 vert.
Lt Side slope = 3.000 horizontal :1 vert.

Type.... Pond E-V-Q Table
Name.... BIORETENTION7
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\
Inflow HYG file = NONE STORED - BIORETENTION7IN 100
Outflow HYG file = NONE STORED - BIORETENTION7OUT 100

Pond Node Data = BIORETENTION7
Pond Volume Data = BIORETENTION7
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 359.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
359.00	.00	0	5700	.00	.00	.00
359.05	.00	205	5700	.07	.07	6.90
359.10	.00	410	5700	.07	.07	13.75
359.15	.00	616	5700	.07	.07	20.59
359.20	.00	821	5700	.07	.07	27.43
359.25	.00	1026	5700	.07	.07	34.27
359.30	.00	1231	5700	.07	.07	41.10
359.35	.00	1436	5700	.07	.07	47.95
359.40	.00	1642	5700	.07	.07	54.79
359.45	.00	1847	5700	.07	.07	61.63
359.50	.00	2052	5700	.07	.07	68.47
359.55	.00	2257	5700	.07	.07	75.30
359.60	.00	2462	5700	.07	.07	82.15
359.65	.00	2668	5700	.07	.07	88.98
359.70	.00	2873	5700	.07	.07	95.83
359.75	.00	3078	5700	.07	.07	102.67
359.80	.00	3283	5700	.07	.07	109.50
359.85	.00	3488	5700	.07	.07	116.35
359.90	.00	3694	5700	.07	.07	123.18
359.95	.00	3899	5700	.07	.07	130.03

S/N:
PondPack Ver: Compute Time: Date:

Type.... Pond E-V-Q Table
Name.... BIORETENTION7
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\
Inflow HYG file = NONE STORED - BIORETENTION7IN 100
Outflow HYG file = NONE STORED - BIORETENTION7OUT 100

Pond Node Data = BIORETENTION7
Pond Volume Data = BIORETENTION7
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 359.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
360.00	.00	4104	5700	.07	.07	136.87
360.05	.00	4309	5700	.07	.07	143.70
360.10	.00	4514	5700	.07	.07	150.55
360.15	.00	4720	5700	.07	.07	157.38
360.20	.00	4925	5700	.07	.07	164.23
360.25	.00	5130	5700	.07	.07	171.07
360.30	.00	5335	5700	.07	.07	177.90
360.35	.00	5540	5700	.07	.07	184.75
360.40	.00	5746	5700	.07	.07	191.58
360.45	.00	5951	5700	.07	.07	198.43
360.50	.00	6156	5700	.07	.07	205.27
360.55	.00	6362	5773	.07	.07	212.15
360.60	.00	6572	5846	.07	.07	219.12
360.65	.00	6783	5920	.07	.07	226.18
360.70	.00	6998	5994	.07	.07	233.33
360.75	.00	7215	6069	.07	.07	240.57
360.80	.00	7435	6144	.07	.07	247.90
360.85	.00	7657	6220	.07	.07	255.32
360.90	.00	7883	6296	.07	.07	262.83
360.95	.00	8111	6373	.07	.07	270.44

S/N:
PondPack Ver: Compute Time: Date:

Name.... BIORETENTION7
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\
Inflow HYG file = NONE STORED - BIORETENTION7IN 100
Outflow HYG file = NONE STORED - BIORETENTION7OUT 100

Pond Node Data = BIORETENTION7
Pond Volume Data = BIORETENTION7
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 359.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
361.00	.00	8342	6450	.07	.07	278.13
361.05	.00	8575	6519	.08	.08	285.91
361.10	.00	8811	6588	.08	.08	293.78
361.15	.00	9049	6658	.08	.08	301.72
361.20	.00	9290	6728	.08	.08	309.76
361.25	.00	9534	6799	.08	.08	317.87
361.30	.33	9780	6870	.08	.41	326.40
361.35	.92	10029	6941	.08	1.00	335.29
361.40	1.70	10280	7012	.08	1.78	344.43
361.45	2.54	10533	7084	.08	2.62	353.73
361.50	2.84	10790	7157	.08	2.92	362.57
361.55	3.11	11049	7229	.08	3.19	371.48
361.60	3.35	11310	7302	.08	3.44	380.45
361.65	3.59	11574	7376	.09	3.67	389.49
361.70	3.80	11841	7450	.09	3.89	398.60
361.75	4.01	12111	7524	.09	4.10	407.79
361.80	4.20	12383	7598	.09	4.29	417.05
361.85	4.39	12658	7673	.09	4.48	426.41
361.90	4.57	12935	7748	.09	4.66	435.84
361.95	4.74	13216	7824	.09	4.83	445.36

S/N:
PondPack Ver: Compute Time: Date:

Name.... BIORETENTION7
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\5508RPL4-100 YR-BMP 7.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\
Inflow HYG file = NONE STORED - BIORETENTION7IN 100
Outflow HYG file = NONE STORED - BIORETENTION7OUT 100

Pond Node Data = BIORETENTION7
Pond Volume Data = BIORETENTION7
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 359.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
362.00	4.91	13499	7900	.09	5.00	454.96

S/N:
PondPack Ver: Compute Time: Date:

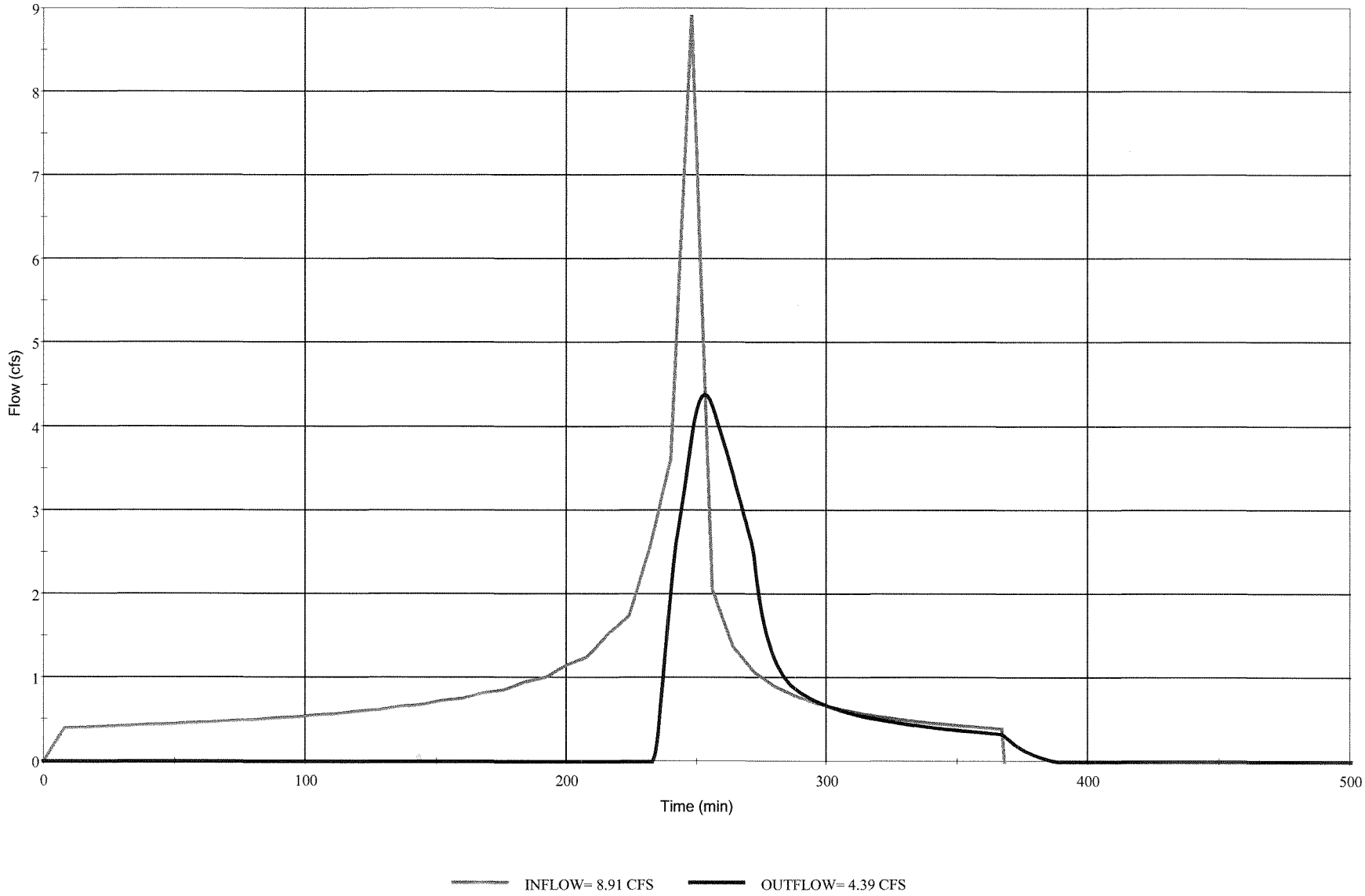
LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 7\
Inflow  HYG file = NONE STORED - BIORETENTION7IN  100
Outflow HYG file = NONE STORED - BIORETENTION7OUT 100

Pond Node   Data = BIORETENTION7
Pond Volume Data = BIORETENTION7
Pond Outlet Data = Outlet 1

Infiltration =    .5000 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   359.00 ft
Starting Volume    =        0 cu.ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =     1.00 min


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =      8.91 cfs    at    248.00 min
Peak Outflow      =      4.39 cfs    at    253.00 min
Peak Infiltration =       .09 cfs    at    253.00 min
-----------------------------------------------------
Peak Elevation    =    361.85 ft
Peak Storage =          12649 cu.ft
=====================================================


MASS BALANCE (cu.ft)
--------------------------
+ Initial Vol  =           0
+ HYG Vol IN   =       22133
- Infiltration =        8335
- HYG Vol OUT  =       10945
- Retained Vol =        2854
                   ----------
Unrouted Vol =           0 cu.ft  (.000% of Inflow Volume)
```

DETENTION TIMES SUMMARY

```
 HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 7\
 Inflow  HYG file = NONE STORED - BIORETENTION7IN  100
 Outflow HYG file = NONE STORED - BIORETENTION7OUT 100

 Pond Node   Data = BIORETENTION7
 Pond Volume Data = BIORETENTION7
 Pond Outlet Data = Outlet 1

 Infiltration =    .5000 in/hr

 APPROXIMATE DETENTION TIME
 --------------------------------------
 Tp, Outflow + Infilt.   =    253.00 min
 Tp, Total Inflow        =    248.00 min
 Peak to Peak            =      5.00 min

 Qout+Infilt. Centroid   =    578.53 min
 Inflow Centroid         =    212.20 min
 Centroid to Centroid    =    366.32 min

 Weighted Avg. Plug Time =    560.96 min
 Max.Plug Vol. Plug Time =    600.12 min
 Max.Inflow Plug Volume  =       515 cu.ft   (From 247.00 to 248.00 min)
 --------------------------------------
```

NODE 76 - BIORETENTION - BMP 7
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



Bio-Retention Pond-8

100-year Development Conditions

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/14/12
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 8
----------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.100 to Point/Station      101.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.400
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.682
Initial subarea total flow distance  =  393.600(Ft.)
Highest elevation =  412.500(Ft.)
Lowest elevation =  402.000(Ft.)
Elevation difference =   10.500(Ft.) Slope =  2.668 %
Top of Initial Area Slope adjusted by User to  1.000 %
Bottom of Initial Area Slope adjusted by User to  6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 65.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.07 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6820)*(  65.000^.5)/(   1.000^(1/3)]=   6.07
The initial area total distance of  393.60 (Ft.) entered leaves a
remaining distance of  328.60 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.00 minutes
for a distance of 328.60 (Ft.) and a slope of  6.00 %
with an elevation difference of  19.72(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.999 Minutes
Tt=[(11.9*0.0622^3)/( 19.72)]^.385=  2.00
Total initial area Ti =   6.07 minutes from Figure 3-3 formula plus
  2.00 minutes from the Figure 3-4 formula =   8.07 minutes
Rainfall intensity (I) =      6.774(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.682
Subarea runoff =      6.561(CFS)
Total initial stream area =        1.420(Ac.)
```

++
Process from Point/Station 101.200 to Point/Station 101.200
**** 6 HOUR HYDROGRAPH ****
++

Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration = 8.07
Basin Area = 1.42 Acres
6 Hour Rainfall = 3.500 Inches
Runoff Coefficient = 0.682
Peak Discharge = 6.56 CFS

Time (Min)	Discharge (CFS)
0	0.000
8	0.202
16	0.205
24	0.212
32	0.215
40	0.222
48	0.226
56	0.234
64	0.239
72	0.248
80	0.253
88	0.264
96	0.270
104	0.283
112	0.290
120	0.306
128	0.314
136	0.334
144	0.345
152	0.370
160	0.384
168	0.417
176	0.437
184	0.485
192	0.514
200	0.589
208	0.639
216	0.781
224	0.889
232	1.306
240	1.840
248	6.561
256	1.047
264	0.701
272	0.548
280	0.459
288	0.400
296	0.357
304	0.324
312	0.297
320	0.276
328	0.258
336	0.243
344	0.230
352	0.219
360	0.209
368	0.200

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: **NODE 101.2**
5508rpl4 - Bioretention - BMP 8

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... 100
Executive Summary (Nodes) 2.01

********** RUNOFF HYDROGRAPHS **********

HYD 8..... 100
Read HYG 3.01

********** POND VOLUMES **********

BIORETENTION8... Vol: Elev-Area 4.01
Vol: Void Adjustments 4.02

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 5.01

********** POND ROUTING **********

BIORETENTION8... Pond E-V-Q Table 6.01

Table of Contents (continued)

BIORETENTION8OUT 100
Pond Routing Summary 6.05
Detention Time 6.06

S/N:
PondPack Ver: Compute Time: Date:

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
BIORETENTION8IN	POND	100	12254		248.00	6.56		
BIORETENTION8OUT	POND	100	5434		253.00	3.30	403.74	7403
HYD 8	HYG	100	12260	R	248.00	6.56		
*OUT 8 - N86	JCT	100	5434		253.00	3.30		

S/N:
PondPack Ver: Compute Time: Date:

Type.... Executive Summary (Nodes) Page 2.01
Name.... Watershed Event: 100 yr
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\
Storm... 100 Tag: 100

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
BIORETENTION8IN	POND	12254		248.00	6.56	
BIORETENTION8OUT	POND	5434		253.00	3.30	403.74
HYD 8	HYG	12260	R	248.00	6.56	
Outfall OUT 8 - N86	JCT	5434		253.00	3.30	

S/N:
PondPack Ver: Compute Time: Date:

HYG file =
HYG ID = HYG 8
HYG Tag = N101.2

Peak Discharge	=	6.56 cfs
Time to Peak	=	248.00 min
HYG Volume	=	12260 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 8.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	.20	.21	.21	.22
40.00	.22	.23	.23	.24	.25
80.00	.25	.26	.27	.28	.29
120.00	.31	.31	.33	.35	.37
160.00	.38	.42	.44	.49	.51
200.00	.59	.64	.78	.89	1.31
240.00	1.84	6.56	1.05	.70	.55
280.00	.46	.40	.36	.32	.30
320.00	.28	.26	.24	.23	.22
360.00	.21	.20			

S/N:
PondPack Ver: Compute Time: Date:

Type.... Vol: Elev-Area
Name.... BIORETENTION8

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
401.00	-----	3450	0	0	0
402.50	-----	3450	10350	5175	5175
403.00	-----	3900	11018	1836	7011
404.00	-----	4850	13099	4366	11378

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

VOLUME COMPLETELY FILLED WITH MATERIAL
(Adjust Volumes for Voids)

Void Spaces = 73.00000 %

HW Elv, ft	Total, cu.ft	Adjusted,cu.ft
401.00	0	0
402.50	5175	3778
403.00	7011	5118
404.00	11378	8306

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 401.00 ft
Increment = .05 ft
Max. Elev.= 404.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	R2	--->	CV	403.250	404.000
Stand Pipe	R4	--->	CV	403.250	404.000
Stand Pipe	R1	--->	CV	403.250	372.000
Stand Pipe	R5	--->	CV	403.250	404.000
Stand Pipe	R0	--->	CV	403.250	372.000
Stand Pipe	R3	--->	CV	403.250	404.000
Stand Pipe	RP	--->	CV	403.250	372.000
Stand Pipe	R6	--->	CV	403.250	404.000
Culvert-Circular	CV	--->	TW	396.750	404.000
TW SETUP, DS Channel					

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R2
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    403.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = R4
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    403.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R1
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    403.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = R5
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    403.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R0
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    403.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = R3
Structure Type    = Stand Pipe
-----------------------------------
# of Openings     =         1
Invert Elev.      =    403.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = RP
Structure Type    = Stand Pipe
------------------------------------
# of Openings     =         1
Invert Elev.      =    403.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

```
Structure ID      = R6
Structure Type    = Stand Pipe
------------------------------------
# of Openings     =         1
Invert Elev.      =    403.25 ft
Diameter          =     .5000 ft
Orifice Area      =     .1963 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      1.57 ft
Weir Coeff.       =     3.100
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CV
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         1
Barrel Diameter   =    1.5000 ft
Upstream Invert   =    396.75 ft
Dnstream Invert   =    396.00 ft
Horiz. Length     =     39.45 ft
Barrel Length     =     39.46 ft
Barrel Slope      =    .01901 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .018213  (per ft of full flow)
Kr                =     .5000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0078
Inlet Control M   =    2.0000
Inlet Control c   =    .03790
Inlet Control Y   =     .6900
T1 ratio (HW/D)   =     1.126
T2 ratio (HW/D)   =     1.287
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    398.44 ft  --->  Flow =      7.58 cfs
At T2 Elev =    398.68 ft  --->  Flow =      8.66 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
-----------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID:   Chn-Cir - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID: Chn-Cir - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

CIRCULAR CROSS SECTION

Slope = .017100 ft/ft
Mannings n = 0.01300
Invert Elev. = 373.00 ft
Top of Channel = 375.00 ft
Diameter = 2.0000 ft

Type.... Pond E-V-Q Table
Name.... BIORETENTION8
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\
Inflow HYG file = NONE STORED - BIORETENTION8IN 100
Outflow HYG file = NONE STORED - BIORETENTION8OUT 100

Pond Node Data = BIORETENTION8
Pond Volume Data = BIORETENTION8
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 401.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
401.00	.00	0	3450	.00	.00	.00
401.05	.00	126	3450	.04	.04	4.24
401.10	.00	252	3450	.04	.04	8.44
401.15	.00	378	3450	.04	.04	12.63
401.20	.00	504	3450	.04	.04	16.83
401.25	.00	630	3450	.04	.04	21.03
401.30	.00	756	3450	.04	.04	25.22
401.35	.00	881	3450	.04	.04	29.42
401.40	.00	1007	3450	.04	.04	33.62
401.45	.00	1133	3450	.04	.04	37.82
401.50	.00	1259	3450	.04	.04	42.01
401.55	.00	1385	3450	.04	.04	46.21
401.60	.00	1511	3450	.04	.04	50.41
401.65	.00	1637	3450	.04	.04	54.61
401.70	.00	1763	3450	.04	.04	58.81
401.75	.00	1889	3450	.04	.04	63.00
401.80	.00	2015	3450	.04	.04	67.20
401.85	.00	2141	3450	.04	.04	71.40
401.90	.00	2267	3450	.04	.04	75.59
401.95	.00	2393	3450	.04	.04	79.79

S/N:
PondPack Ver: Compute Time: Date:

Type.... Pond E-V-Q Table
Name.... BIORETENTION8
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\
Inflow HYG file = NONE STORED - BIORETENTION8IN 100
Outflow HYG file = NONE STORED - BIORETENTION8OUT 100

Pond Node Data = BIORETENTION8
Pond Volume Data = BIORETENTION8
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 401.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
402.00	.00	2519	3450	.04	.04	83.99
402.05	.00	2644	3450	.04	.04	88.19
402.10	.00	2770	3450	.04	.04	92.39
402.15	.00	2896	3450	.04	.04	96.58
402.20	.00	3022	3450	.04	.04	100.78
402.25	.00	3148	3450	.04	.04	104.98
402.30	.00	3274	3450	.04	.04	109.17
402.35	.00	3400	3450	.04	.04	113.37
402.40	.00	3526	3450	.04	.04	117.57
402.45	.00	3652	3450	.04	.04	121.77
402.50	.00	3778	3450	.04	.04	125.96
402.55	.00	3904	3494	.04	.04	130.19
402.60	.00	4033	3538	.04	.04	134.47
402.65	.00	4163	3582	.04	.04	138.80
402.70	.00	4294	3627	.04	.04	143.19
402.75	.00	4427	3672	.04	.04	147.63
402.80	.00	4562	3717	.04	.04	152.12
402.85	.00	4699	3762	.04	.04	156.67
402.90	.00	4837	3808	.04	.04	161.28
402.95	.00	4977	3854	.04	.04	165.94

S/N:
PondPack Ver: Compute Time: Date:

Type.... Pond E-V-Q Table
Name.... BIORETENTION8
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\
Inflow HYG file = NONE STORED - BIORETENTION8IN 100
Outflow HYG file = NONE STORED - BIORETENTION8OUT 100

Pond Node Data = BIORETENTION8
Pond Volume Data = BIORETENTION8
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 401.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
403.00	.00	5118	3900	.05	.05	170.65
403.05	.00	5261	3945	.05	.05	175.43
403.10	.00	5406	3990	.05	.05	180.26
403.15	.00	5553	4036	.05	.05	185.14
403.20	.00	5701	4082	.05	.05	190.08
403.25	.00	5851	4128	.05	.05	195.07
403.30	.27	6002	4174	.05	.32	200.39
403.35	.77	6155	4221	.05	.82	206.00
403.40	1.41	6310	4268	.05	1.46	211.81
403.45	2.11	6467	4315	.05	2.16	217.73
403.50	2.36	6625	4362	.05	2.42	223.26
403.55	2.59	6785	4410	.05	2.64	228.82
403.60	2.80	6947	4458	.05	2.85	234.42
403.65	2.99	7111	4506	.05	3.04	240.07
403.70	3.17	7276	4554	.05	3.22	245.76
403.75	3.34	7443	4603	.05	3.39	251.50
403.80	3.50	7612	4652	.05	3.56	257.29
403.85	3.66	7783	4701	.05	3.71	263.14
403.90	3.81	7955	4750	.05	3.86	269.04
403.95	3.95	8130	4800	.06	4.01	275.00

S/N:
PondPack Ver: Compute Time: Date:

Name.... BIORETENTION8
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\
Inflow HYG file = NONE STORED - BIORETENTION8IN 100
Outflow HYG file = NONE STORED - BIORETENTION8OUT 100

Pond Node Data = BIORETENTION8
Pond Volume Data = BIORETENTION8
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 401.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
404.00	4.09	8306	4850	.06	4.15	281.01

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\5508RPL4-100 YR-BMP 8.PPW
Storm... 100 Tag: 100

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond
Pack\BMP 8\
Inflow  HYG file = NONE STORED - BIORETENTION8IN  100
Outflow HYG file = NONE STORED - BIORETENTION8OUT 100

Pond Node   Data = BIORETENTION8
Pond Volume Data = BIORETENTION8
Pond Outlet Data = Outlet 1

Infiltration =    .5000 in/hr

INITIAL CONDITIONS
---------------------------------
Starting WS Elev   =   401.00 ft
Starting Volume    =        0 cu.ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =     1.00 min


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =      6.56 cfs    at    248.00 min
Peak Outflow      =      3.30 cfs    at    253.00 min
Peak Infiltration =       .05 cfs    at    253.00 min
-----------------------------------------------------
Peak Elevation    =    403.74 ft
Peak Storage =           7403 cu.ft
=====================================================


MASS BALANCE (cu.ft)
--------------------------
+ Initial Vol  =           0
+ HYG Vol IN   =       12254
- Infiltration =        5032
- HYG Vol OUT  =        5434
- Retained Vol =        1788
                   ----------
Unrouted Vol = -            cu.ft  (.001% of Inflow Volume)
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 8\
Inflow  HYG file = NONE STORED - BIORETENTION8IN  100
Outflow HYG file = NONE STORED - BIORETENTION8OUT 100

Pond Node   Data = BIORETENTION8
Pond Volume Data = BIORETENTION8
Pond Outlet Data = Outlet 1

Infiltration =    .5000 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------
Tp, Outflow + Infilt.   =    253.00 min
Tp, Total Inflow        =    248.00 min
Peak to Peak            =      5.00 min

Qout+Infilt. Centroid   =    613.37 min
Inflow Centroid         =    215.03 min
Centroid to Centroid    =    398.33 min

Weighted Avg. Plug Time =    617.19 min
Max.Plug Vol. Plug Time =    713.48 min
Max.Inflow Plug Volume  =       376 cu.ft   (From 247.00 to 248.00 min)
--------------------------------------
```

NODE 101.2 - BIORETENTION - BMP 8
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT

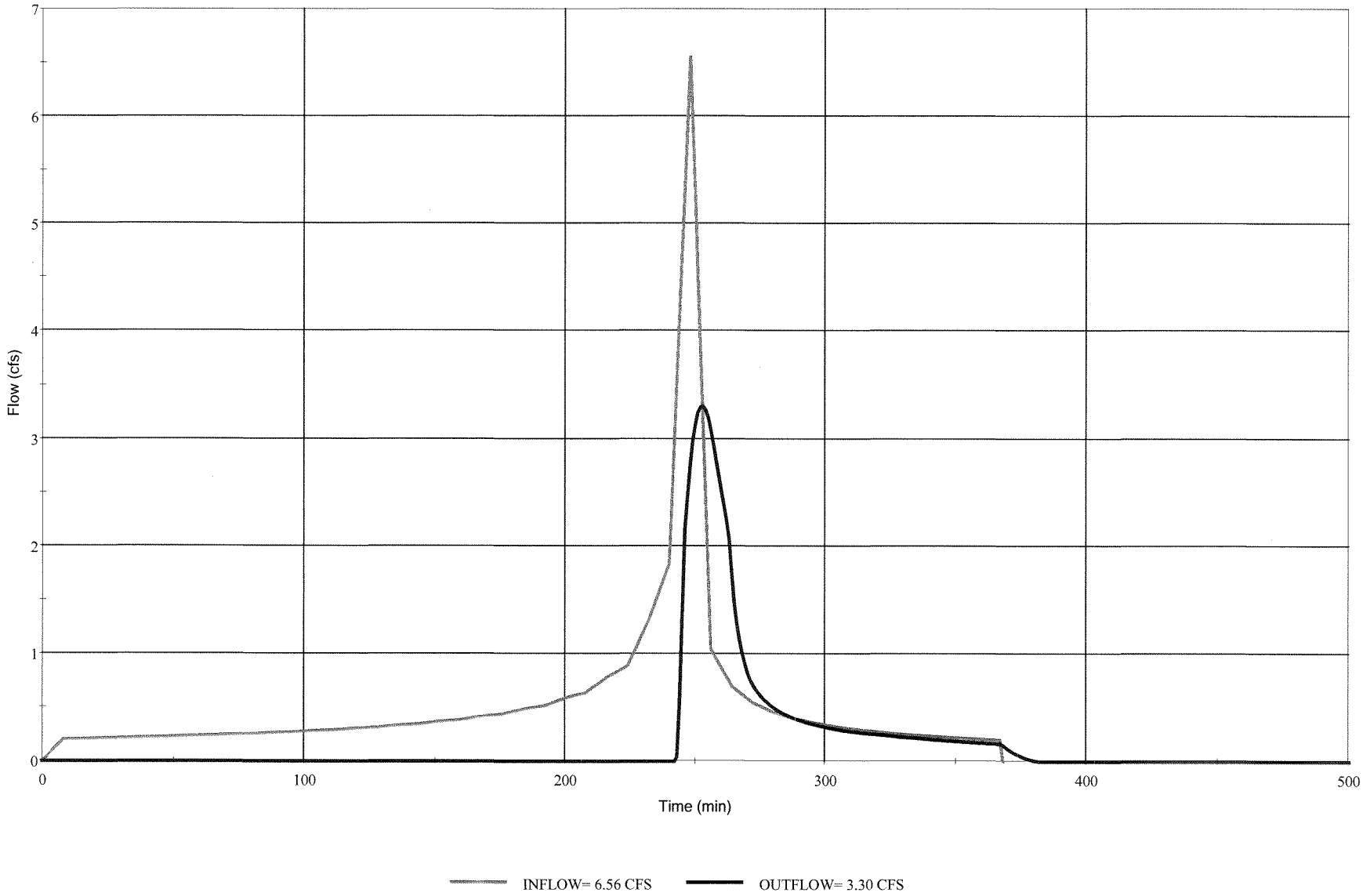


Table A: Comparison of Pre & Post Hydrology Calculations

Table "A"

Existing Vs. Proposed Condition Design Point 1

TABLE "A"

Existing Vs. Proposed Conditions

Existing Condition:

Design Point No.	Event (year)	"C"	TC (min.)	Intensity (in/hr)	Area (acres)	Run-Off (cfs)
1	100	0.35	48	3.96	4,115.20	5,697.19
Total					**4,115**	**5,697.19**

Development Condition:

Design Point No.	Event (year)	"C"	TC (min.)	Intensity (in/hr)	Area (acres)	Run-Off (cfs)
1	100	0.41	48	3.20	4,117.25	5,402.56
Total					**4,117**	**5,402.56**

Gomez Creek Pre HEC-RAS
Analysis 100-Year Storm Event

Hec-Ras Analysis

Gomez Creek 100 year Floodplain Existing Condition Analysis

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: WR-GOMEZ CREEK PRE-1
Project File : WR-GOMEZCREEKPRE-.prj
Run Date and Time: 11/20/2012 4:07:35 PM

Project in English units

Project Description:
******* Autodesk, Inc. HEC-2 Input Data file ********
****
Minimum Data Input **********

****

****

PLAN DATA

Plan Summary Information:

Number of:	Cross Sections	= 144	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

****

FLOW DATA

Flow Title: Imported Flow 01
Flow File : C:\Shapouri&Associates\Active Projects\Warner Ranch\Hydrology\Hecras 2012\Hecras Gomez Creek Pre\Revised Gomez Creek Pre-1\WR-GOMEZCREEKPRE-.f01

Flow Data (cfs)

River	Reach	RS	PF 1
RIVER-1	Reach-1	152	5697.9

CROSS SECTION
REACH: Reach-1 RS: 150

INPUT
Description: 4
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	396.29	6.96	394.21	14.42	392	22.34	389.59	26.34	388.39
28.57	387.8	36.42	386	45.4	384.01	51.02	382.69	57.53	381.3
63.28	380	67.32	379.13	72.33	378	81.38	375.94	84.62	375.07
88.17	374	93.63	372.3	94.28	372	99.31	369.8	102.35	368.45
102.54	368.32	103.03	368.3	103.42	368.39	107.14	370	111.27	372
120.57	373.75	122.31	374	130.01	375.26	134.46	376	137.83	376.74
143.29	378	145.19	378.42	148.68	379.13	153.48	380	160.84	381.29
164.51	382	167.1	382.37	169.06	382.5	172.03	382.8		

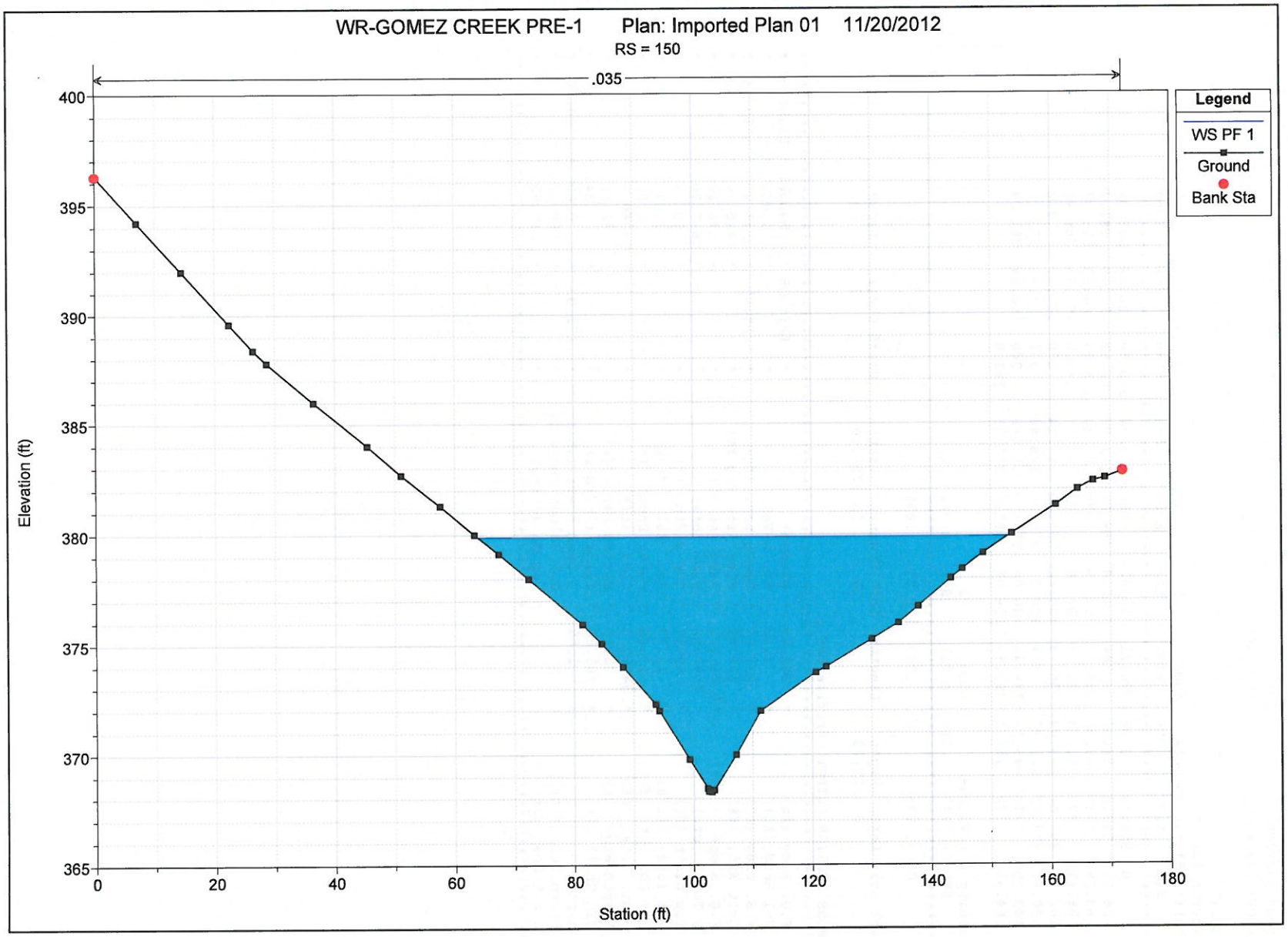
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	0	.035	172.03	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	172.03	25	25	1755.66	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	382.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.53	Wt. n-Val.		0.035	
W.S. Elev (ft)	379.89	Reach Len. (ft)	25.00	25.00	1755.66
Crit W.S. (ft)	379.89	Flow Area (sq ft)		446.10	
E.G. Slope (ft/ft)	0.011109	Area (sq ft)		446.10	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	89.13	Top Width (ft)		89.13	
Vel Total (ft/s)	12.77	Avg. Vel. (ft/s)		12.77	
Max Chl Dpth (ft)	11.59	Hydr. Depth (ft)		5.01	
Conv. Total (cfs)	54060.0	Conv. (cfs)		54060.0	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		92.50	
Min Ch El (ft)	368.30	Shear (lb/sq ft)		3.34	
Alpha	1.00	Stream Power (lb/ft s)	172.03	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		60.06	
C & E Loss (ft)		Cum SA (acres)		38.63	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 150
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
400
395
390
385
380
375
370
365
0
20
40
60
80
100
120
140
160
180
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 140

INPUT
Description: 14
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
207.94	390	208.9	389.49	212.08	388	213.5	387.25	224.63	382
226.6	381.14	228.99	380	231.57	379.09	233.67	378	237.63	376.96
241.83	376	245.65	374	249.11	372	252.75	370	257.41	370
259.64	372	262.14	372.86	264.99	374	269.54	374.71	276.94	376
286.99	377.16	288.53	377.27	290.57	376.73	291.47	376.72	294.79	378
298.23	379.63	310.84	378	323.41	377.87	329.13	377.78	334.44	377.6
337.89	377.83	341.99	378	347.2	378.62	351.8	379.25	356.9	380
359.52	380.96	362.72	382	364.95	382.79	368.66	384		

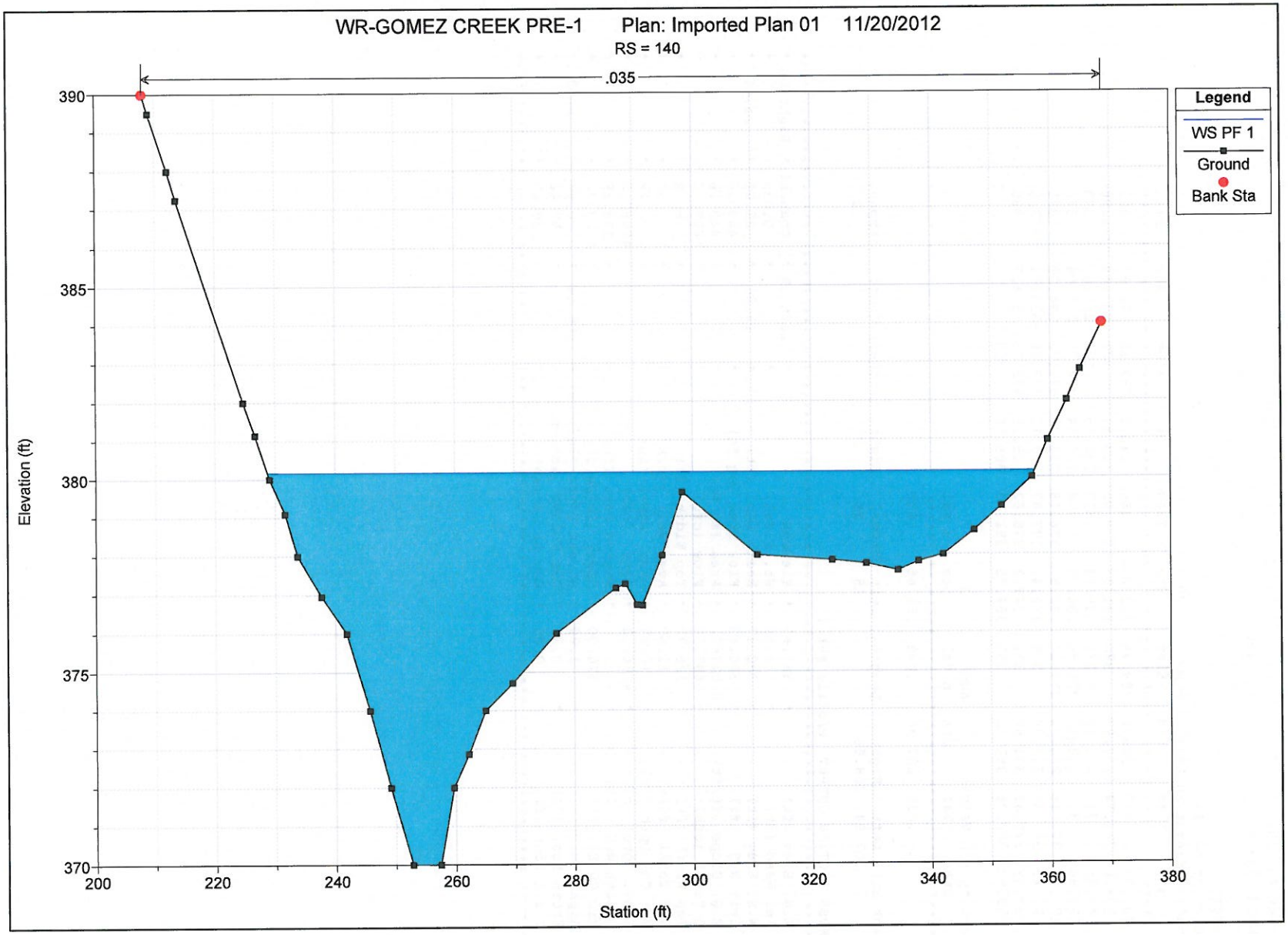
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	207.94	.035	368.66	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
207.94	368.66	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	382.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.50	Wt. n-Val.		0.035	
W.S. Elev (ft)	380.17	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	380.63	Flow Area (sq ft)		449.16	
E.G. Slope (ft/ft)	0.017672	Area (sq ft)		449.16	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	128.72	Top Width (ft)		128.72	
Vel Total (ft/s)	12.69	Avg. Vel. (ft/s)		12.69	
Max Chl Dpth (ft)	10.17	Hydr. Depth (ft)		3.49	
Conv. Total (cfs)	42862.2	Conv. (cfs)		42862.2	
Length Wtd. (ft)		Wetted Per. (ft)		133.29	
Min Ch El (ft)	370.00	Shear (lb/sq ft)		3.72	
Alpha	1.00	Stream Power (lb/ft s)	368.66	0.00	0.00
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)		57.42	
C & E Loss (ft)	0.06	Cum SA (acres)		38.00	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 140
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
390
385
380
375
370
200
220
240
260
280
300
320
340
360
380
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 130

INPUT
Description: 24
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
326.43	382.73	334.3	379.11	336.58	378	340.95	376	343.31	374.99
355.21	370	382.88	370	387.71	370.48	391.09	370.85	400.35	372
404.15	372.27	406.89	372.36	413.04	372.62	443.91	374	449.03	375.07
452.96	376	458.27	377.31	470.51	380.27	478.69	382	506.04	384.92

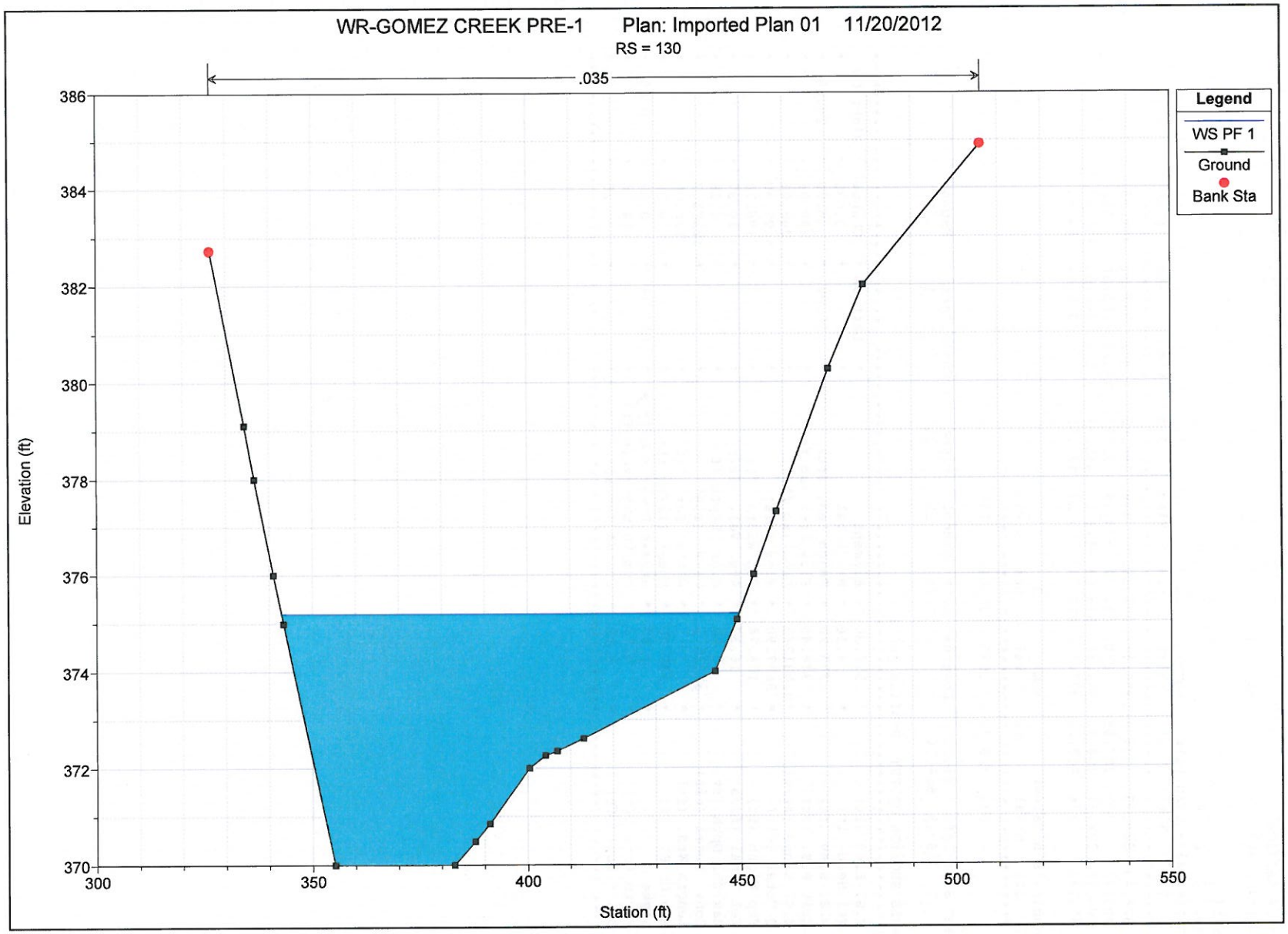
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	326.43	.035	506.04	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
326.43	506.04	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	379.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.16	Wt. n-Val.		0.035	
W.S. Elev (ft)	375.20	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	376.45	Flow Area (sq ft)		348.06	
E.G. Slope (ft/ft)	0.031263	Area (sq ft)		348.06	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	106.74	Top Width (ft)		106.74	
Vel Total (ft/s)	16.37	Avg. Vel. (ft/s)		16.37	
Max Chl Dpth (ft)	5.20	Hydr. Depth (ft)		3.26	
Conv. Total (cfs)	32225.3	Conv. (cfs)		32225.3	
Length Wtd. (ft)		Wetted Per. (ft)		108.08	
Min Ch El (ft)	370.00	Shear (lb/sq ft)		6.29	
Alpha	1.00	Stream Power (lb/ft s)	506.04	0.00	0.00
Frctn Loss (ft)	0.73	Cum Volume (acre-ft)		54.78	
C & E Loss (ft)	0.02	Cum SA (acres)		37.30	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 130
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
386
384
382
380
378
376
374
372
370
300
350
400
450
500
550
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 120

INPUT
Description: 34
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
283.44	386	286.24	384.81	287.97	384	292.01	382.18	292.72	381.8
294.47	381.07	299.67	378.74	301.54	378	302.97	377.34	306.1	376
307.43	374.8	309.16	374	313.83	373.26	318.05	372.48	320.33	372
336.55	372	340.75	371.96	340.94	372	353.94	372	355.15	371.69
361.14	370.78	366.1	370	366.81	369.83	378.93	369.57	380.05	369.62
391.54	370	392.95	370.27	396.5	372	397.86	372.63	400.3	374
420.81	374	422.01	373.51	425.43	372	441.67	371.91	458.72	371.91
460.43	371.92	488.17	371.39	489.98	371.42	495.84	371.45	499.58	371.54
507.93	371.95	509.22	372	512.84	372.72	517.4	373.38	519.7	373.76
521.95	374	526.34	374.99	528.04	375.41	530.1	376	537.92	378
542.75	379.3								

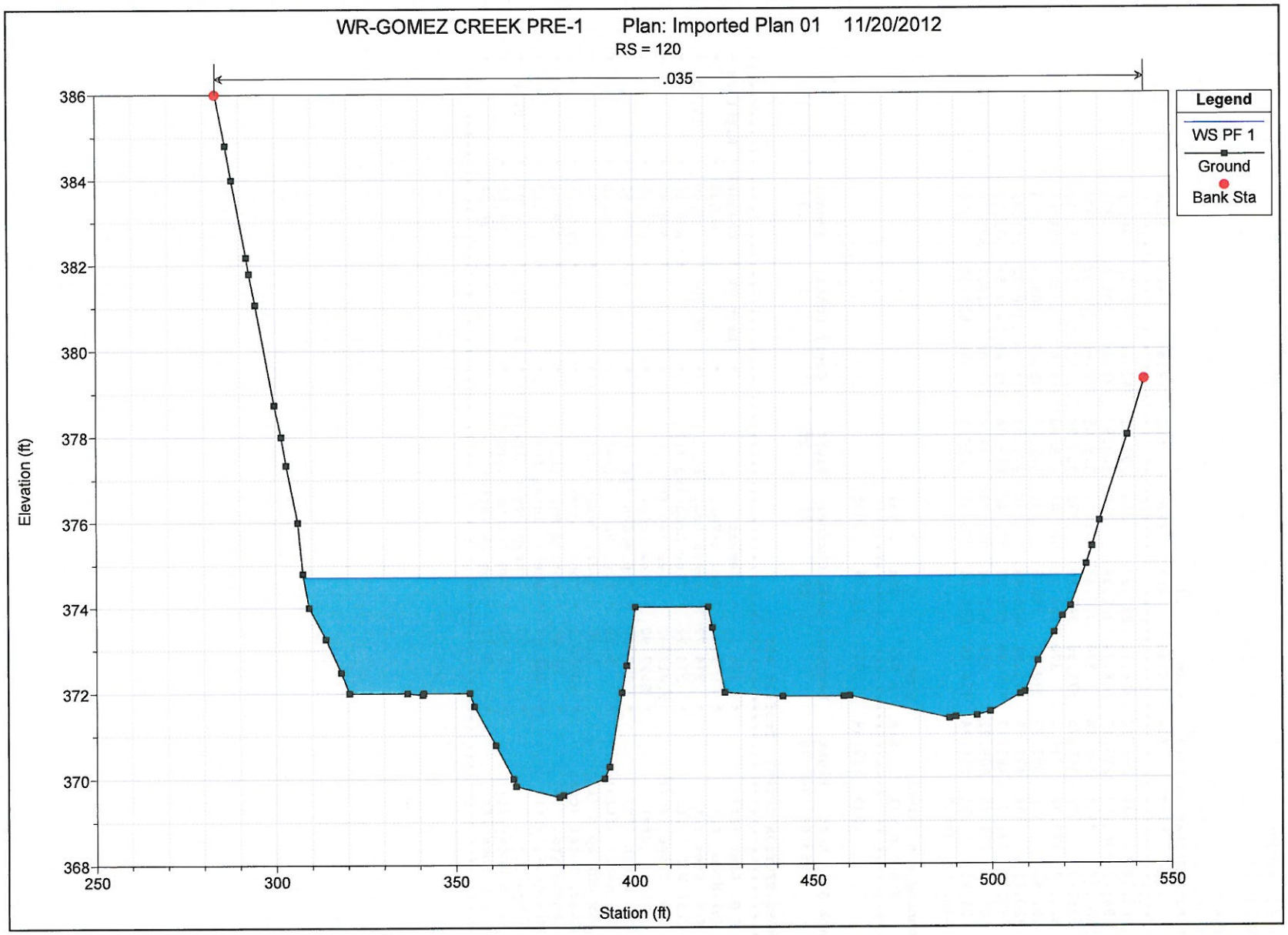
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	283.44	.035	542.75	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
283.44	542.75	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	376.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.40	Wt. n-Val.		0.035	
W.S. Elev (ft)	374.72	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	374.72	Flow Area (sq ft)		600.86	
E.G. Slope (ft/ft)	0.013042	Area (sq ft)		600.86	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	217.52	Top Width (ft)		217.52	
Vel Total (ft/s)	9.48	Avg. Vel. (ft/s)		9.48	
Max Chl Dpth (ft)	5.15	Hydr. Depth (ft)		2.76	
Conv. Total (cfs)	49894.1	Conv. (cfs)		49894.1	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		219.66	
Min Ch El (ft)	369.57	Shear (lb/sq ft)		2.23	
Alpha	1.00	Stream Power (lb/ft s)	542.75	0.00	0.00
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)		51.80	
C & E Loss (ft)	0.17	Cum SA (acres)		36.24	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 120
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
386
384
382
380
378
376
374
372
370
368
250
300
350
400
450
500
550
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 110

INPUT
Description: 44
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
279.48	380.34	286.75	380	293.63	378.9	297.96	378	302.31	376.98
306.61	376	316.49	374.87	324.4	374	334.62	373.46	351.38	372.52
361.87	371.95	370.91	371.04	382.48	370	388.73	368.06	389.12	367.97
403.33	366	409.53	366	415.76	368	421.62	370	427.33	372
440.84	372	442.63	371.73	444.7	371.47	446.15	371.39	453.24	371.18
455.92	371.26	464.74	371.42	467.09	371.51	473.58	372	480.41	374
484.83	376.13	489.73	378.46	493.83	380.39				

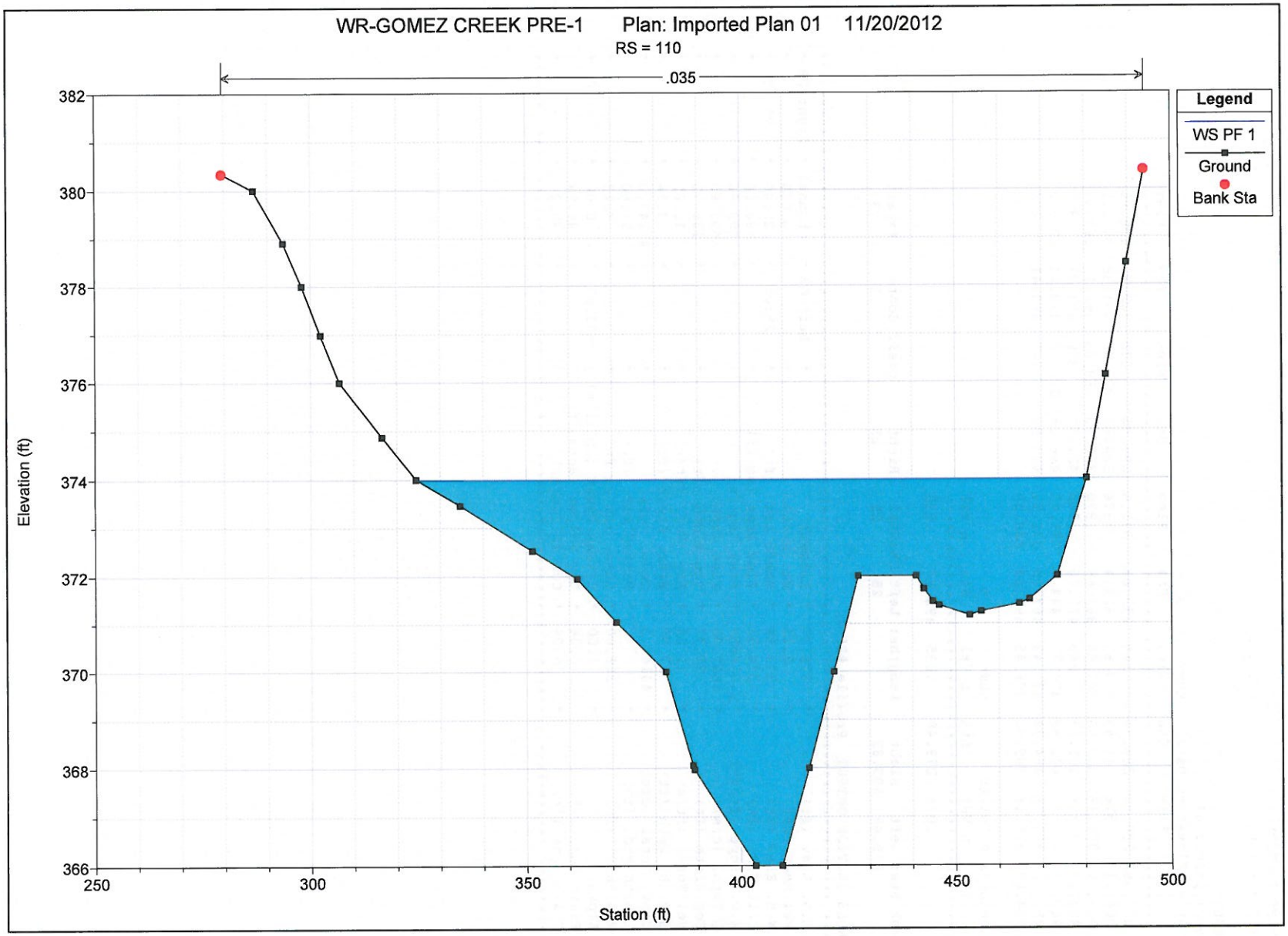
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	279.48	.035	493.83	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
279.48	493.83	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	376.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.11	Wt. n-Val.		0.035	
W.S. Elev (ft)	373.99	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	374.31	Flow Area (sq ft)		488.96	
E.G. Slope (ft/ft)	0.016658	Area (sq ft)		488.96	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	155.73	Top Width (ft)		155.73	
Vel Total (ft/s)	11.65	Avg. Vel. (ft/s)		11.65	
Max Chl Dpth (ft)	7.99	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	44147.3	Conv. (cfs)		44147.3	
Length Wtd. (ft)		Wetted Per. (ft)		157.66	
Min Ch El (ft)	366.00	Shear (lb/sq ft)		3.23	
Alpha	1.00	Stream Power (lb/ft s)	493.83	0.00	0.00
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)		48.64	
C & E Loss (ft)	0.04	Cum SA (acres)		35.24	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 110
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
382
380
378
376
374
372
370
368
366
250
300
350
400
450
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 100

INPUT
Description: 54
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
215.41	374.37	217.45	374.27	220.63	374	232.88	372.33	247.32	370.12
248.25	370	292.97	368.33	296.41	368.22	310.62	368.15	370.09	368
374.81	366	383.99	364	392.97	362.65	396.34	362.33	397.77	362.13
400.85	362.16	419.94	364	421.01	364.85	425.33	368.75	426.63	370
438.7	370	441.88	369.85	462.19	368.53	473.67	368.38	495.12	367.87
499.45	367.72	513.12	367.79	513.53	367.83	522.3	368	526.62	368.74
529.96	370	531.24	371.1	532.5	372	533.7	372.13	539.7	372.61

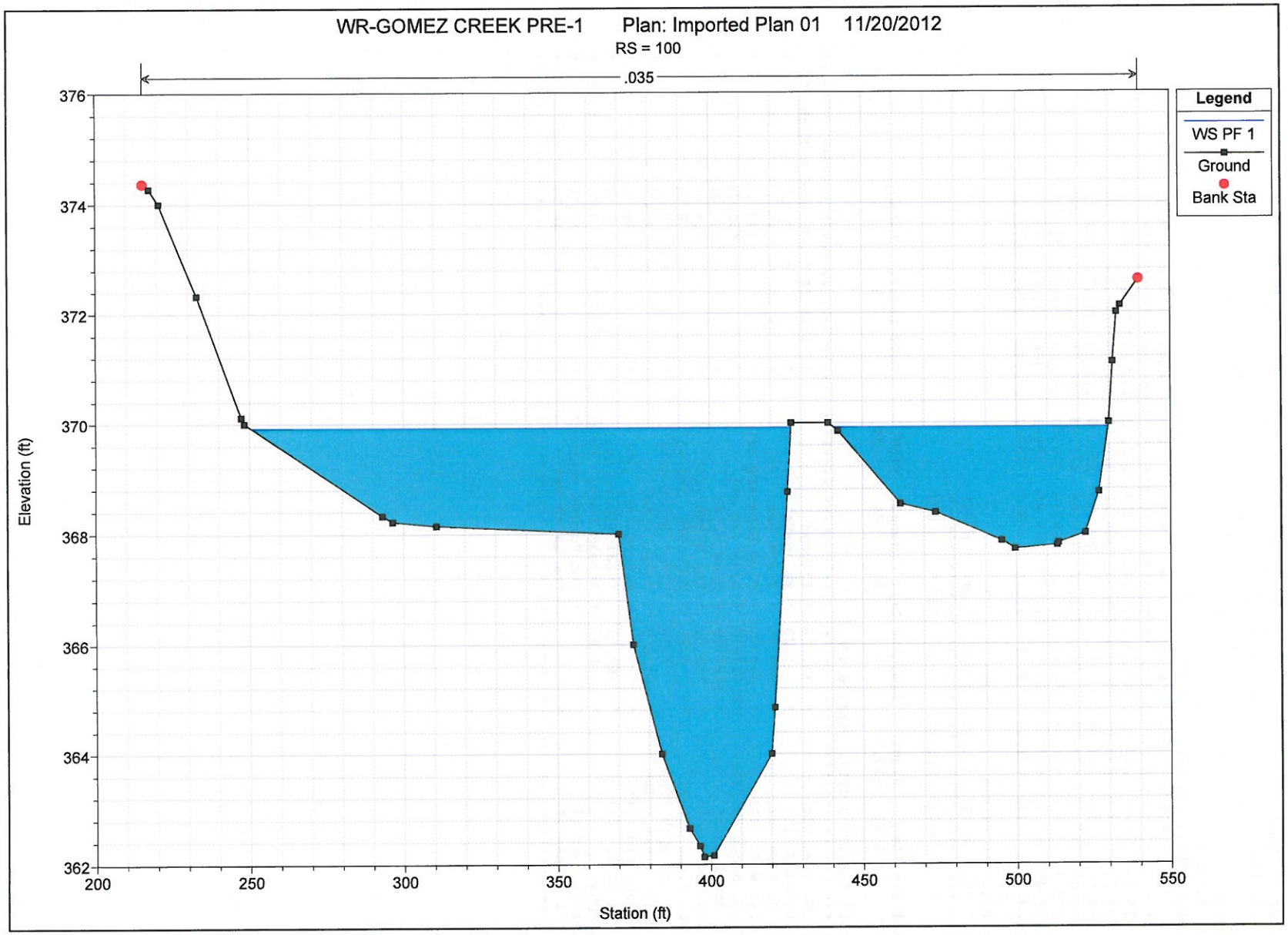
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	215.41	.035	539.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215.41	539.7	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	371.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.23	Wt. n-Val.		0.035	
W.S. Elev (ft)	369.92	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	369.92	Flow Area (sq ft)		639.14	
E.G. Slope (ft/ft)	0.013913	Area (sq ft)		639.14	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	265.60	Top Width (ft)		265.60	
Vel Total (ft/s)	8.91	Avg. Vel. (ft/s)		8.91	
Max Chl Dpth (ft)	7.79	Hydr. Depth (ft)		2.41	
Conv. Total (cfs)	48306.9	Conv. (cfs)		48306.9	
Length Wtd. (ft)		Wetted Per. (ft)		269.08	
Min Ch El (ft)	362.13	Shear (lb/sq ft)		2.06	
Alpha	1.00	Stream Power (lb/ft s)	539.70	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		45.80	
C & E Loss (ft)		Cum SA (acres)		34.21	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 100
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
376
374
372
370
368
366
364
362
200
250
300
350
400
450
500
550
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 90

INPUT
Description: 64
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
179.79	374.24	180.55	374	187.81	372.31	197.31	370	210.65	368.23
211.88	368	220.27	367.51	247.03	366	247.55	365.9	259.7	364
263.2	362.42	268.05	360	270.34	359.19	271.84	358.74	271.9	358.62
278.14	358.7	278.66	358.88	287.02	360	292.36	362	303.18	366
313.95	367.46	316.44	367.82	318.68	367.77	320.35	367.54	331.85	367.06
348.3	366	377.9	364.6	397.06	364.55	452.19	364.13	467.81	364.4
490.45	364.98	504.25	364.82	510.27	364.91	543.61	364.61	580.52	365.24
606.18	364.33	617.28	364.06	620.79	364	635.57	364.09	641.75	364.14
652.34	364.17	660.94	364.22	670.33	364.18	688.72	364	708.49	364.06
721.46	364.07	743.63	364.24	763.7	365.3	768.31	365.42	774.95	365.55
785.94	365.74	791.69	365.86	792.54	365.85	803.1	366	809.1	366
820.58	367.14	826.44	367.67	829.52	368	835.19	368.91	841.25	370
844.68	370.69	854.13	372	861.05	372.51	862.9	372.67	875.24	374

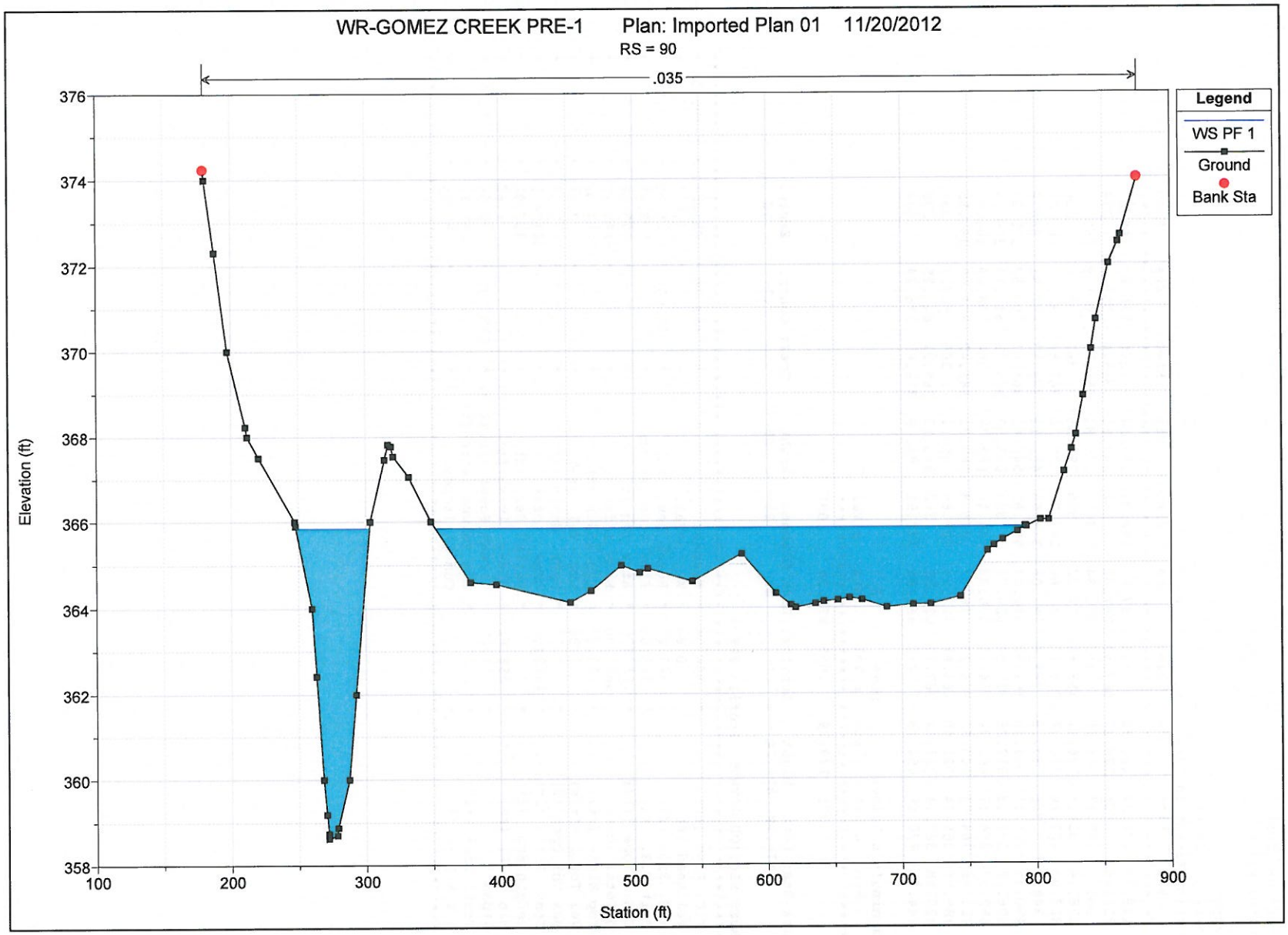
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	179.79	.035	875.24	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
179.79	875.24	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	366.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.84	Wt. n-Val.		0.035	
W.S. Elev (ft)	365.85	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	365.85	Flow Area (sq ft)		773.68	
E.G. Slope (ft/ft)	0.016675	Area (sq ft)		773.68	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	494.32	Top Width (ft)		494.32	
Vel Total (ft/s)	7.36	Avg. Vel. (ft/s)		7.36	
Max Chl Dpth (ft)	7.23	Hydr. Depth (ft)		1.57	
Conv. Total (cfs)	44124.2	Conv. (cfs)		44124.2	
Length Wtd. (ft)		Wetted Per. (ft)		496.92	
Min Ch El (ft)	358.62	Shear (lb/sq ft)		1.62	
Alpha	1.00	Stream Power (lb/ft s)	875.24	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		41.91	
C & E Loss (ft)		Cum SA (acres)		32.01	


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 90
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
376
374
372
370
368
366
364
362
360
358
100
200
300
400
500
600
700
800
900
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 80

INPUT
Description: 74
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
189.17	368.82	193.32	368	202.02	366.56	217.96	364	226.32	362
230.1	360	232.55	358.73	234.16	358	246.71	358	251.79	360
257.13	362	262.36	364	270.79	364.13	318.38	364.02	318.7	364
384.2	362.55	387.02	362.47	390.01	362.45	440.15	362.23	443.28	362.19
456.74	362.14	462.24	362.11	488.22	361.88	529.86	361.84	534.35	361.93
550.53	362.18	563.94	362.36	569.63	362.42	575.05	362.43	577.25	362.51
593.62	362.61	636.46	362.49	678.2	362.55	759.6	362.14	765.46	362.15
771.02	362.05	787.67	361.88	796.19	361.75	803.13	361.61	812.85	361.59
817.74	361.68	822.51	361.73	837.16	362	867.55	362.85	878.72	363.38
880.52	363.41	881.92	363.55	888.44	364	893.84	364.79	897.94	365.25
905.67	366	911.71	366.48	922.6	367.48				

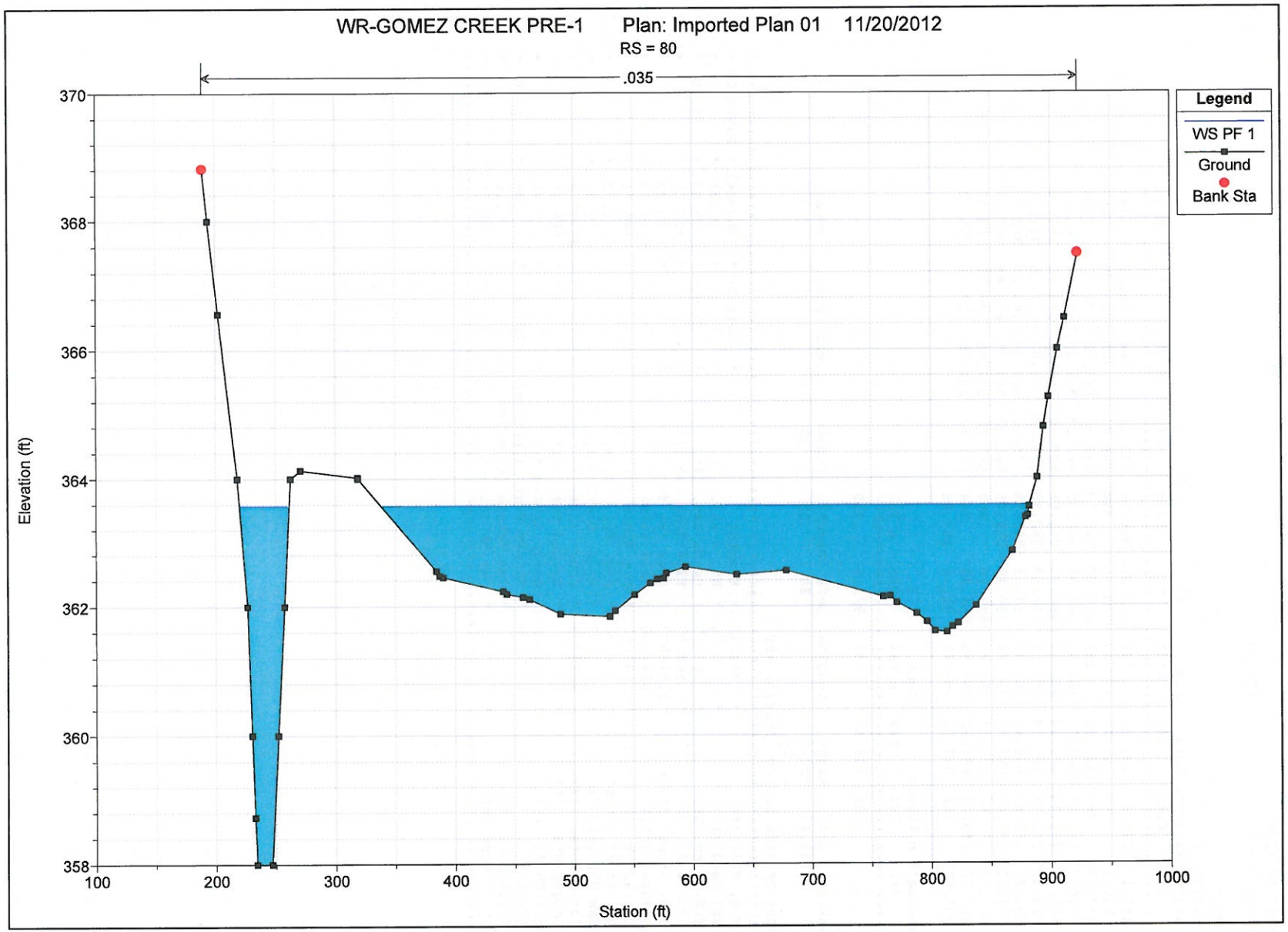
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	189.17	.035	922.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
189.17	922.6	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	364.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.74	Wt. n-Val.		0.035	
W.S. Elev (ft)	363.57	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	363.57	Flow Area (sq ft)		823.23	
E.G. Slope (ft/ft)	0.016972	Area (sq ft)		823.23	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	585.81	Top Width (ft)		585.81	
Vel Total (ft/s)	6.92	Avg. Vel. (ft/s)		6.92	
Max Chl Dpth (ft)	5.57	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	43737.3	Conv. (cfs)		43737.3	
Length Wtd. (ft)		Wetted Per. (ft)		588.05	
Min Ch El (ft)	358.00	Shear (lb/sq ft)		1.48	
Alpha	1.00	Stream Power (lb/ft s)	922.60	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		37.18	
C & E Loss (ft)		Cum SA (acres)		28.74	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 80
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
370
368
366
364
362
360
358
100
200
300
400
500
600
700
800
900
1000
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 70

INPUT
Description: 84
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
215.04	366	222.42	365.48	229.07	365.05	232.6	364.88	235.26	364.81
237.59	364.77	240.28	364.73	249.1	364	255.88	363.83	270.06	363.19
276.84	362.95	280.06	362.85	284.11	362.76	295.14	362	299.09	360.67
301.05	360	301.81	359.75	307.03	358	309.56	357.71	311	357.46
311.5	357.35	311.54	357.28	311.86	357.25	312.17	357.18	323.34	357.11
324.85	357.28	326.24	357.47	327.7	357.76	329.19	358	330.57	358.64
333.61	360	336.44	361.34	337.9	362	339	362.2	352.51	364
353.38	364.04	358	364.28	359.72	364.39	360.24	364.46	366.5	364.53
368.71	364.31	371.53	364	385.36	362.82	400.73	362	403.29	361.93
419.65	361.69	480.1	360.58	489.67	360.5	544.08	361.14	547.93	361.18
605.6	360.94	631.99	361.14	657.04	360.99	734.6	360.71	746.78	360.64
774.24	360.59	809.16	360.59	865.18	361.05	905.46	361.52	924.05	361.89
928.34	362	934.11	362.32	937.69	362.54	945.38	362.96	948.33	363.11
958.61	363.75	960.32	363.85	962.58	364	975.17	365.27		

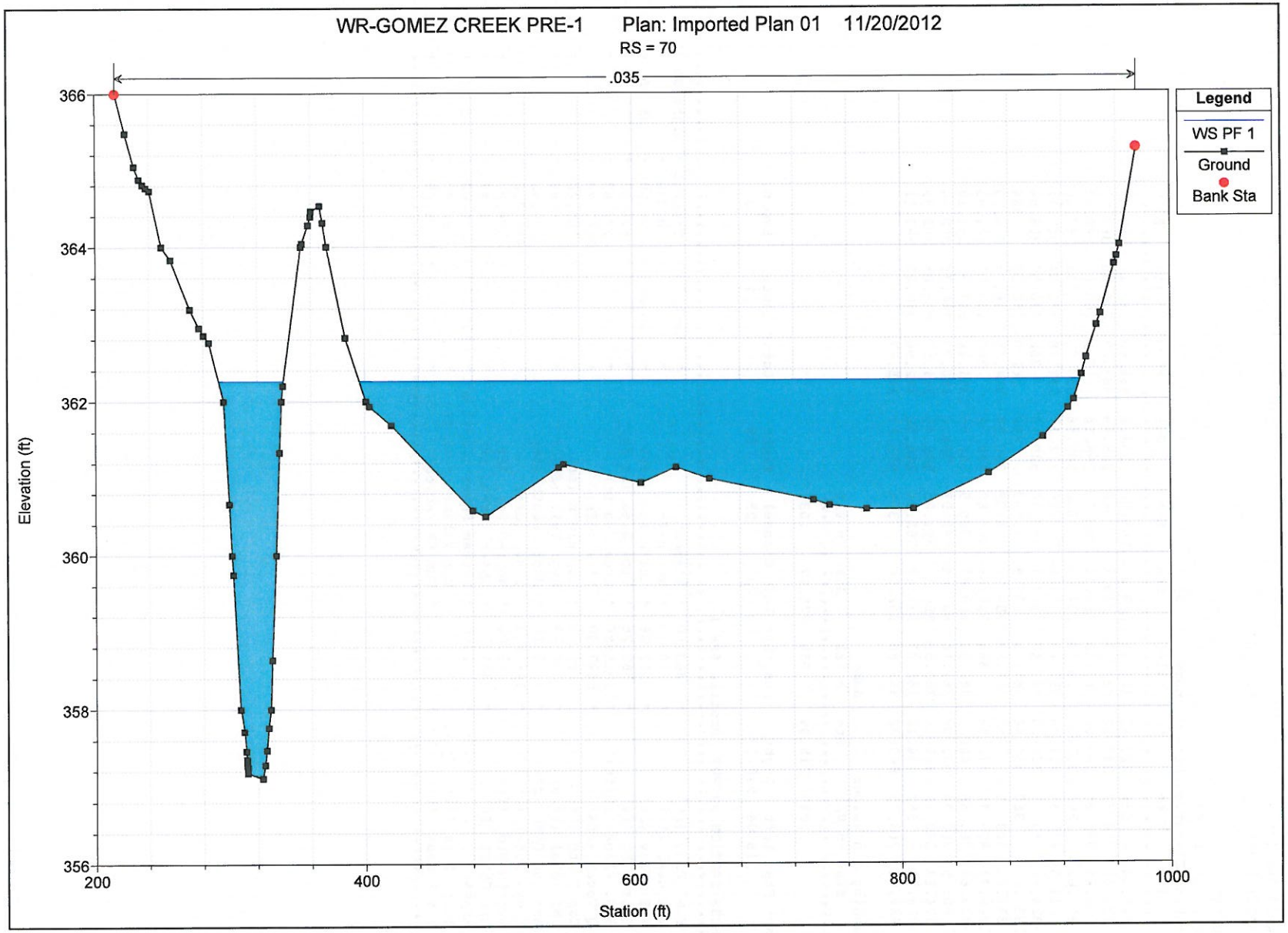
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	215.04	.035	975.17	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215.04	975.17	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	363.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.74	Wt. n-Val.		0.035	
W.S. Elev (ft)	362.26	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	362.26	Flow Area (sq ft)		826.83	
E.G. Slope (ft/ft)	0.016686	Area (sq ft)		826.83	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	585.20	Top Width (ft)		585.20	
Vel Total (ft/s)	6.89	Avg. Vel. (ft/s)		6.89	
Max Chl Dpth (ft)	5.15	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	44110.8	Conv. (cfs)		44110.8	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		586.97	
Min Ch El (ft)	357.11	Shear (lb/sq ft)		1.47	
Alpha	1.00	Stream Power (lb/ft s)	975.17	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		32.42	
C & E Loss (ft)		Cum SA (acres)		25.39	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 70
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
366
364
362
360
358
356
200
400
600
800
1000
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 60

INPUT
Description: 94
Station Elevation Data num= 103

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
233.08	367.28	241.11	366	243.71	365.41	250.47	364	253.91	362
255.65	360.98	257.45	360	259.03	359.07	260.96	358	262.18	357.26
264.49	356	264.94	355.74	265.13	355.43	266.02	355.22	266.45	355.05
268.09	354.91	275.86	354.99	275.95	355.01	277.87	355.15	279.31	355.26
280.99	355.41	283.31	355.7	285.66	355.93	286.28	356	286.82	356.41
289.51	358	290.65	358.79	292.62	360	299.89	360.27	304.48	360.46
332	360	332.82	360.04	333.55	360	339.63	359.83	359.2	359.25
363.59	359.14	364.95	359.1	365.97	359.06	375.79	358.74	418.64	358.46
486.35	358.64	489.28	358.67	489.62	358.68	491.42	358.71	546.93	360
565.19	360.04	569.82	360.06	571.15	360.06	572.57	360.08	573.97	360.08
577.17	360.09	579.72	360.09	581.73	360.1	584.78	360.1	585.28	360.08
586.86	360.06	588.2	360	589.38	359.94	591.53	359.91	593.76	359.91
595.41	359.95	596.7	360	605.03	360	605.12	359.98	612.84	359.93
616.96	359.92	623.26	359.98	623.92	360	660.18	360	661.39	360.01
670.31	360.01	673.87	360	682.5	359.94	694.58	359.91	697.73	359.92
699.26	359.94	700.31	359.97	701.71	360	706.58	360.06	709.14	360.08
710.96	360.09	711.85	360.09	712.59	360.1	715.82	360.12	722.85	360.12
727.78	360.1	729.44	360.09	730.78	360.06	733.28	360.04	735.94	360
755.46	360	757.27	359.99	823.23	359.41	862.29	359.45	946.02	359.38
948.23	359.39	975.22	360	986.35	360.48	1000.47	361.06	1011.5	361.48
1021.71	362	1032.18	362.86	1045.14	364				

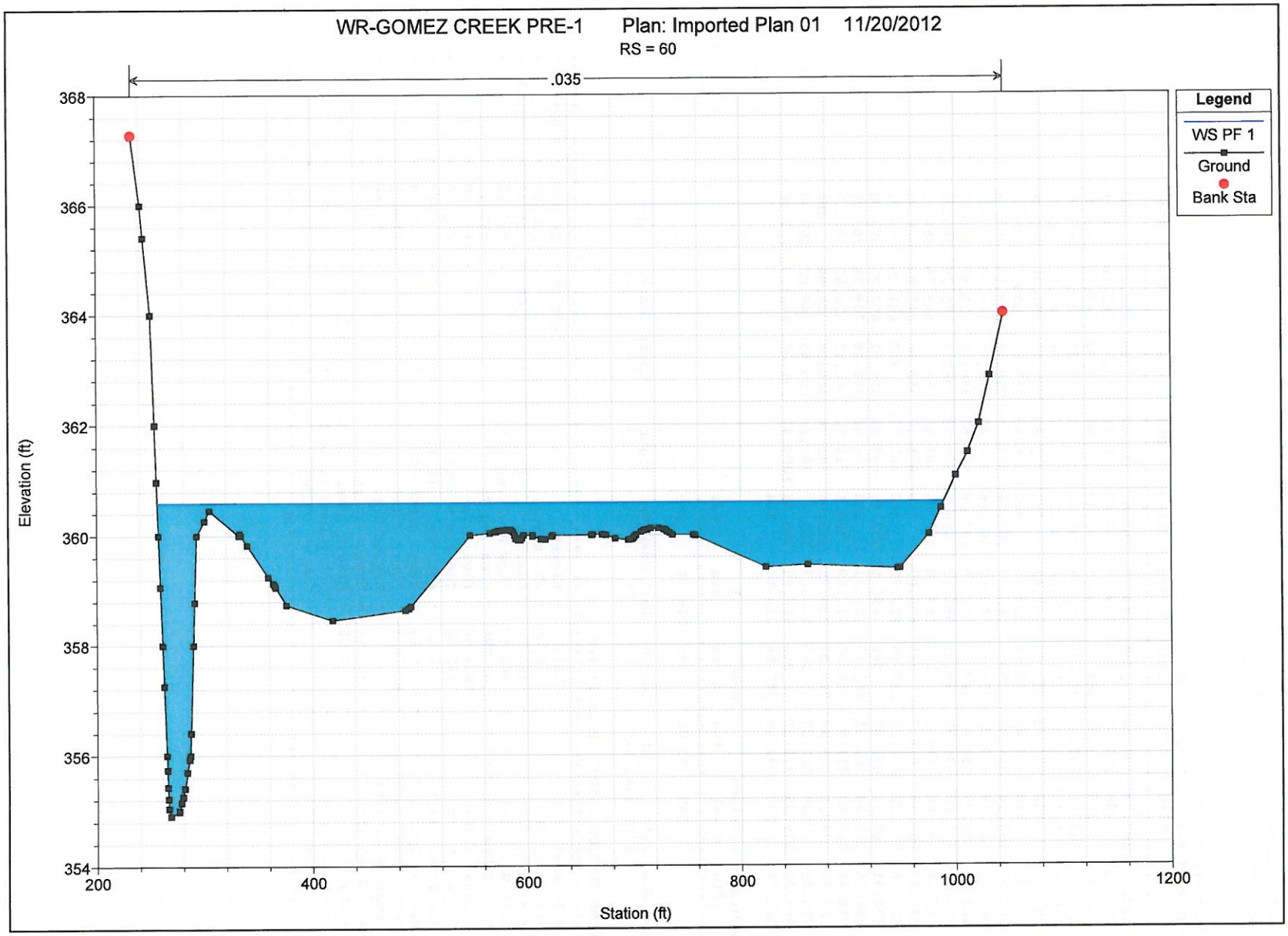
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	233.08	.035	1045.14	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
233.08	1045.14	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	361.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.		0.035	
W.S. Elev (ft)	360.60	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	360.60	Flow Area (sq ft)		880.47	
E.G. Slope (ft/ft)	0.018286	Area (sq ft)		880.47	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	732.86	Top Width (ft)		732.86	
Vel Total (ft/s)	6.47	Avg. Vel. (ft/s)		6.47	
Max Chl Dpth (ft)	5.69	Hydr. Depth (ft)		1.20	
Conv. Total (cfs)	42136.3	Conv. (cfs)		42136.3	
Length Wtd. (ft)		Wetted Per. (ft)		735.68	
Min Ch El (ft)	354.91	Shear (lb/sq ft)		1.37	
Alpha	1.00	Stream Power (lb/ft s)	1045.14	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		27.57	
C & E Loss (ft)		Cum SA (acres)		21.69	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 60
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
200
400
600
800
1000
1200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 50

INPUT
Description: 104
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
97.67	364	110.39	362.44	113.43	362	127.98	360	131.89	359.7
143.38	358.61	155.96	358.02	156.44	358	161.04	356	165.07	354.21
165.58	354	170.03	352	174.68	352	176.31	352.31	184.93	354
187.16	355	189.52	356	193.87	358	195.92	358.46	196.46	358.55
211.49	358.54	211.63	358.43	213.1	358.32	220	358	246.69	358
255.16	358.1	266.3	358.1	270.14	358.09	277.82	358	285.23	357.79
330.82	357.47	350.69	357.46	367.27	357.41	422.53	357.64	424.53	357.69
428.7	357.75	435.67	357.82	442.79	357.87	447	357.91	450.75	357.97
452.18	358	472.81	358.15	475.8	358.16	478.82	358.18	482.53	358.19
486.5	358.21	498.42	358.32	600.32	358	604.7	357.94	610.17	357.89
612.93	357.85	616.87	357.83	617.82	357.84	618.93	357.92	619.96	357.95
623.39	358	628.1	358.04	631.7	358.06	634.95	358.06	637.43	358.04
639.34	358	642.52	357.96	661.64	357.77	662.79	357.75	665.86	357.72
667.96	357.73	671.63	357.73	674.5	357.7	676.39	357.69	679.25	357.69
686.39	357.73	691.12	357.77	696.07	357.8	721.74	357.86	769.08	357.73
773.03	357.71	777.04	357.68	781.14	357.68	783.33	357.66	790.6	357.66
800.66	357.69	846.33	357.7	851.25	357.72	859.09	357.77	863.12	357.77
864.89	357.76	867.38	357.77	871.49	357.81	876.47	357.89	885.93	357.99
890.45	357.98	894.23	358	908.78	358.01	918.44	358	920.45	357.99
921.81	358	979.32	358	990	359.15	999.66	360	1001.48	360.48

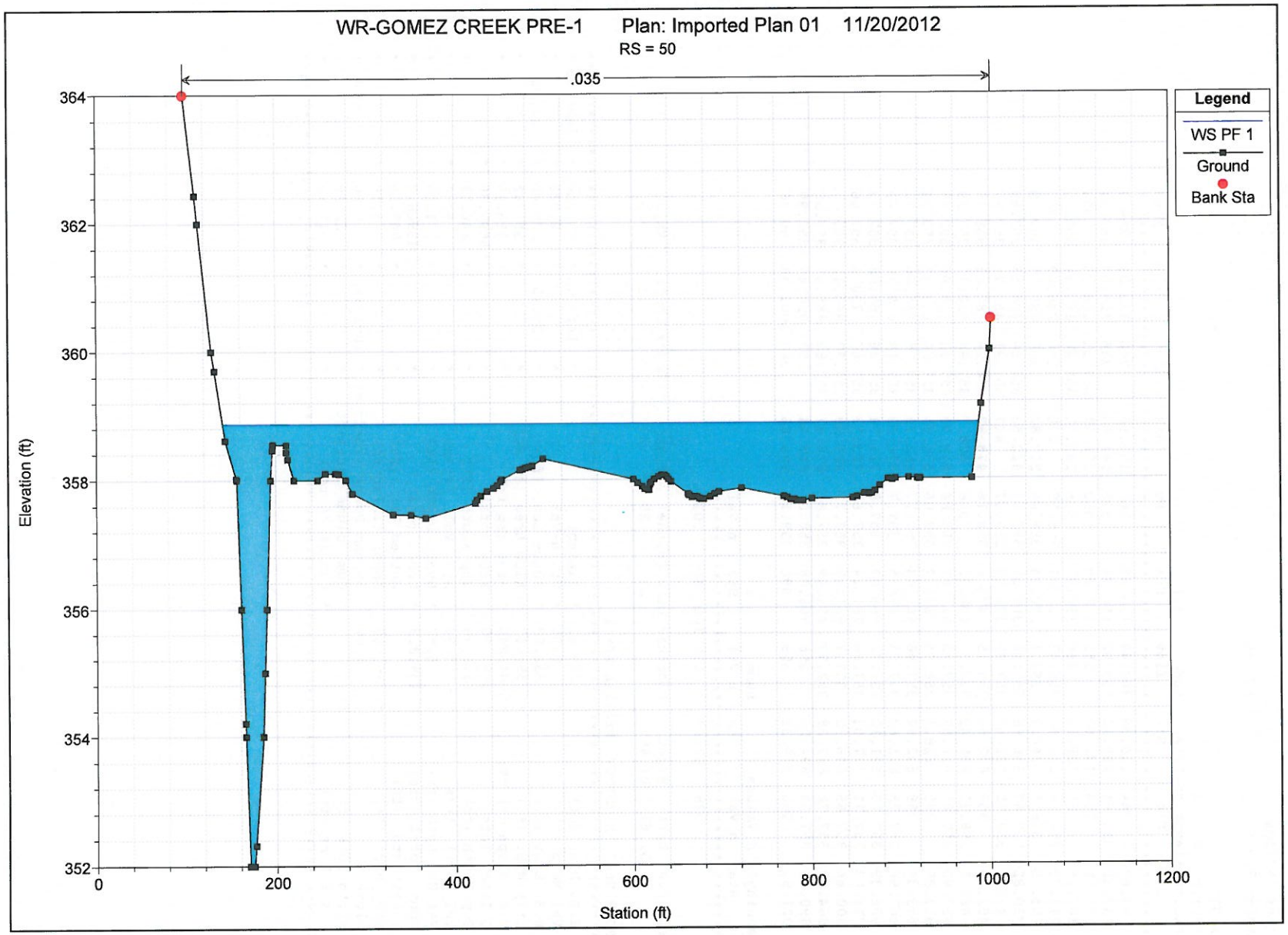
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	97.67	.035	1001.48	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
97.67	1001.48	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	359.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.		0.035	
W.S. Elev (ft)	358.87	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	358.87	Flow Area (sq ft)		955.85	
E.G. Slope (ft/ft)	0.016840	Area (sq ft)		955.85	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	846.74	Top Width (ft)		846.74	
Vel Total (ft/s)	5.96	Avg. Vel. (ft/s)		5.96	
Max Chl Dpth (ft)	6.87	Hydr. Depth (ft)		1.13	
Conv. Total (cfs)	43908.3	Conv. (cfs)		43908.3	
Length Wtd. (ft)		Wetted Per. (ft)		849.26	
Min Ch El (ft)	352.00	Shear (lb/sq ft)		1.18	
Alpha	1.00	Stream Power (lb/ft s)	1001.48	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		22.29	
C & E Loss (ft)		Cum SA (acres)		17.13	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 50
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
364
362
360
358
356
354
352
0
200
400
600
800
1000
1200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 40

INPUT
Description: 114
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
91.89	362.5	93.04	362.23	96.97	361.61	101.77	361	109.4	360
111.97	359.65	113.79	359.72	114.33	359.69	135.1	358	142.41	353.43
144.75	352	163.93	352	167.38	353.41	173.33	356	175.45	356.87
178.05	358	184.41	358	210.09	356	235.52	355.67	280.65	355.27
308.33	355.56	311.59	355.58	347.93	355.93	355.68	355.93	362.32	355.91
380.6	355.91	384.17	355.94	394.17	356	404.89	356.2	409.34	356.27
414.86	356.31	422.05	356.2	423.65	356.16	440.93	356.08	445.71	356.12
473.99	356.32	522.95	357.32	532.64	357.4	538.45	357.32	598.34	356.11
611.43	356.11	619.84	356.13	624.16	356.1	645.79	356	648.78	355.74
650.33	355.53	652.59	355.45	658.71	355.55	658.92	355.62	660.69	355.82
663.74	356	700.25	356	705.44	355.84	709.41	355.74	711.42	355.71
723.63	355.58	730.65	355.56	738.22	355.67	754.98	355.96	762.67	356.04
769.48	356.07	773.91	356.07	787.56	356.09	791.38	356.03	795.74	356
801.6	355.94	805.25	355.92	808.81	355.92	816.06	355.95	820.97	355.95
828.21	355.91	832.08	355.86	838.54	355.85	840.98	355.83	850.31	355.86
858.34	355.87	860.79	355.89	876.99	355.98	879.63	356	900.3	357.25
915.36	358	915.74	358.03	936.44	360	948.05	361.44		

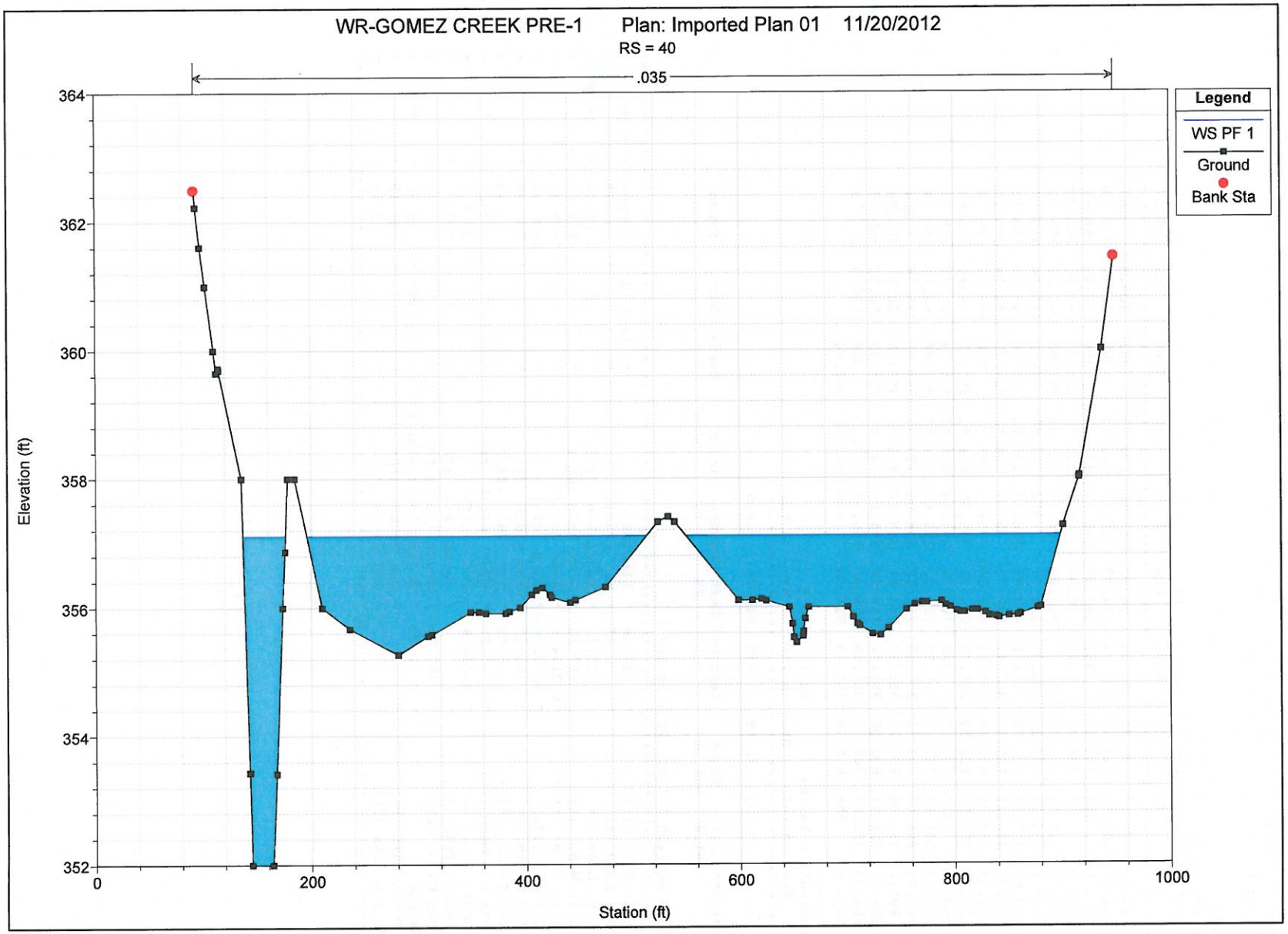
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	91.89	.035	948.05	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91.89	948.05	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	357.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.		0.035	
W.S. Elev (ft)	357.11	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	357.11	Flow Area (sq ft)		878.60	
E.G. Slope (ft/ft)	0.017496	Area (sq ft)		878.60	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	705.30	Top Width (ft)		705.30	
Vel Total (ft/s)	6.49	Avg. Vel. (ft/s)		6.49	
Max Chl Dpth (ft)	5.11	Hydr. Depth (ft)		1.25	
Conv. Total (cfs)	43076.4	Conv. (cfs)		43076.4	
Length Wtd. (ft)		Wetted Per. (ft)		707.97	
Min Ch El (ft)	352.00	Shear (lb/sq ft)		1.36	
Alpha	1.00	Stream Power (lb/ft s)	948.05	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		17.19	
C & E Loss (ft)		Cum SA (acres)		12.87	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 40
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
364
362
360
358
356
354
352
0
200
400
600
800
1000
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 30

INPUT
Description: 124
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
134.49	358	153.17	356.9	167.14	356	174.71	354.36	176.17	354
181.92	352	185.03	351.68	186.85	351.43	187.92	351.11	188.17	350.73
195.47	350.73	196.65	350.93	200.15	351.41	204.85	352	208.61	354
212.43	356	213.02	356.23	213.26	356.69	213.58	356.91	214.66	357.23
219.22	356.96	221.39	356.72	225.26	356.36	228.58	356	230.6	355.83
233.08	355.59	253.72	355.08	296.19	354.38	409.66	354.23	411.25	354.24
412.98	354.29	424.04	354.29	426.1	354.27	440.25	354.17	455.13	354
458.67	353.91	465.37	353.78	468.96	353.79	476.66	353.76	480.66	353.79
485.68	353.85	492.12	353.96	496.09	354.01	501.17	354.03	518.42	354
522.87	354	525.6	353.96	536.85	353.9	540.41	353.89	544.57	353.91
550.25	354	584.51	354	587.32	354.02	593.33	354.09	596.74	354.14
605.34	354.12	609.89	354.12	637.6	354.01	642.09	354.02	659.68	353.97
668.12	354	672.53	354.03	677.33	354.1	678.76	354.09	682.06	354
706.24	354	712.93	354.13	725.54	354.11	727.62	354.09	733.37	354
744.49	353.86	746.9	353.82	749.32	353.82	755.87	353.79	759.72	353.8
760.92	353.85	766.03	354	793.13	354.2	801.51	354.24	821.79	355.05
856.79	356	858.57	356.15	878.89	358	885.58	360		

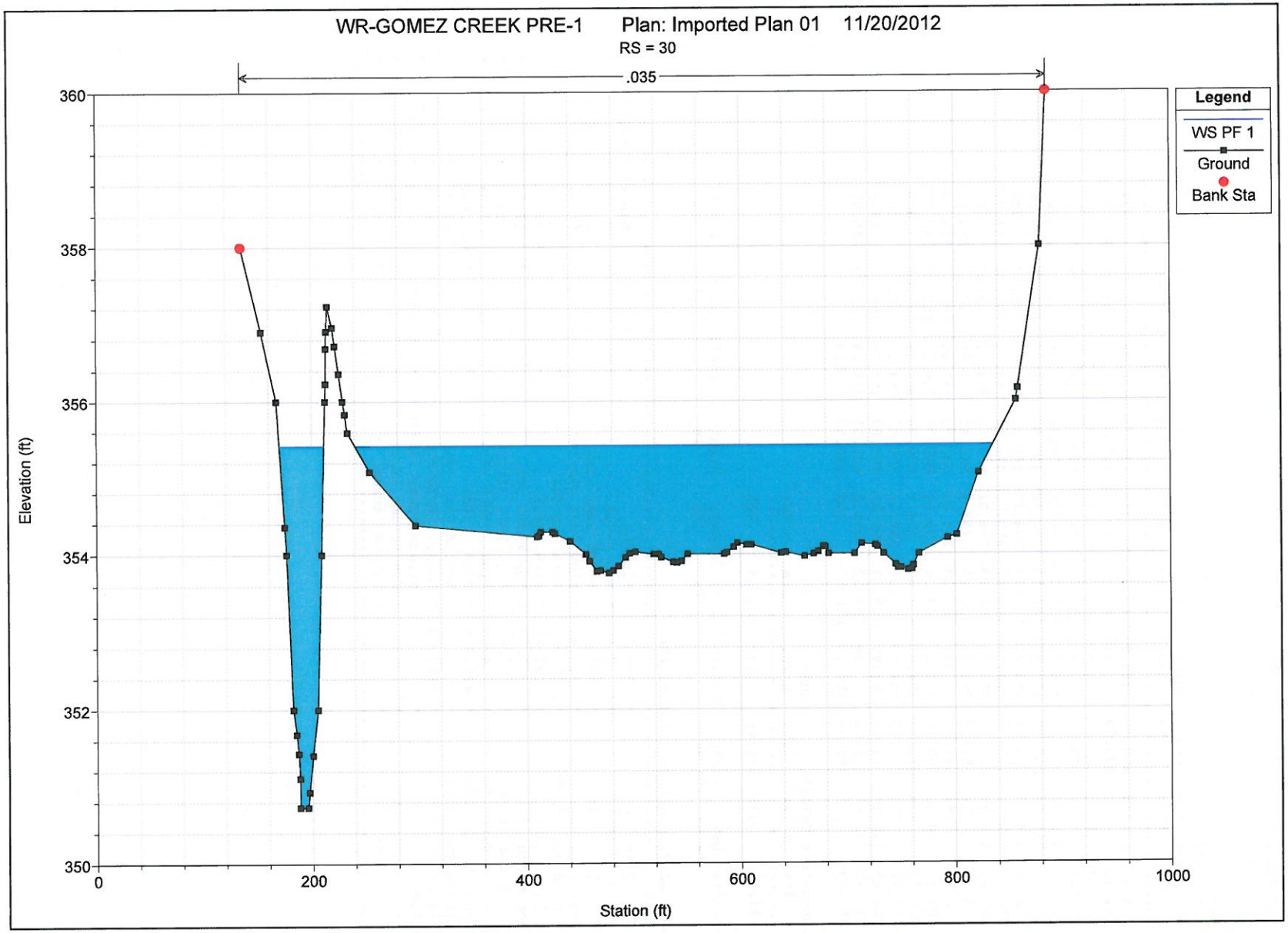
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
134.49	.035	134.49	.035	885.58	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
134.49	885.58	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.69	Wt. n-Val.		0.035	
W.S. Elev (ft)	355.42	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	355.42	Flow Area (sq ft)		851.91	
E.G. Slope (ft/ft)	0.016918	Area (sq ft)		851.91	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	637.33	Top Width (ft)		637.33	
Vel Total (ft/s)	6.69	Avg. Vel. (ft/s)		6.69	
Max Chl Dpth (ft)	4.69	Hydr. Depth (ft)		1.34	
Conv. Total (cfs)	43806.9	Conv. (cfs)		43806.9	
Length Wtd. (ft)		Wetted Per. (ft)		639.09	
Min Ch El (ft)	350.73	Shear (lb/sq ft)		1.41	
Alpha	1.00	Stream Power (lb/ft s)	885.58	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		12.11	
C & E Loss (ft)		Cum SA (acres)		8.77	


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 30
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
360
358
356
354
352
350
0
200
400
600
800
1000
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 18

INPUT
Description: 136
Station Elevation Data num= 130

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
154.8	354.98	159.5	355.03	159.83	354.99	160.26	354.94	161.61	354.77
163.22	354.59	166.96	354.16	168.5	354	169.5	353.32	171.45	352
173.34	350.79	174.57	350	176.32	348.98	178.05	348	180.32	347.6
181.54	347.35	182.92	347.03	183.53	346.92	185.58	346.63	186.19	346.56
186.7	346.47	191.54	346.46	191.62	346.47	192.57	346.62	195.03	347.02
195.75	347.11	203.63	348	206.21	348.44	214.58	350	218.49	351.2
221.43	352	224.51	353.31	226.17	354	241.48	354	247.23	353.84
271.41	353	341.82	352.56	368.98	352.5	370.15	352.49	372.13	352.49
372.71	352.48	373.33	352.48	374.3	352.47	443.83	352.09	444.4	352.09
464.98	352	465.45	351.99	469.61	351.95	476.19	351.91	481.51	351.89
486.33	351.89	491.61	351.93	495.35	351.97	497.53	352	546.14	352
546.91	351.99	564.48	351.58	572.53	351.68	573.95	351.68	574.79	351.67
575.55	351.65	576.18	351.64	577.12	351.63	581.83	351.66	589.58	351.69
591.73	351.69	593.17	351.7	594.2	351.7	596	351.72	606.2	351.79
638.87	351.69	641.15	351.72	644.71	351.74	648.02	351.71	649.67	351.68
650.96	351.61	653.21	351.6	657.45	351.57	659.69	351.57	661.7	351.58
667.17	351.62	675.71	351.7	696.46	351.94	701.61	351.99	702.27	352
703.38	352.01	704.99	352.02	706.57	352.01	707.18	352	709.91	351.96
711.33	351.93	712.58	351.88	714.49	351.85	726.99	351.82	730.2	351.88
730.53	351.91	732.02	351.94	736.74	352	740.77	352.06	742.58	352.1
743.83	352.13	744.92	352.16	746.15	352.2	747.55	352.23	752.34	352.29
754.85	352.31	761.37	352.35	788.25	352.6	851.27	352.79	855.13	352.76
855.41	352.76	867.99	352.88	907.64	353.12	941.72	353.07	994.5	353.13
1005.67	353.25	1005.77	353.24	1007.2	353.24	1008.19	353.23	1009.74	353.23
1011.38	353.24	1012.48	353.24	1022.34	353.17	1080.41	352.97	1094.87	352.95
1154.8	353.08	1161.13	353.26	1162.02	353.27	1188.42	353.66	1205.92	354

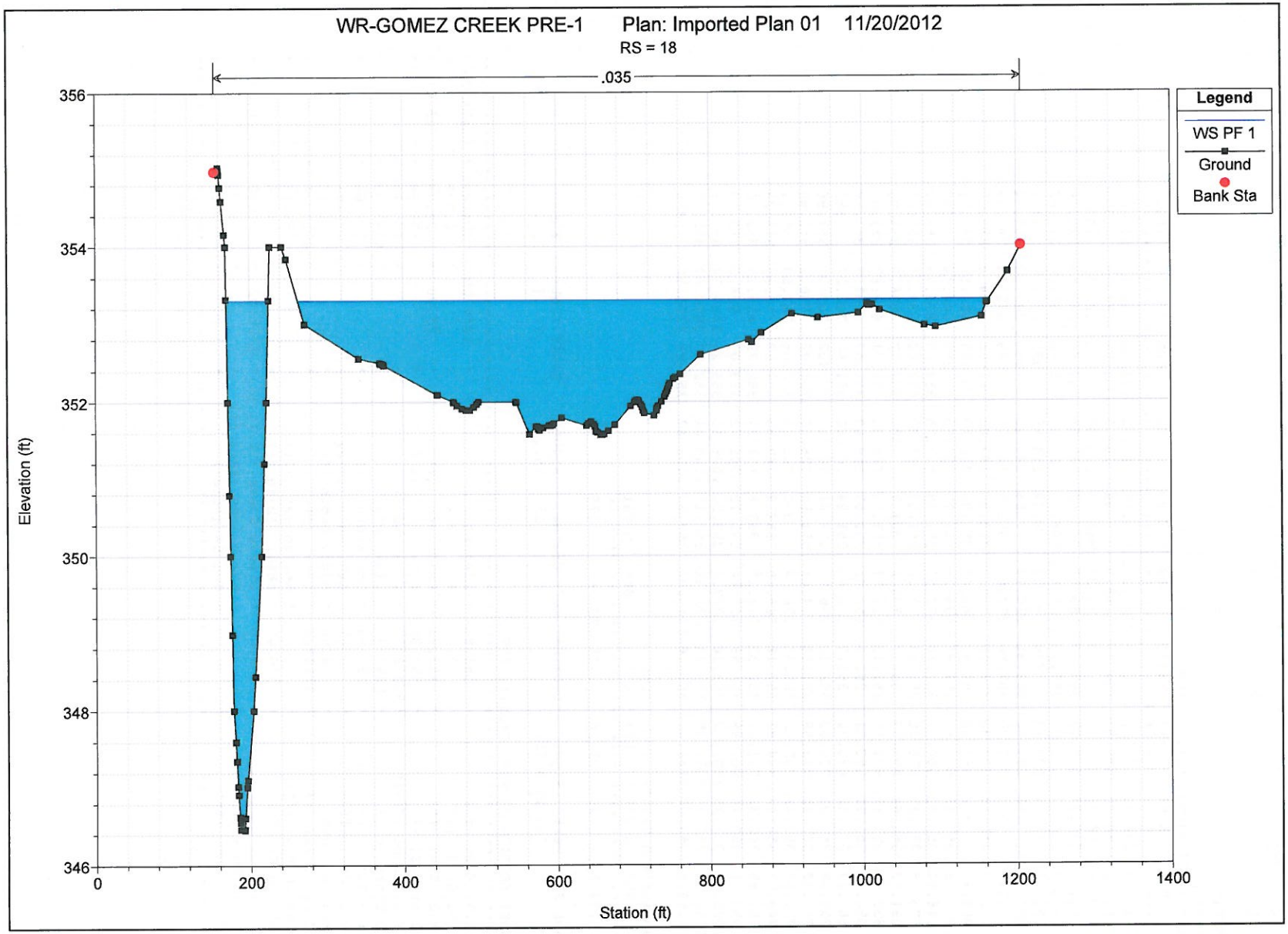
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
154.8	.035	154.8	.035	1205.92	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
154.8	1205.92	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.31	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	353.31	Flow Area (sq ft)		979.98	
E.G. Slope (ft/ft)	0.018237	Area (sq ft)		979.98	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	957.04	Top Width (ft)		957.04	
Vel Total (ft/s)	5.81	Avg. Vel. (ft/s)		5.81	
Max Chl Dpth (ft)	6.85	Hydr. Depth (ft)		1.02	
Conv. Total (cfs)	42192.6	Conv. (cfs)		42192.6	
Length Wtd. (ft)		Wetted Per. (ft)		959.58	
Min Ch El (ft)	346.46	Shear (lb/sq ft)		1.16	
Alpha	1.00	Stream Power (lb/ft s)	1205.92	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		6.01	
C & E Loss (ft)		Cum SA (acres)		3.87	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 18
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
0
200
400
600
800
1000
1200
1400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 17

INPUT
Description: 137
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
149.3	354.53	160.94	354.63	161.78	354.53	162.84	354.4	163.85	354.27
166.02	354	166.29	353.8	168.78	352	170.44	350.9	172.96	349.54
175.5	348	181.9	346.24	182.76	346	191.53	346	196.49	346.7
205.4	348	208.26	348.66	214.48	350	218.89	351.72	219.67	352
221.38	352.68	224.67	354	243.99	354	269.53	352.99	282.37	352.55
301.49	352.43	381.69	352.25	394.54	352.18	397.39	352.15	424.57	352.01
428.34	352.01	440.21	352.04	441.54	352.05	443.04	352.05	444.13	352.06
448.4	352.06	450.01	352.05	451.06	352.05	452.81	352.04	464.35	352
469.4	351.94	473.47	351.88	476.1	351.85	480.39	351.81	482.04	351.81
484.98	351.79	487.64	351.79	488.43	351.8	490.56	351.81	491.69	351.83
498.66	351.91	501	351.94	502.83	351.96	504.57	351.97	534.42	351.75
541.08	351.69	561.7	351.58	562.51	351.58	562.9	351.57	564.27	351.53
566.77	351.48	567.81	351.49	568.11	351.49	568.2	351.48	568.79	351.48
569.02	351.49	570.85	351.49	571.37	351.5	572.18	351.5	647.1	351.3
660.26	351.35	712.34	351.66	713.64	351.66	714.96	351.64	715.49	351.62
715.97	351.61	716.69	351.6	717.97	351.59	719.7	351.59	721.43	351.58
722.65	351.61	722.78	351.62	723.34	351.63	726.64	351.67	727.54	351.69
728.34	351.7	732.56	351.79	743.17	351.94	750.07	352.01	761.06	352.08
806.41	352.5	851.36	352.62	866.86	352.48	867.99	352.48	918.44	352.95
926.53	353	933.49	352.99	956.63	353.02	1004.42	352.95	1013.58	353.25
1017.69	353.25	1020.14	353.26	1087.5	353.03	1094.13	353.06	1096.1	353.06
1098.2	353.07	1146.69	353.19	1149.34	353.19	1161.12	353.23	1201.23	354

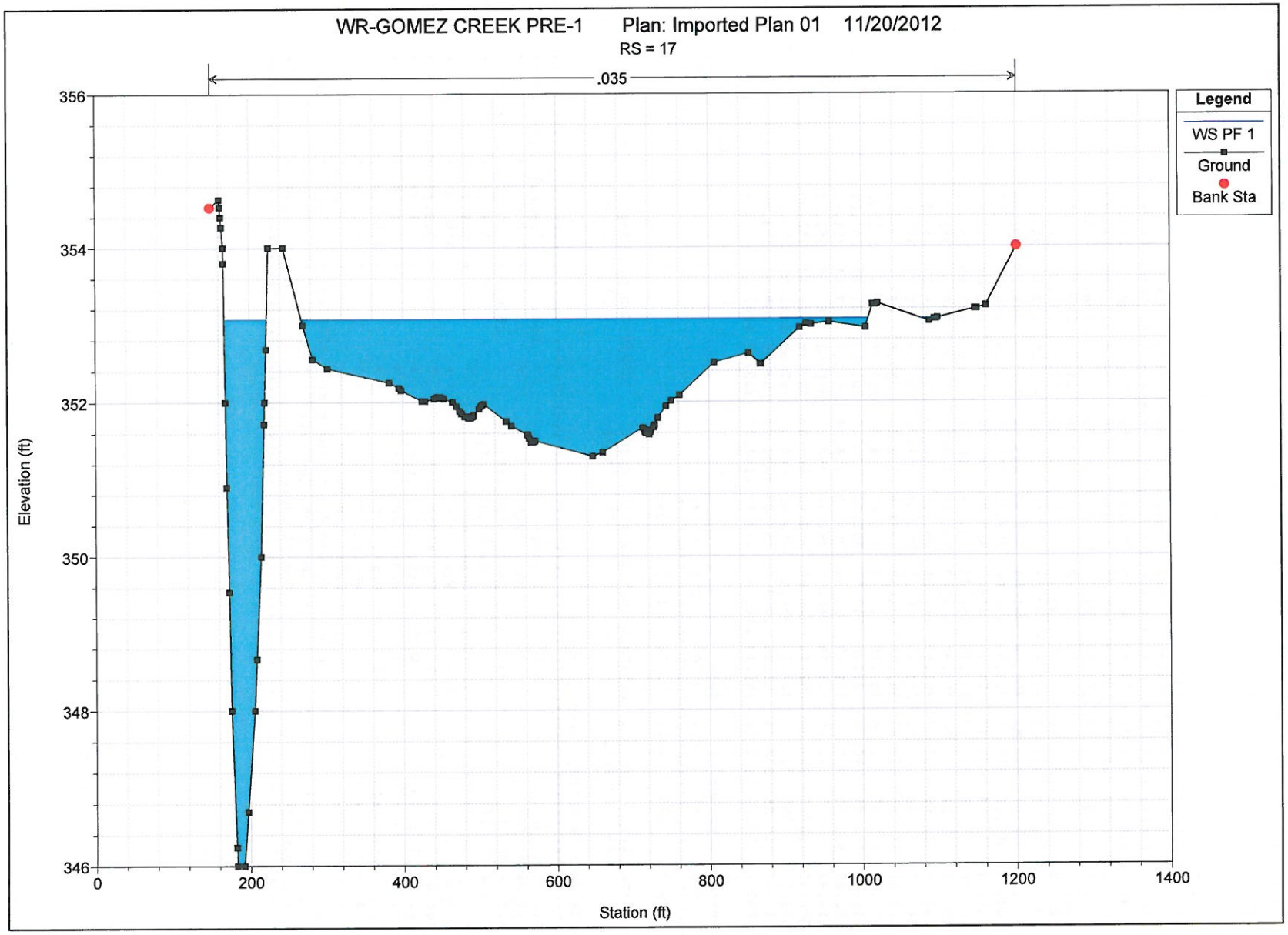
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
149.3	.035	149.3	.035	1201.23	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
149.3	1201.23	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.57	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.07	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	353.07	Flow Area (sq ft)		939.11	
E.G. Slope (ft/ft)	0.017102	Area (sq ft)		939.11	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	819.34	Top Width (ft)		819.34	
Vel Total (ft/s)	6.07	Avg. Vel. (ft/s)		6.07	
Max Chl Dpth (ft)	7.07	Hydr. Depth (ft)		1.15	
Conv. Total (cfs)	43571.0	Conv. (cfs)		43571.0	
Length Wtd. (ft)		Wetted Per. (ft)		822.03	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		1.22	
Alpha	1.00	Stream Power (lb/ft s)	1201.23	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		5.46	
C & E Loss (ft)		Cum SA (acres)		3.36	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 17
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
0
200
400
600
800
1000
1200
1400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 16

INPUT
Description: 138
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
143.75	354.06	162.38	354.22	163.73	354.07	164.31	354	165.23	353.29
166.96	352	169.12	350.44	169.78	350	170.7	349.6	173.93	348
180.24	346.18	180.82	346	194.78	346	205.35	347.77	206.63	348
207.18	348.16	214.04	350	218.02	351.59	219.1	352	219.89	352.31
223.84	354	238.2	354	243.8	353.78	293.1	352.23	294.92	352.21
297.46	352.2	345.58	352.08	346.03	352.08	346.61	352.09	347.46	352.09
347.74	352.08	351.77	352.08	393.93	352	394.6	352	409.45	351.95
411.33	351.95	415.24	351.93	425.43	351.9	428.18	351.9	430.71	351.91
436.43	351.97	438.57	352	439.14	352	440.45	352.01	441.21	352.02
456.02	352.02	460.58	352	483.95	351.74	486.23	351.71	486.74	351.7
487.88	351.7	488.17	351.69	489.1	351.69	489.51	351.7	489.91	351.7
490.28	351.71	491.07	351.72	491.51	351.72	491.87	351.73	492.2	351.73
506.24	351.62	601.63	351.18	649.39	351.07	702.39	351.28	719.75	351.44
756.12	351.85	758.74	351.87	763.07	351.89	779.03	352	797.1	352.22
799.84	352.26	802.11	352.28	806.04	352.3	811.32	352.3	812.68	352.31
829.66	352.39	851.45	352.44	878.59	352.2	880.57	352.2	910.04	352.48
911.69	352.47	916.45	352.45	918.85	352.45	922.08	352.47	923.03	352.48
923.68	352.5	924.18	352.54	924.54	352.59	926.6	352.66	929.3	352.65
935.23	352.65	936.88	352.66	938.46	352.66	943.87	352.7	992.04	352.63
1017.69	353.47								

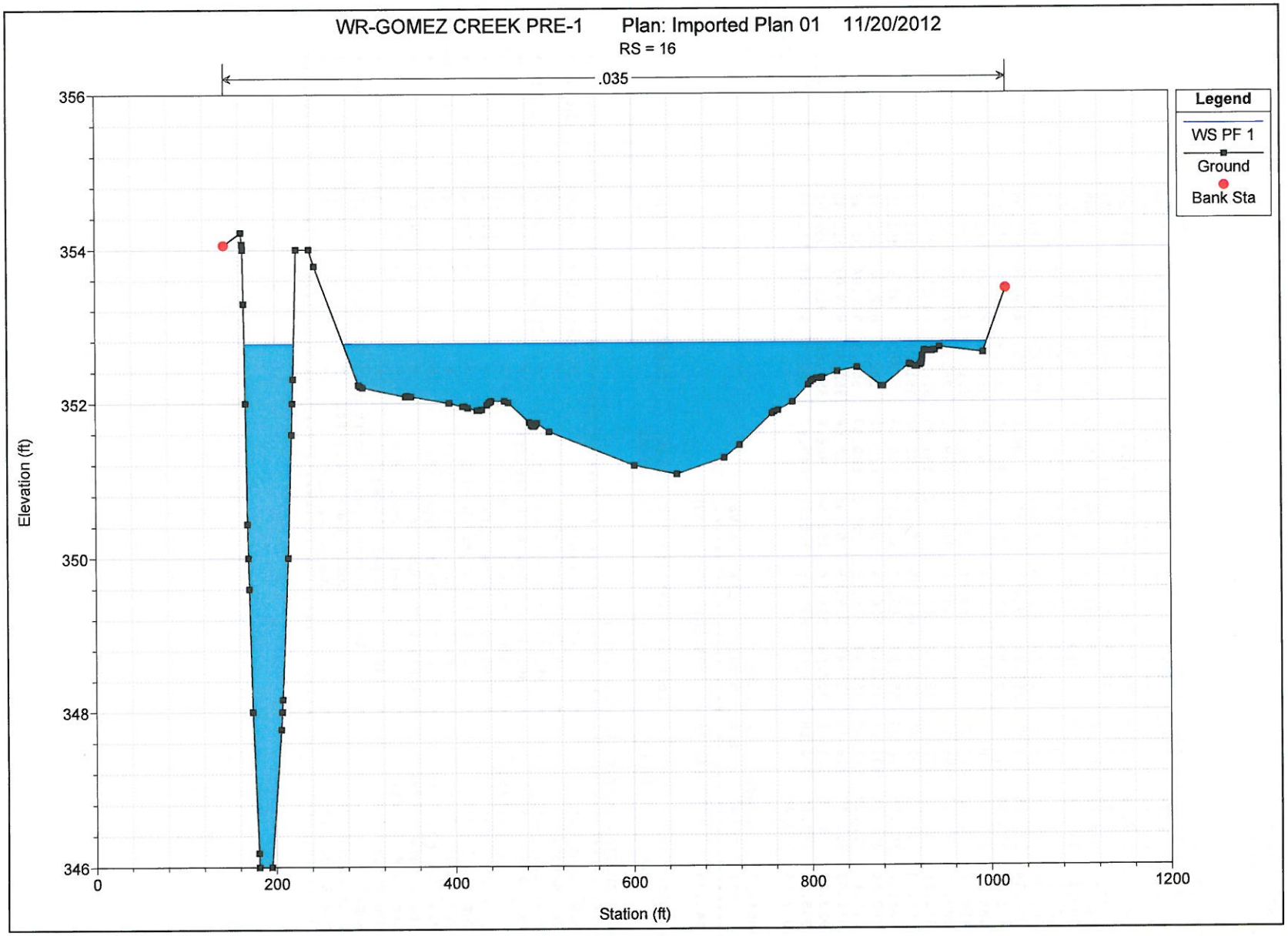
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
143.75	.035	143.75	.035	1017.69	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
143.75	1017.69	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.77	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	352.77	Flow Area (sq ft)		883.51	
E.G. Slope (ft/ft)	0.019480	Area (sq ft)		883.51	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	775.46	Top Width (ft)		775.46	
Vel Total (ft/s)	6.45	Avg. Vel. (ft/s)		6.45	
Max Chl Dpth (ft)	6.77	Hydr. Depth (ft)		1.14	
Conv. Total (cfs)	40824.6	Conv. (cfs)		40824.6	
Length Wtd. (ft)		Wetted Per. (ft)		778.10	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		1.38	
Alpha	1.00	Stream Power (lb/ft s)	1017.69	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		4.94	
C & E Loss (ft)		Cum SA (acres)		2.90	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 16
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
0
200
400
600
800
1000
1200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 15

INPUT
Description: 139
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
141.74	354	162.25	354	163.89	352.84	165.13	352	166.72	350.88
167.98	350	171.9	348	177.69	346.13	178.09	346	203.31	346
206.47	347.28	208.01	348	210.29	348.93	218.02	351.72	218.84	352
219.82	352.35	224.37	354	230	354	295.12	352.22	297.09	352.16
302.74	352	305.62	351.98	317.63	351.95	321.25	351.96	323.38	351.98
324.14	352	327.44	352.01	333.08	352.01	335.97	352	336.18	352
346.79	351.93	350.42	351.92	353.8	351.92	356.8	351.95	358.48	351.98
359.14	352	381.91	352	411.56	351.85	422.46	351.81	423.93	351.8
425.27	351.8	426.92	351.79	428.09	351.79	429.47	351.78	431.21	351.78
432.36	351.79	433.5	351.81	434.13	351.82	435.12	351.84	436.98	351.86
439.49	351.86	440.88	351.85	453.12	351.91	477.51	351.58	642.21	350.86
651.68	350.84	662.19	350.88	724.14	351.43	736.88	351.58	737.8	351.58
789.35	352.01	798.68	352.06	811.24	352.07	814.47	352.08	845.66	352.23
847.22	352.24	849.16	352.26	850.68	352.26	851.78	352.25	853.23	352.23
855.69	352.21	859.53	352.17	878.45	352	914.76	352	915.33	352.08
920.18	352.23	934.31	352.21	944.29	352.24	946.57	352.25	947.98	352.25
960.67	352.34	979.65	352.31	1021.8	353.7				

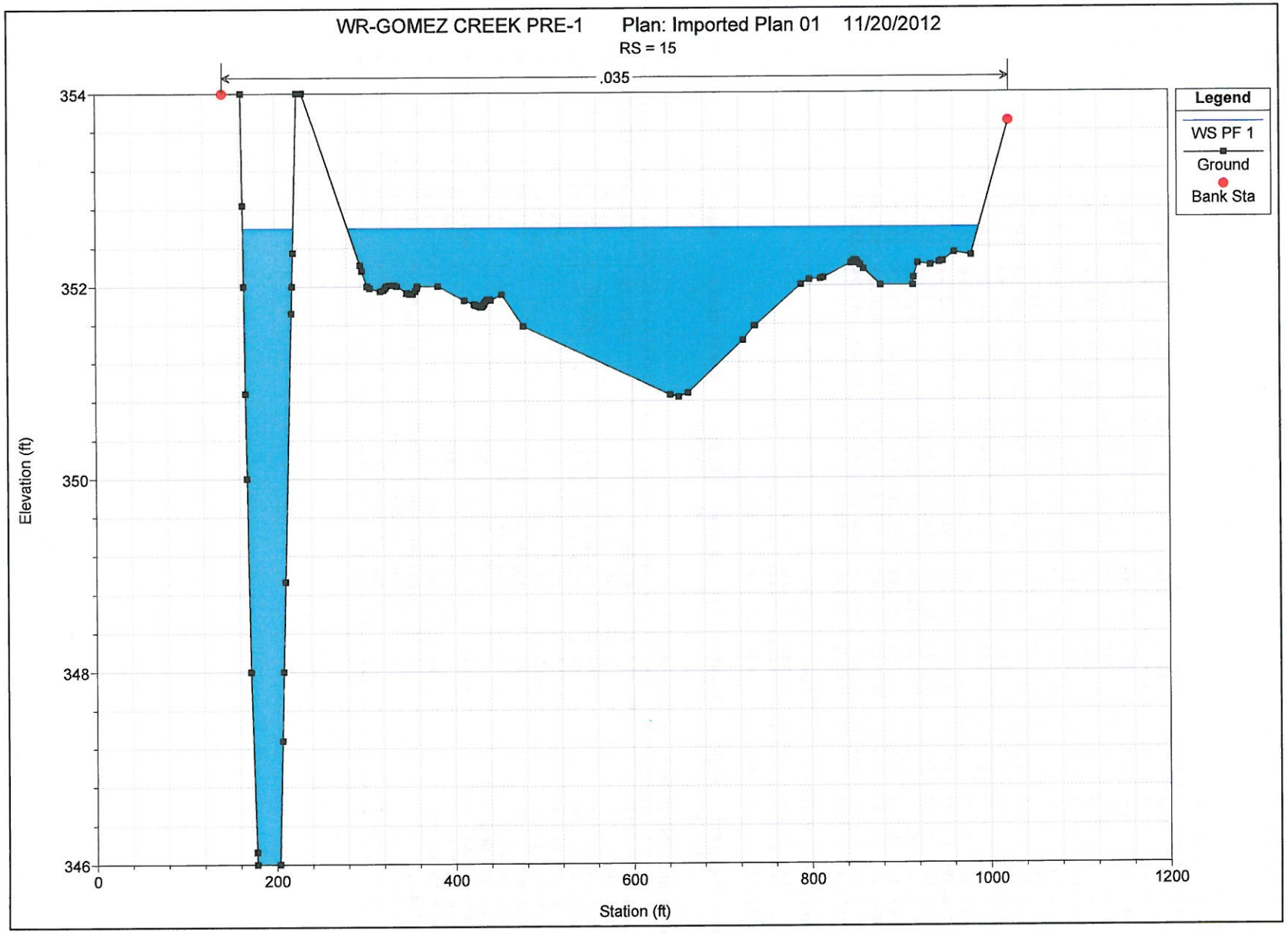
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
141.74	.035	141.74	.035	1021.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
141.74	1021.8	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.61	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	352.61	Flow Area (sq ft)		902.49	
E.G. Slope (ft/ft)	0.017795	Area (sq ft)		902.49	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	763.87	Top Width (ft)		763.87	
Vel Total (ft/s)	6.31	Avg. Vel. (ft/s)		6.31	
Max Chl Dpth (ft)	6.61	Hydr. Depth (ft)		1.18	
Conv. Total (cfs)	42713.1	Conv. (cfs)		42713.1	
Length Wtd. (ft)		Wetted Per. (ft)		766.75	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		1.31	
Alpha	1.00	Stream Power (lb/ft s)	1021.80	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		4.43	
C & E Loss (ft)		Cum SA (acres)		2.46	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 15
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
0
200
400
600
800
1000
1200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 14

INPUT
Description: 140
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
143.18	354	161.27	354	163.76	352.14	163.94	352	164.09	351.88
166.48	350	168.69	348.88	170.22	348	174.84	346.65	177.32	346
205.6	346	208.79	347.69	209.33	348	210	348.32	213.38	350
218.83	351.94	219.02	352	219.35	352.11	219.66	352.23	220.04	352.35
224.13	353.74	227.64	353.86	229.24	353.8	231.65	353.69	238.66	353.38
242.88	353.18	274.86	352.29	277.48	352.27	323.58	352	331.46	351.92
336.51	351.86	337.86	351.83	338.29	351.81	338.87	351.8	339.9	351.79
342.97	351.77	345.3	351.77	345.84	351.78	346.17	351.79	348.86	351.79
351.79	351.77	352.71	351.76	353.57	351.76	354.33	351.77	354.76	351.78
355.46	351.8	356.73	351.82	359.36	351.84	362.42	351.85	363.93	351.84
389.99	351.85	433.05	351.61	446.95	351.67	462.11	351.47	588.88	350.95
649.33	350.94	657.36	351.03	660.91	351.03	662.11	351.04	665.26	351.04
665.4	351.05	666.15	351.06	669.63	351.1	670.28	351.11	725.11	351.54
729.28	351.41	767.45	351.74	771.48	351.76	790.75	352	799.97	351.83
802.51	351.83	811.4	351.85	813.98	351.85	816.46	351.86	819.1	351.88
825.13	351.96	827.2	352	831.16	352.04	833.59	352.04	843.17	352
847.65	351.94	847.82	351.89	868.77	352	966.78	352	968.17	352.01
970.78	352.05	976.93	352.74	1000.72	353.1	1025.91	353.93		

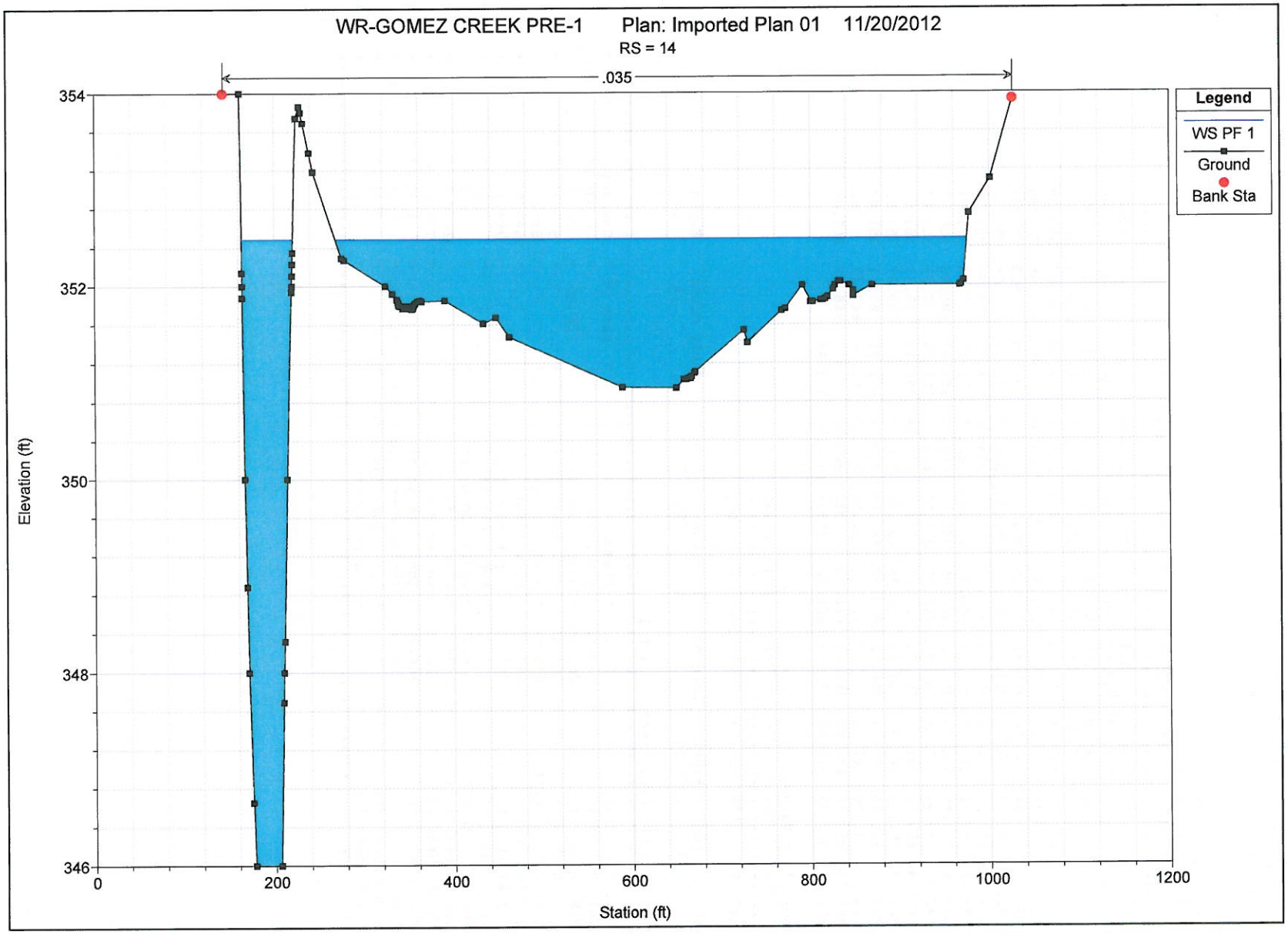
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
143.18	.035	143.18	.035	1025.91	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
143.18	1025.91	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.49	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	352.49	Flow Area (sq ft)		899.72	
E.G. Slope (ft/ft)	0.017994	Area (sq ft)		899.72	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	764.15	Top Width (ft)		764.15	
Vel Total (ft/s)	6.33	Avg. Vel. (ft/s)		6.33	
Max Chl Dpth (ft)	6.49	Hydr. Depth (ft)		1.18	
Conv. Total (cfs)	42476.9	Conv. (cfs)		42476.9	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		767.24	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		1.32	
Alpha	1.00	Stream Power (lb/ft s)	1025.91	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		3.91	
C & E Loss (ft)		Cum SA (acres)		2.02	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 14
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
0
200
400
600
800
1000
1200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 13

INPUT
Description: 141
Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
143.29	354	161.26	354	161.86	353.47	163.52	352	164.81	350.8
165.71	350	166.09	349.65	167.74	348	173.16	346.79	176.86	346
199.84	346	206.31	347.39	208.47	348	209.81	348.45	214.34	350
218.7	351.7	219.44	352	245	352.38	249.65	352.44	252.97	352.45
253.89	352.45	255.31	352.43	255.44	352.42	256.76	352.4	258.97	352.39
263.63	352.39	265.44	352.38	312.21	352	315.1	351.96	323.1	351.93
339.78	351.65	358.38	351.51	418.49	351.51	420.89	351.49	435.33	351.41
440.77	351.44	446.7	351.36	498.09	351.16	548.71	351.18	550.66	351.19
553.58	351.19	555.57	351.2	558.54	351.2	560.47	351.21	562.64	351.21
563.22	351.22	563.67	351.22	564.3	351.23	565.5	351.23	578.48	351.16
645.45	351.15	664.17	351.36	666.85	351.37	675.23	351.37	682.36	351.39
682.56	351.39	682.87	351.4	684.62	351.42	694.25	351.55	722.09	351.76
735.3	351.38	745.11	351.46	746.14	351.47	788.81	352	809.22	351.62
812.23	351.62	812.77	351.63	813.33	351.63	815.82	351.67	816.51	351.67
818.67	351.65	819.48	351.64	887.53	352	895.27	352	901.59	352.33
905.45	352.45	909.22	352.58	913.38	352.58	919.86	352.48	924.45	352.78
926.29	352.77	931.7	352.87	938.1	353.25	940.71	353.38	950.99	354

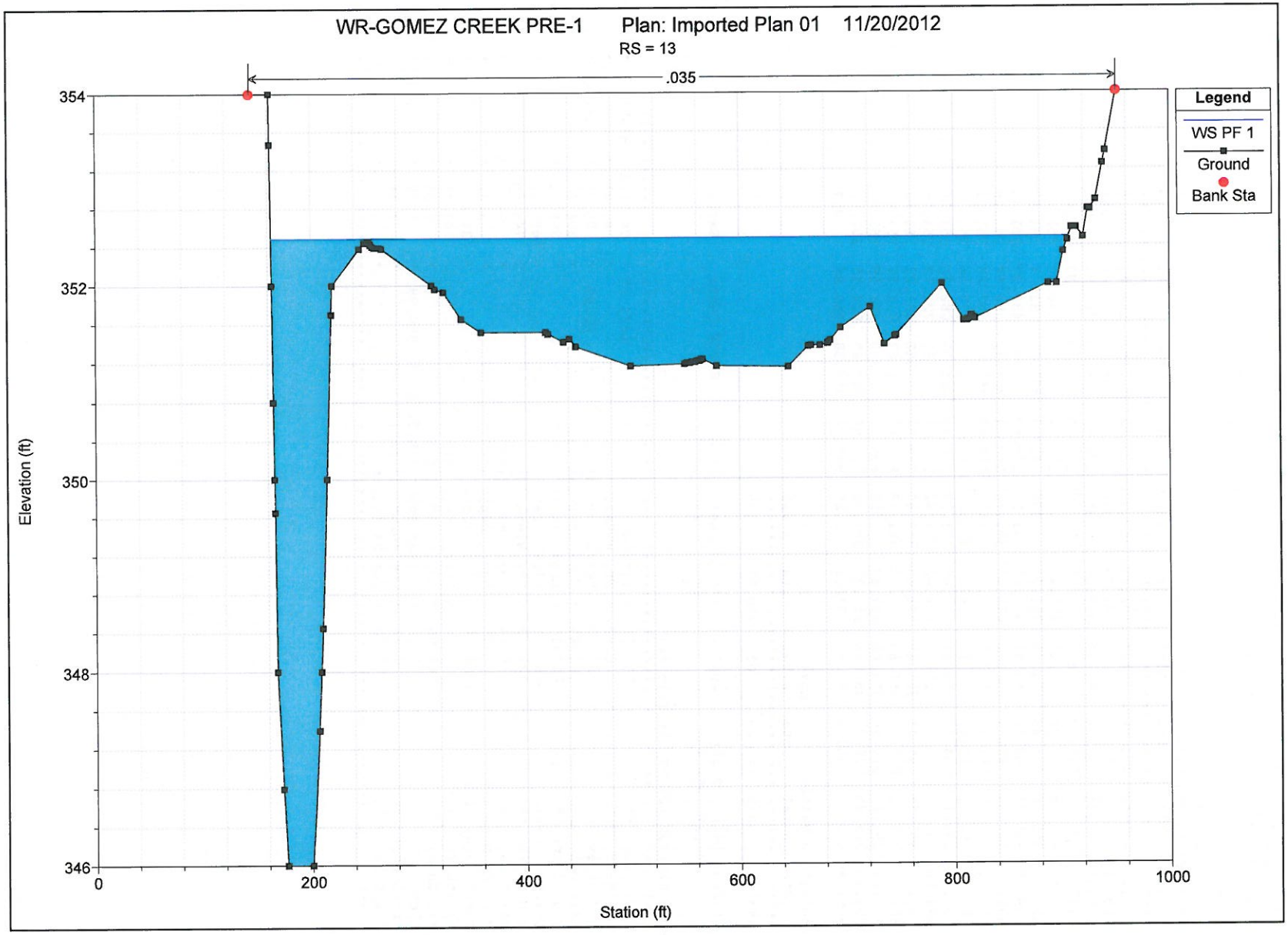
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
143.29	.035	143.29	.035	950.99	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
143.29	950.99	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.49	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	352.49	Flow Area (sq ft)		899.21	
E.G. Slope (ft/ft)	0.017410	Area (sq ft)		899.21	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	744.46	Top Width (ft)		744.46	
Vel Total (ft/s)	6.34	Avg. Vel. (ft/s)		6.34	
Max Chl Dpth (ft)	6.49	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	43182.9	Conv. (cfs)		43182.9	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		747.44	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		1.31	
Alpha	1.00	Stream Power (lb/ft s)	950.99	0.00	0.00
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)		3.39	
C & E Loss (ft)	0.00	Cum SA (acres)		1.59	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 13
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
0
200
400
600
800
1000
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 12

INPUT
Description: 142
Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
142.2	354	149.86	354	153.09	353.62	157.53	353.15	158.8	353.21
159.54	354	160.76	354	161.04	353.71	163.11	352	163.85	351.27
165.06	350	166.34	348.72	167.03	348	172.04	346.48	172.85	346
193.55	346	194.4	346.11	202.27	347.05	209.12	348	211.62	348.8
215.08	350	218.07	351.17	220.41	352	228.62	352.11	235.2	352.21
249.8	352.25	253.81	352.25	260.06	352.15	260.63	352.1	266.46	352.05
276.14	352	278.7	352	291.77	351.9	296.54	351.9	304.15	351.81
316.1	351.59	316.75	351.58	317.14	351.57	317.73	351.57	318.97	351.55
365.81	351.21	429.37	351.19	436.1	351.36	437.43	351.37	441.95	351.37
443.71	351.38	538.94	351.42	557.41	351.46	559.81	351.47	564.31	351.47
565.39	351.48	576.42	351.51	577.99	351.52	579.2	351.52	580.89	351.54
584.14	351.56	619.05	351.36	641.58	351.35	670.97	351.7	683.96	351.7
699.54	351.74	699.86	351.75	700.35	351.75	703.09	351.79	718.22	351.99
719.06	351.99	719.81	351.97	726.69	351.85	731.44	351.8	735.98	351.77
740.13	351.77	743.74	351.78	753.14	351.79	777.47	351.88	786.86	352
790.85	351.93	796.61	351.96	801.38	352	802	352.04	802.25	352.04
807.78	352.4	812.85	352.86	818.8	353.08	823.9	353.33	834.17	353.67
835.12	353.7	836.56	353.7	844.21	354				

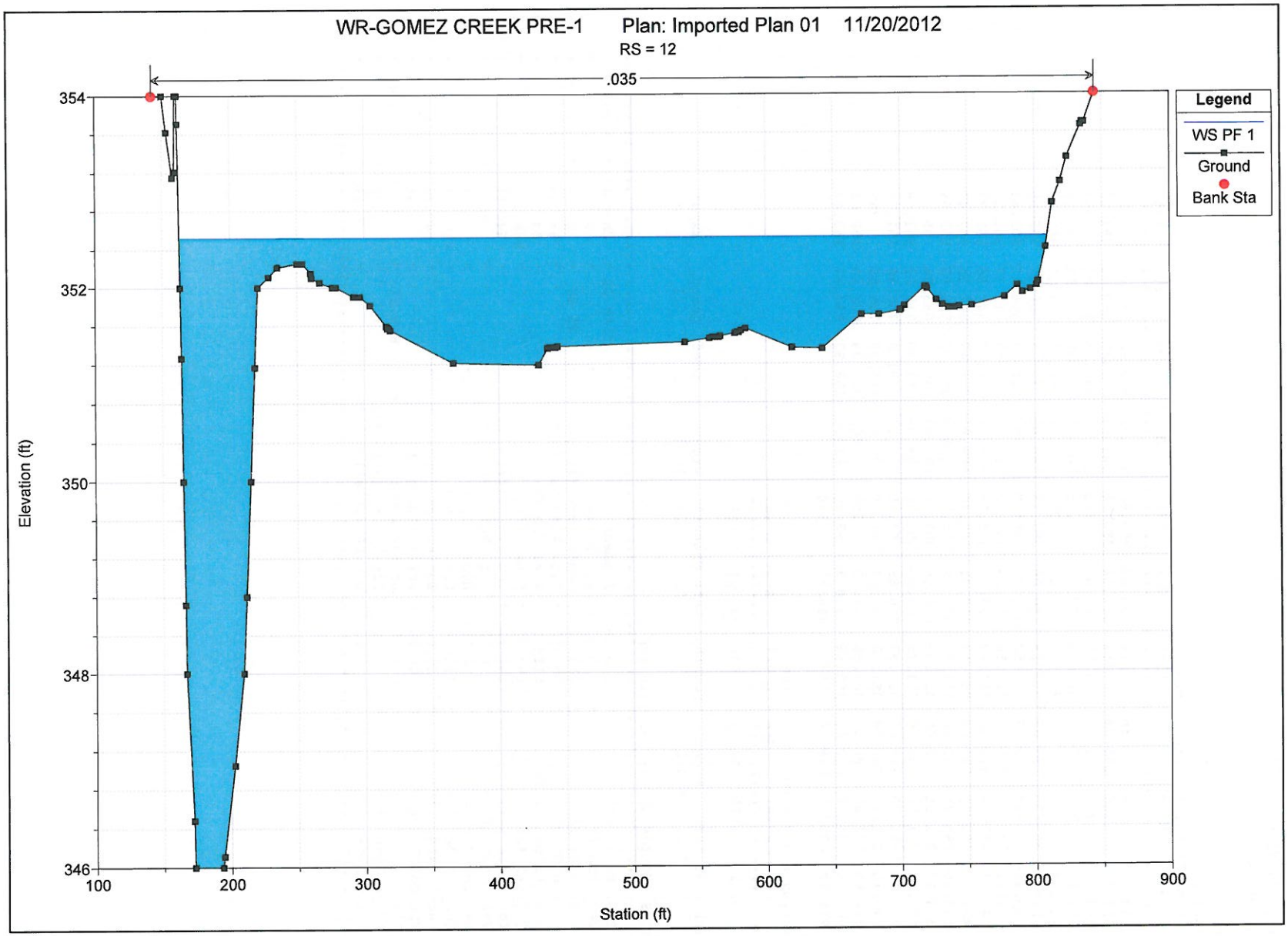
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
142.2	.035	142.2	.035	844.21	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
142.2	844.21	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.52	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	352.52	Flow Area (sq ft)		835.51	
E.G. Slope (ft/ft)	0.018451	Area (sq ft)		835.51	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	646.62	Top Width (ft)		646.62	
Vel Total (ft/s)	6.82	Avg. Vel. (ft/s)		6.82	
Max Chl Dpth (ft)	6.52	Hydr. Depth (ft)		1.29	
Conv. Total (cfs)	41947.4	Conv. (cfs)		41947.4	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		649.71	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		1.48	
Alpha	1.00	Stream Power (lb/ft s)	844.21	0.00	0.00
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)		2.90	
C & E Loss (ft)	0.01	Cum SA (acres)		1.19	


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 12
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
100
200
300
400
500
600
700
800
900
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 11

INPUT
Description: 143
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
136.77	352.95	149.58	353.2	161.6	352	162.61	350.97	163.61	350
164.21	349.41	165.63	348	166.92	346.7	167.54	346	204.8	346
205.77	346.31	210.62	348	214.55	349.36	216.25	350	221.04	351.72
221.8	352	222.39	352.16	226.7	352	246.63	352.05	253.74	352.05
256.88	352	269.53	352	272.36	351.98	277.71	351.92	316.44	351.67
322.44	351.67	344.93	351.11	373.23	350.91	408.56	350.89	434.14	351.57
439.2	351.58	440.66	351.58	441.72	351.59	453.51	351.6	456.36	351.61
559.26	351.72	563.16	351.74	570.48	351.75	572.25	351.75	590.21	351.8
592.76	351.81	594.74	351.83	600.42	351.87	602.77	351.89	621.82	351.78
626.54	351.87	631.51	352	634.08	352.05	634.33	352.05	638.52	352.11
643.46	352.12	648.41	352.1	657.48	352.02	657.56	352.02	663.99	352.01
669.91	352.02	676.34	352.11	681.25	352.13	683.28	352	690.16	352.36
697.06	352.36	700	352.39	705.47	352.49	716.44	352.72	717.6	352.85
717.84	352.86	718.2	352.89	732.14	354				

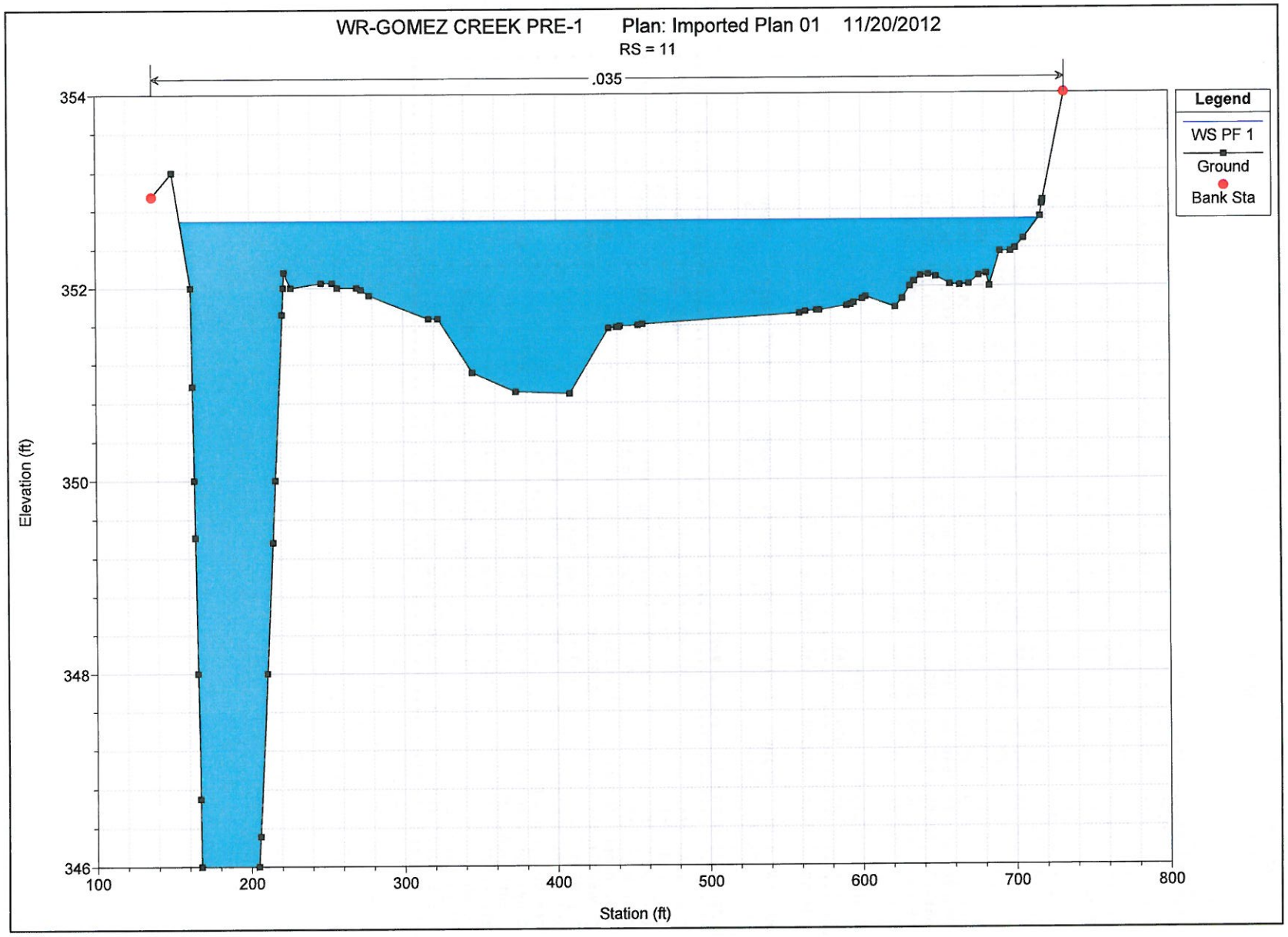
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
136.77	.035	136.77	.035	732.14	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
136.77	732.14	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.70	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	352.70	Flow Area (sq ft)		830.78	
E.G. Slope (ft/ft)	0.015583	Area (sq ft)		830.78	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	560.68	Top Width (ft)		560.68	
Vel Total (ft/s)	6.86	Avg. Vel. (ft/s)		6.86	
Max Chl Dpth (ft)	6.70	Hydr. Depth (ft)		1.48	
Conv. Total (cfs)	45644.9	Conv. (cfs)		45644.9	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		564.31	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		1.43	
Alpha	1.00	Stream Power (lb/ft s)	732.14	0.00	0.00
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)		2.42	
C & E Loss (ft)	0.00	Cum SA (acres)		0.84	


WR-GOMEZ CREEK PRE-1 Plan: Imported Plan 01 11/20/2012
RS = 11
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
100
200
300
400
500
600
700
800
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 10

INPUT
Description: 144
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
134.76	353.04	148.6	352.81	160.85	352	162.12	350.62	162.72	350
163.95	348.48	164.41	348	166.03	346.14	166.15	346	202.23	346
205.94	346.62	212.06	348	214.79	349.21	216.6	350	220.01	351.53
221.16	352	223.76	353.15	225.58	354	226.39	354.21	227.82	354.38
229.69	354.42	231.6	354.36	233.09	354.19	234.21	354	235.3	353.83
239.96	353.18	242.85	352.95	248.89	352.29	250.71	352	251.57	351.93
251.66	351.93	252.06	351.68	260.8	351.1	265.2	351.16	266.45	351.17
267.63	351.16	267.87	351.17	268.95	351.12	269.74	351.15	269.94	351.16
270.88	351.09	286.99	352	315.5	351.82	317.69	351.82	320.41	351.81
328.02	351.8	374.97	350.65	380.65	350.61	387.75	350.6	432.17	351.78
440.97	351.79	447.96	351.82	459.64	351.84	460.99	351.84	462.7	351.83
465.82	351.84	470.77	351.84	561.1	351.98	565.4	352	566.7	352.03
576.46	352.15	578.56	352.17	587	352.34	589.73	352.32	598.13	352.49
606.58	352.61	608.95	352.67	610.61	352.73	614.3	352.9	615.58	352.93
622.66	353.06	632.55	353.19						

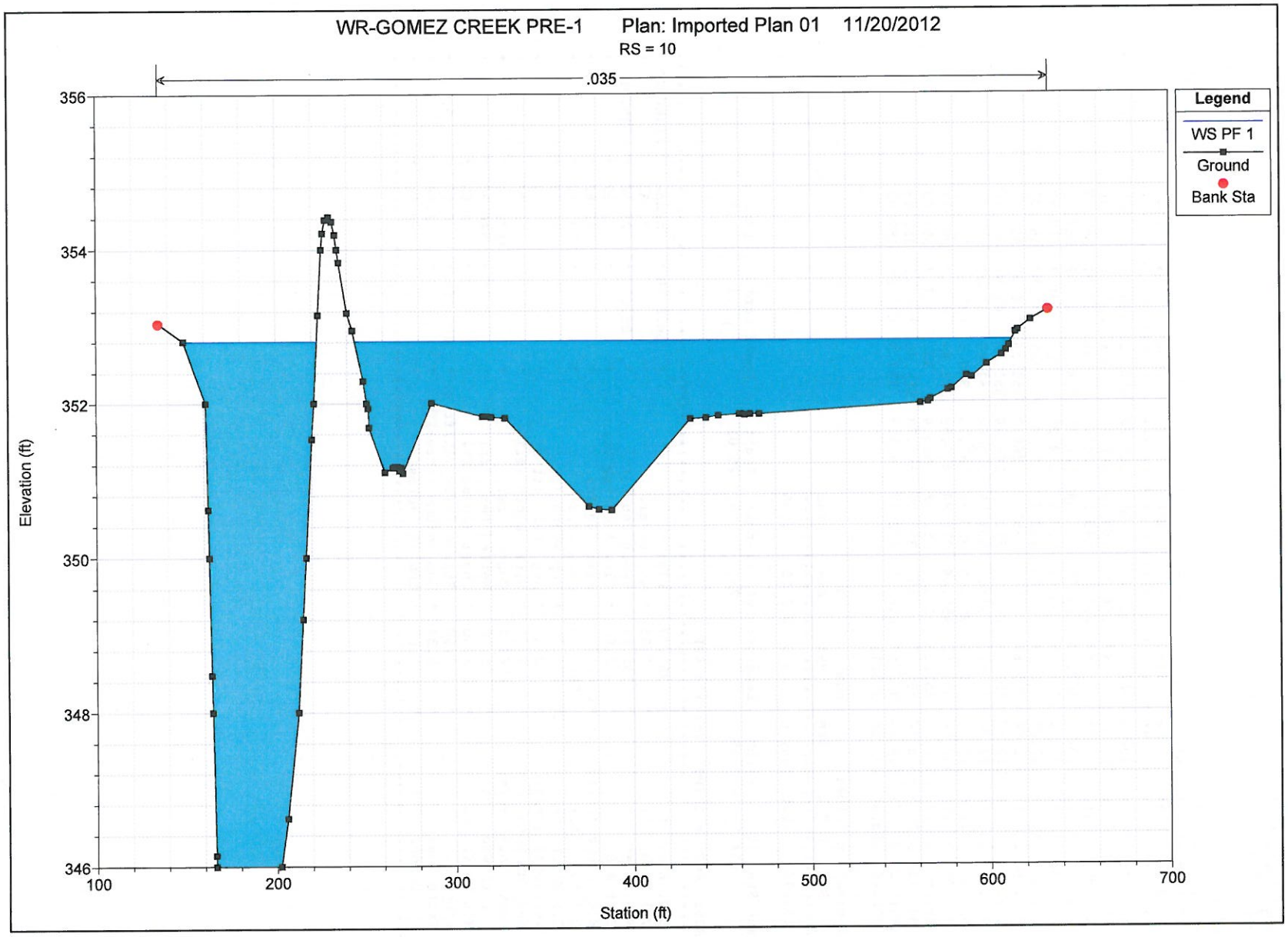
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
134.76	.035	134.76	.035	632.55	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
134.76	632.55	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.81	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	352.81	Flow Area (sq ft)		765.92	
E.G. Slope (ft/ft)	0.014971	Area (sq ft)		765.92	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	442.73	Top Width (ft)		442.73	
Vel Total (ft/s)	7.44	Avg. Vel. (ft/s)		7.44	
Max Chl Dpth (ft)	6.81	Hydr. Depth (ft)		1.73	
Conv. Total (cfs)	46568.4	Conv. (cfs)		46568.4	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		446.90	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		1.60	
Alpha	1.00	Stream Power (lb/ft s)	632.55	0.00	0.00
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)		1.96	
C & E Loss (ft)	0.01	Cum SA (acres)		0.55	


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 10
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
100
200
300
400
500
600
700
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 9

INPUT
Description: 145
Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
135.92	354.1	137.47	354.08	138.66	354.05	139.8	354	151.31	354
154.5	353.99	155.22	354	166.82	354	167.66	353.59	170.53	352
172.79	350.95	174.6	350	176.87	348.87	178.68	348	181.49	346.63
182.77	346	204.2	346	206.32	346.59	211.54	348	213.37	348.81
218.72	351.26	220.41	352	221.82	352.61	224.85	354	225.84	354.35
226.73	354.64	226.8	354.65	226.86	354.65	228.2	354.57	229.71	354.49
231.56	354.42	234.22	354.34	234.86	354.31	235.57	354.28	236.28	354.23
236.98	354.14	237.99	354	243.18	352.45	244.61	352.26	246.1	352
247.38	351.32	247.88	351.04	248.4	350.85	249.06	350.7	249.61	350.59
256.84	350	259.02	349.81	261.2	350	273	350	273.84	350.08
274.26	350.09	275.48	350.19	275.68	350.19	276.67	350.2	308.47	352
314.55	351.96	322.03	351.96	333.61	351.94	352.57	351.47	362.07	351.4
363.79	351.4	371.8	351.42	386.15	351.5	402.57	351.69	425.33	351.85
430.21	351.98	438.72	352	442.67	352.19	445.47	352.38	447.57	352.48
449.75	352.67	451.99	352.83	457.66	352.95	465.18	353.6		

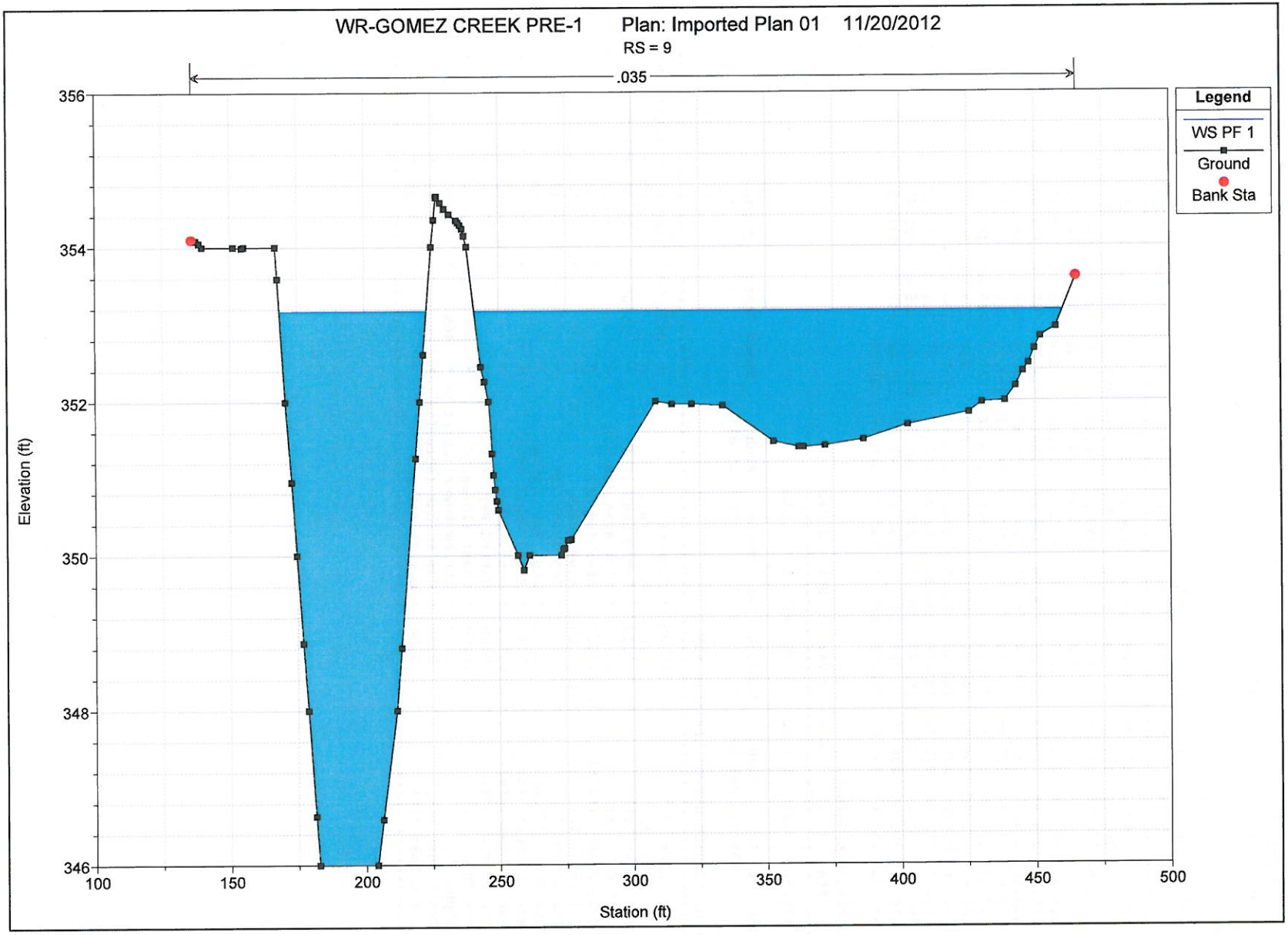
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
135.92	.035	135.92	.035	465.18	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
135.92	465.18	25	25	25.01	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.21	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.18	Reach Len. (ft)	25.00	25.00	25.01
Crit W.S. (ft)	353.18	Flow Area (sq ft)		645.33	
E.G. Slope (ft/ft)	0.014062	Area (sq ft)		645.33	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	274.19	Top Width (ft)		274.19	
Vel Total (ft/s)	8.83	Avg. Vel. (ft/s)		8.83	
Max Chl Dpth (ft)	7.18	Hydr. Depth (ft)		2.35	
Conv. Total (cfs)	48049.0	Conv. (cfs)		48049.0	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		277.86	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.04	
Alpha	1.00	Stream Power (lb/ft s)	465.18	0.00	0.00
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)		1.55	
C & E Loss (ft)	0.04	Cum SA (acres)		0.35	


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 9
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
100
150
200
250
300
350
400
450
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 8

INPUT
Description: 146
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
129.67	354.66	129.72	354.67	129.91	354.66	130.05	354.66	130.17	354.65
130.23	354.65	163.11	354	167.87	354	169.79	353.1	171.86	352
174.52	350.73	175.93	350	177.04	349.44	180.01	348	181.19	347.42
184.02	346	208.37	346	209.19	346.24	209.83	346.41	210.93	346.64
215.62	347.85	217.33	347.85	218.73	347.77	219.36	347.63	219.97	347.28
221.44	347.02	221.72	347.2	221.75	347.31	222.04	347.44	222.66	347.61
228.31	348.87	228.53	348.91	228.66	348.93	228.75	348.95	229.03	349
230.83	349	231.65	349.05	261.78	351	262.29	351.38	266.58	351.31
285.96	352.56	291.43	352.92	292.74	353	308.22	354	496.19	354

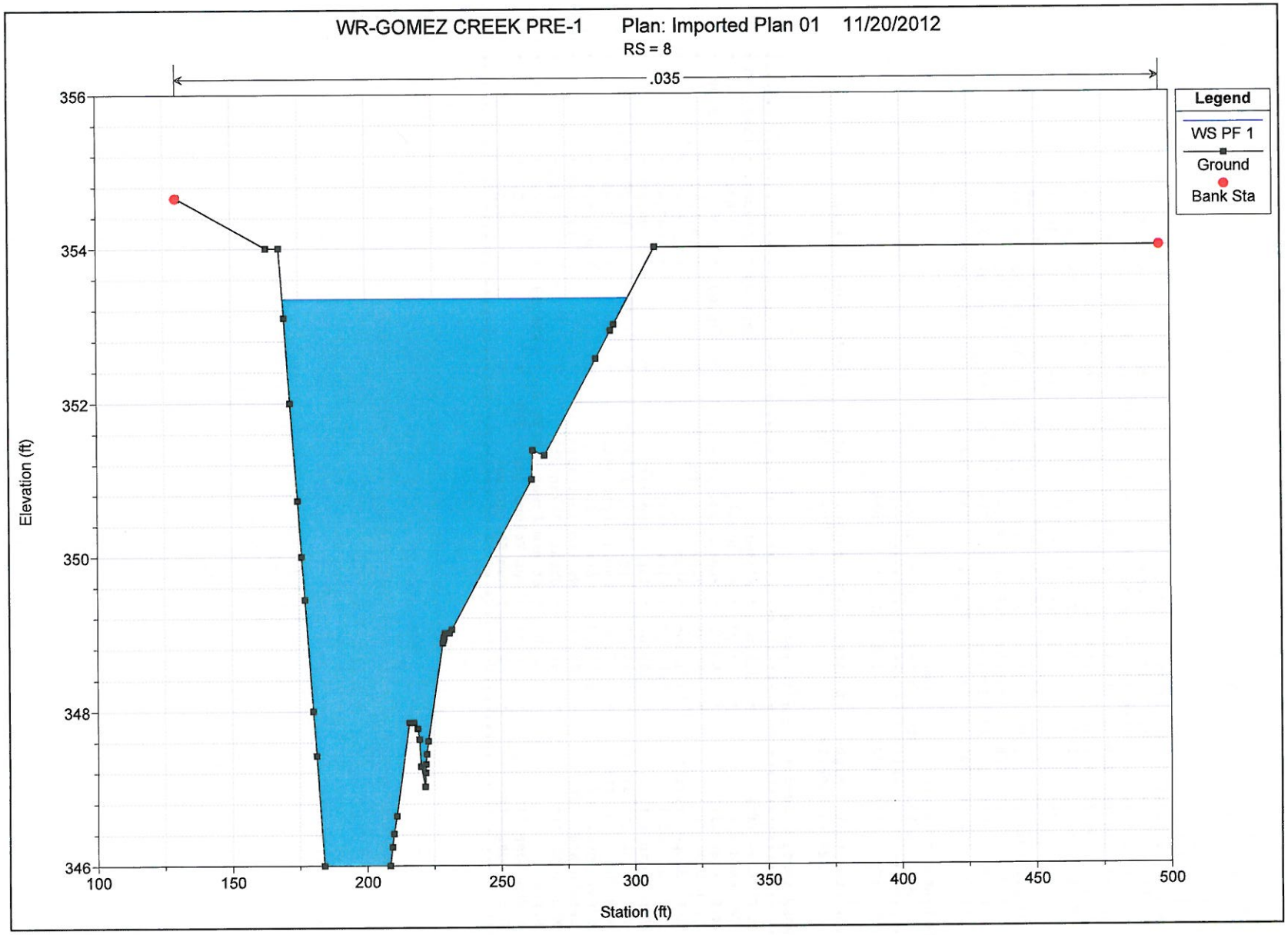
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
129.67	.035	129.67	.035	496.19	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129.67	496.19	75	75	75	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	355.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.97	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.35	Reach Len. (ft)	75.00	75.00	75.00
Crit W.S. (ft)	353.35	Flow Area (sq ft)		505.82	
E.G. Slope (ft/ft)	0.011686	Area (sq ft)		505.82	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	128.85	Top Width (ft)		128.85	
Vel Total (ft/s)	11.26	Avg. Vel. (ft/s)		11.26	
Max Chl Dpth (ft)	7.35	Hydr. Depth (ft)		3.93	
Conv. Total (cfs)	52708.9	Conv. (cfs)		52708.9	
Length Wtd. (ft)	75.00	Wetted Per. (ft)		131.54	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.81	
Alpha	1.00	Stream Power (lb/ft s)	496.19	0.00	0.00
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)		1.22	
C & E Loss (ft)	0.08	Cum SA (acres)		0.23	


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 8
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
100
150
200
250
300
350
400
450
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 5

INPUT
Description: 149
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
110.5	354	167.68	354	169.34	353.18	170.42	352.73	171.41	352
173.63	350.27	174.05	350	174.75	349.58	177.43	348	180.28	346.45
181.36	346	181.79	345.65	184.79	344	207.02	344	211.18	345.67
211.94	346	213.63	346.72	215.04	347.27	216.87	348	218.61	348.69
220.91	349.58	222.06	350	224.98	351.18	226.88	352	228.39	352.85
229.2	353.25	229.53	353.46	229.67	353.59	229.72	353.81	229.81	353.84
229.95	353.87	230.06	353.9	230.14	353.91	230.27	353.92	230.39	353.91
230.8	353.91	230.89	353.9	231.05	353.88	231.76	353.83	232.06	353.8
232.5	353.78	233.1	353.74	234.63	353.66	235.63	353.61	237.9	353.49

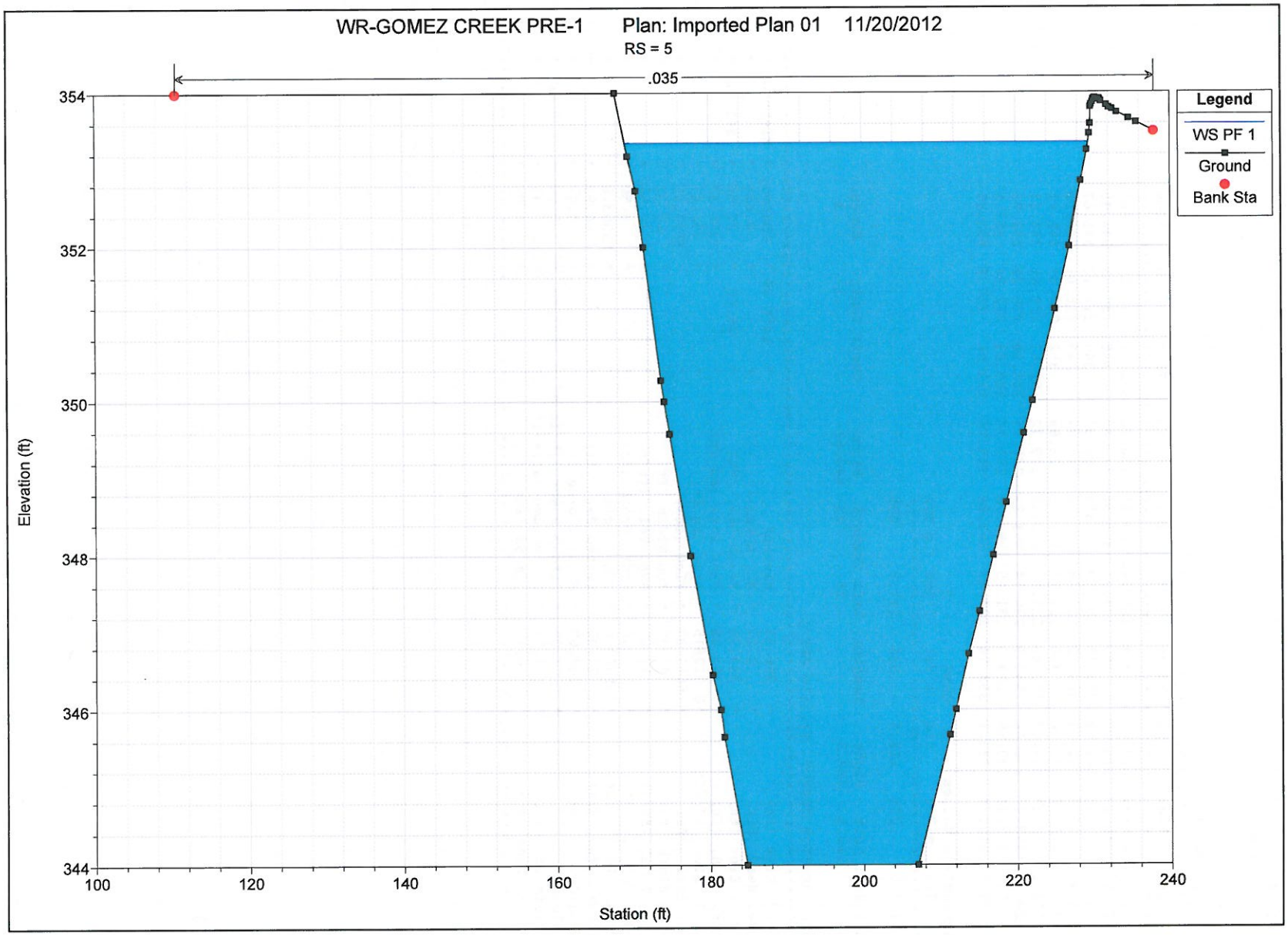
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
110.5	.035	110.5	.035	237.9	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
110.5	237.9	25	25	840.82	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.27	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.36	Reach Len. (ft)	25.00	25.00	840.82
Crit W.S. (ft)	353.36	Flow Area (sq ft)		392.47	
E.G. Slope (ft/ft)	0.010615	Area (sq ft)		392.47	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	60.38	Top Width (ft)		60.38	
Vel Total (ft/s)	14.52	Avg. Vel. (ft/s)		14.52	
Max Chl Dpth (ft)	9.36	Hydr. Depth (ft)		6.50	
Conv. Total (cfs)	55303.8	Conv. (cfs)		55303.8	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		64.91	
Min Ch El (ft)	344.00	Shear (lb/sq ft)		4.01	
Alpha	1.00	Stream Power (lb/ft s)	237.90	0.00	0.00
Frctn Loss (ft)	0.83	Cum Volume (acre-ft)		0.45	
C & E Loss (ft)	0.13	Cum SA (acres)		0.07	


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 5
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
344
100
120
140
160
180
200
220
240
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 4

INPUT
Description: 150
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
160.9	354.32	162.27	354.32	165.63	354.28	167.36	354.24	168.9	354.21
171.73	354.11	173.98	354	175.02	353.35	177.32	352	178.45	351.3
180.66	350	181.85	349.25	184.03	348	185.24	347.25	187.54	346
189.65	344.78	191.47	344	209.52	344	211.75	344.65	216.56	346
220.17	347.41	221.84	348	223.35	348.94	224.3	349.63	224.93	350
227.15	351.04	229.33	352	229.82	352.18	235.12	354	241.82	354

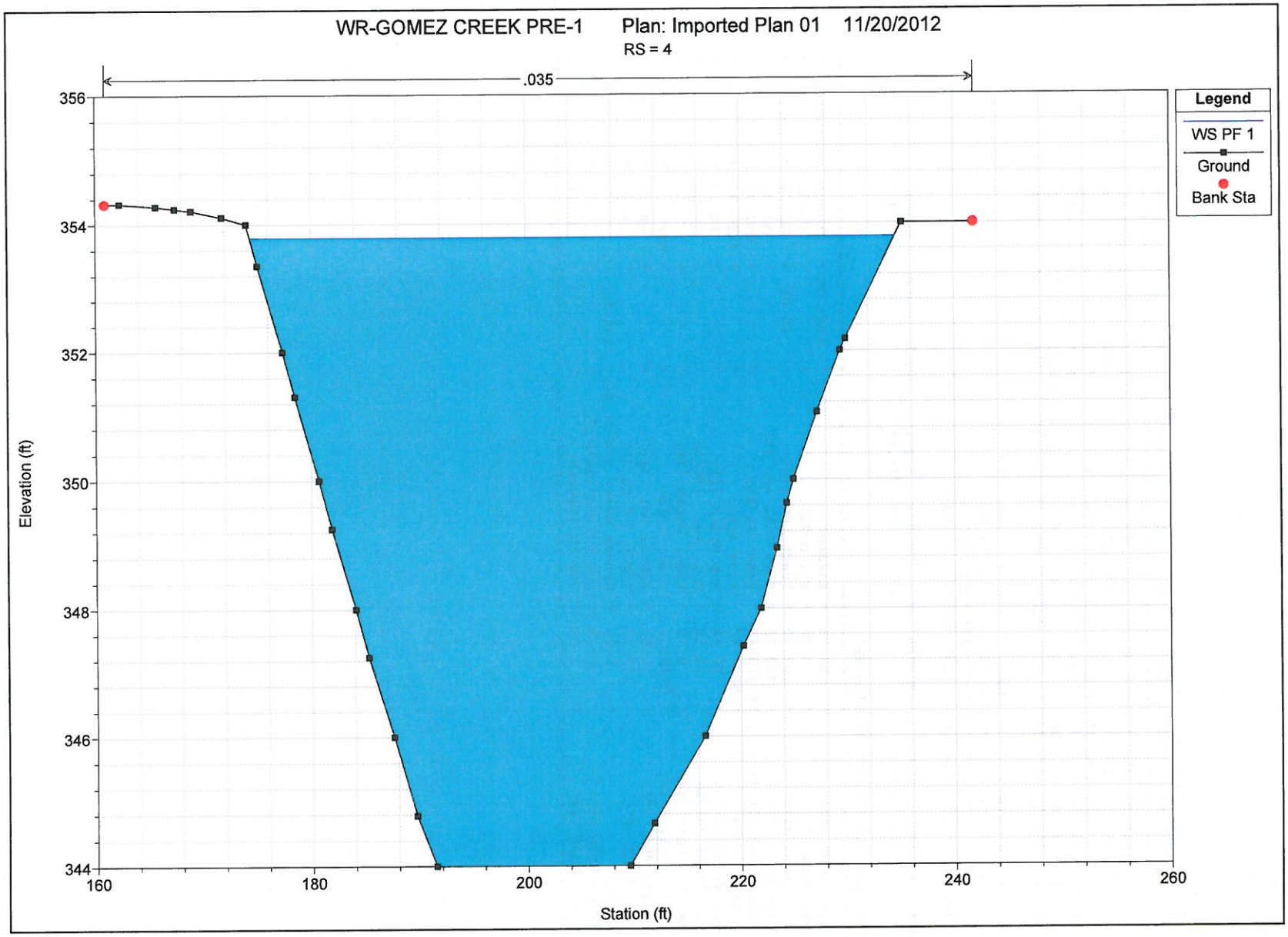
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
160.9	.035	160.9	.035	241.82	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
160.9	241.82	25	25	296.06	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	357.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.26	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.79	Reach Len. (ft)	25.00	25.00	296.06
Crit W.S. (ft)	353.79	Flow Area (sq ft)		392.99	
E.G. Slope (ft/ft)	0.010542	Area (sq ft)		392.99	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	60.19	Top Width (ft)		60.19	
Vel Total (ft/s)	14.50	Avg. Vel. (ft/s)		14.50	
Max Chl Dpth (ft)	9.79	Hydr. Depth (ft)		6.53	
Conv. Total (cfs)	55495.6	Conv. (cfs)		55495.6	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		64.78	
Min Ch El (ft)	344.00	Shear (lb/sq ft)		3.99	
Alpha	1.00	Stream Power (lb/ft s)	241.82	0.00	0.00
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)		0.23	
C & E Loss (ft)	0.00	Cum SA (acres)		0.03	


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 4
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
344
160
180
200
220
240
260
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 3

INPUT
Description: 151
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
168.9	354.21	171.73	354.11	173.98	354	175.02	353.35	177.32	352
178.45	351.3	180.66	350	181.85	349.25	184.03	348	185.24	347.25
187.54	346	189.65	344.78	191.47	344	209.52	344	211.75	344.65
216.56	346	220.17	347.41	221.84	348	223.35	348.94	224.3	349.63
224.93	350	227.15	351.04	229.33	352	229.82	352.18	235.12	354
241.82	354								

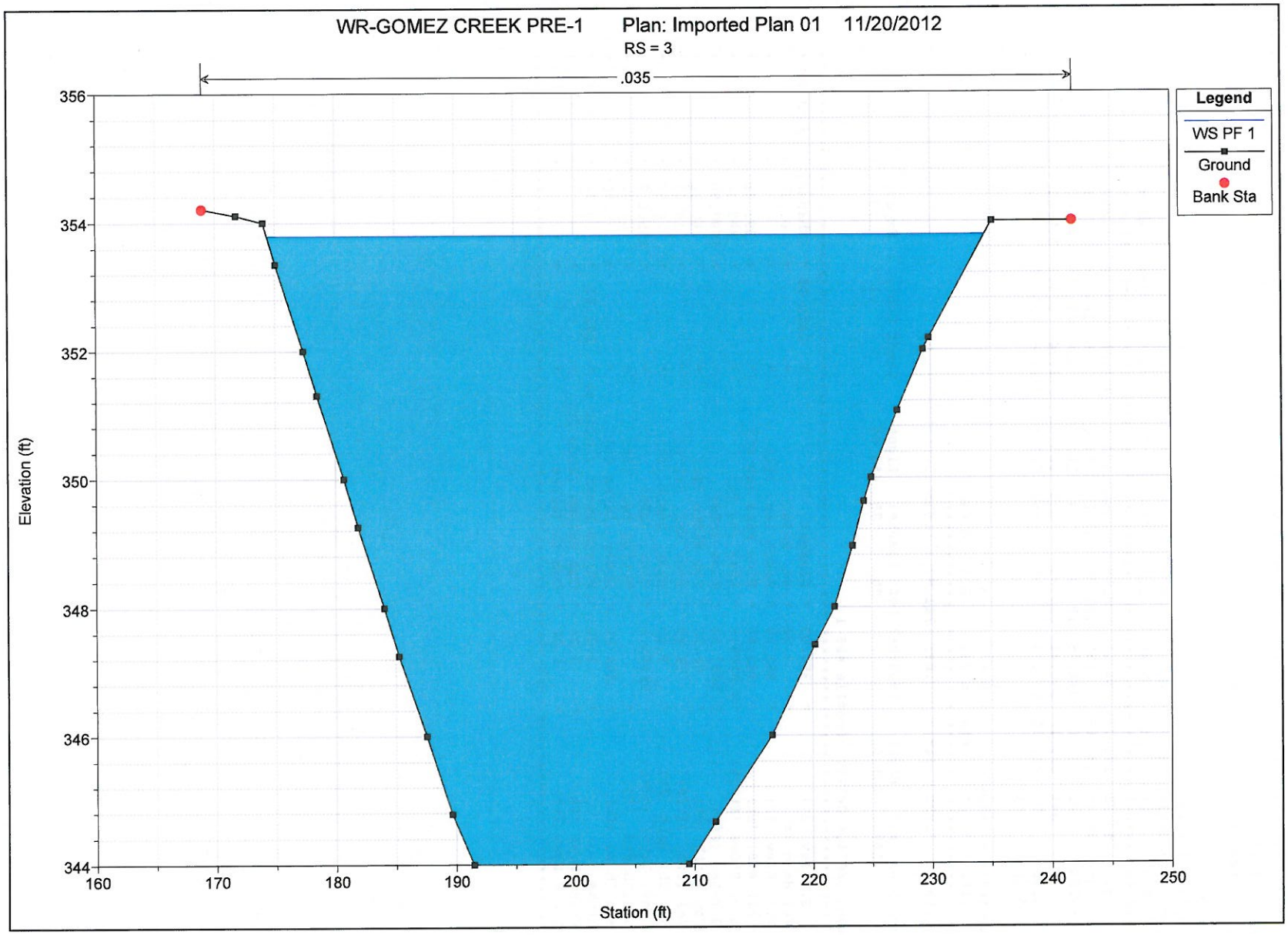
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
168.9	.035	168.9	.035	241.82	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
168.9	241.82	75	75	656.89	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	357.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.26	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.80	Reach Len. (ft)			
Crit W.S. (ft)	353.80	Flow Area (sq ft)		393.36	
E.G. Slope (ft/ft)	0.010515	Area (sq ft)		393.36	
Q Total (cfs)	5697.90	Flow (cfs)		5697.90	
Top Width (ft)	60.22	Top Width (ft)		60.22	
Vel Total (ft/s)	14.49	Avg. Vel. (ft/s)		14.49	
Max Chl Dpth (ft)	9.80	Hydr. Depth (ft)		6.53	
Conv. Total (cfs)	55566.2	Conv. (cfs)		55566.2	
Length Wtd. (ft)		Wetted Per. (ft)		64.81	
Min Ch El (ft)	344.00	Shear (lb/sq ft)		3.98	
Alpha	1.00	Stream Power (lb/ft s)	241.82	0.00	0.00
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)			
C & E Loss (ft)	0.00	Cum SA (acres)			


WR-GOMEZ CREEK PRE-1
Plan: Imported Plan 01
11/20/2012
RS = 3
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
344
160
170
180
190
200
210
220
230
240
250
Station (ft)

Gomez Creek Post HEC-RAS
Analysis 100-Year Storm Event

Hec-Ras Analysis

Gomez Creek 100 year Floodplain Development Condition Analysis

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: 2012WRPOST-1
Project File : 2012WRPOST-1.prj
Run Date and Time: 11/19/2012 5:04:32 PM

Project in English units

Project Description:
******* Autodesk, Inc. HEC-2 Input Data file ********
****
Minimum Data Input **********

****

****

PLAN DATA

Plan Summary Information:

Number of:	Cross Sections =		Multiple Openings =		0
	Culverts =	0	Inline Structures =		0
	Bridges =	0	Lateral Structures =		0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

****

FLOW DATA

Flow Title: Imported Flow 01
Flow File : C:\Shapouri&Associates\Active Projects\Warner Ranch\Hydrology\Hecras 2012\Hecras Gomez Creek Post\2012WRPOST-1.f01

Flow Data (cfs)

River	Reach	RS	PF 1
RIVER-1	Reach-1		5402.57

CROSS SECTION
REACH: Reach-1 RS: 150

INPUT
Description: 4
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	396.29	.27	396.2	.97	396	6.96	394.21	7.69	394
8.93	393.63	14.42	392	16.67	391.31	21	390	22.34	389.59
26.34	388.39	26.97	388.21	27.76	388	28.13	387.91	28.57	387.8
33.83	386.6	36.42	386	45.35	384.02	45.4	384.01	51.02	382.69
57.53	381.3	63.28	380	67.32	379.13	71.96	378.09	72.33	378
81.1	376	81.38	375.94	81.53	375.9	84.62	375.07	88.17	374
93.63	372.3	94.28	372	98.69	370.07	98.84	370	99.31	369.8
102.35	368.45	102.54	368.32	103.03	368.3	103.08	368.32	103.26	368.36
103.34	368.38	103.42	368.39	104.07	368.66	107.14	370	110.69	371.71
111.27	372	120.57	373.75	122.31	374	130.01	375.26	134.46	376
135.31	376.19	137.83	376.74	143.29	378	145.19	378.42	145.59	378.5
148.68	379.13	153.48	380	160.84	381.29	164.51	382	167.1	382.37
169.06	382.5	172.03	382.8						

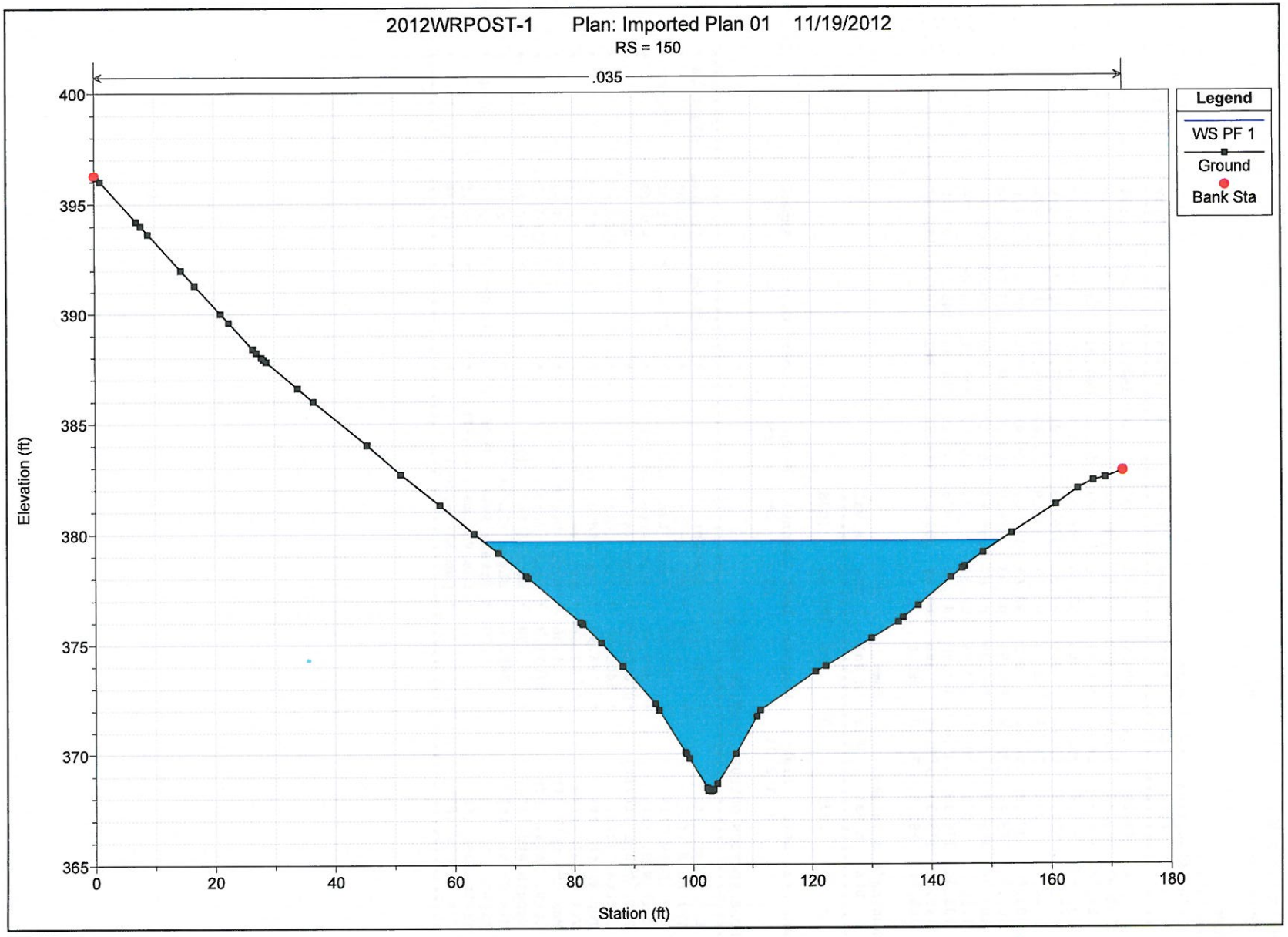
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	0	.035	172.03	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	172.03	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	382.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.49	Wt. n-Val.		0.035	
W.S. Elev (ft)	379.68	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	379.68	Flow Area (sq ft)		426.88	
E.G. Slope (ft/ft)	0.011190	Area (sq ft)		426.88	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	86.90	Top Width (ft)		86.90	
Vel Total (ft/s)	12.66	Avg. Vel. (ft/s)		12.66	
Max Chl Dpth (ft)	11.38	Hydr. Depth (ft)		4.91	
Conv. Total (cfs)	51071.3	Conv. (cfs)		51071.3	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		90.24	
Min Ch El (ft)	368.30	Shear (lb/sq ft)		3.30	
Alpha	1.00	Stream Power (lb/ft s)	172.03	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		48.10	
C & E Loss (ft)		Cum SA (acres)		20.48	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 150
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
400
395
390
385
380
375
370
365
0
20
40
60
80
100
120
140
160
180
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 140

INPUT
Description: 14
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
205.11	391.33	207.94	390	208.9	389.49	212.08	388	213.5	387.25
216.21	386	218.03	385.11	224.63	382	226.6	381.14	228.99	380
231.57	379.09	233.67	378	236.07	377.35	236.58	377.22	236.77	377.18
236.96	377.13	237.63	376.96	239.3	376.58	241.83	376	244.45	374.61
245.65	374	246.18	373.69	249.11	372	252.75	370	257.41	370
258.11	370.67	259.64	372	260.05	372.14	260.7	372.38	262.14	372.86
264.99	374	269.54	374.71	276.94	376	286.99	377.16	287.62	377.22
287.97	377.25	288.24	377.27	288.43	377.28	288.53	377.27	289.55	376.93
290.57	376.73	291.47	376.72	294.79	378	297.95	379.52	298.23	379.63
310.84	378	311.53	378.04	312.26	378	313.05	377.98	314.66	377.95
323.41	377.87	329.13	377.78	332.64	377.65	334.44	377.6	335.84	377.68
337.89	377.83	341.03	377.97	341.99	378	344.57	378.29	347.2	378.62
351.8	379.25	354.45	379.63	356.9	380	359.52	380.96	362.72	382
364.95	382.79	368.66	384						

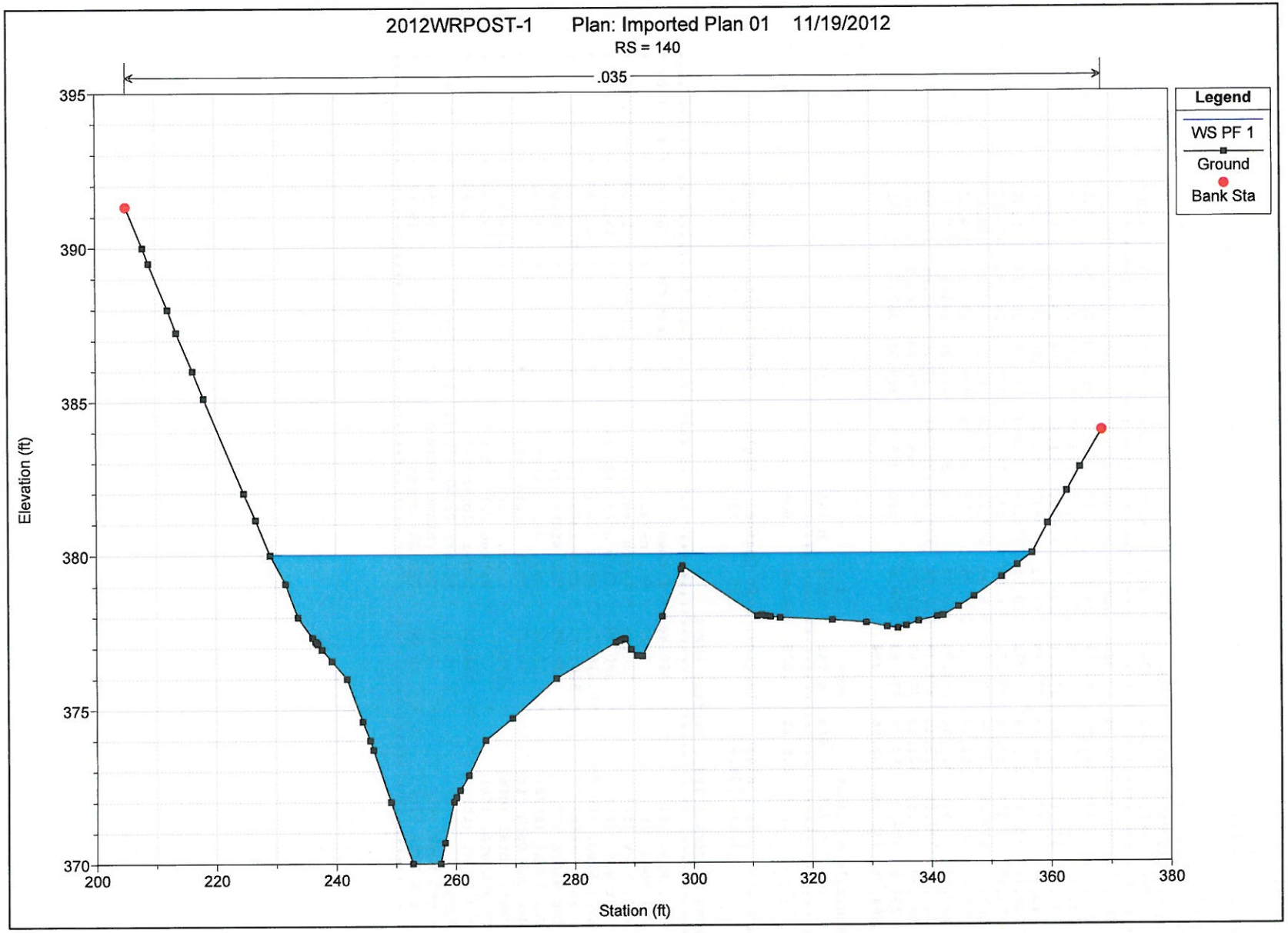
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	205.11	.035	368.66	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.11	368.66	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	382.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.43	Wt. n-Val.		0.035	
W.S. Elev (ft)	380.03	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	380.48	Flow Area (sq ft)		431.64	
E.G. Slope (ft/ft)	0.018013	Area (sq ft)		431.64	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	128.05	Top Width (ft)		128.05	
Vel Total (ft/s)	12.52	Avg. Vel. (ft/s)		12.52	
Max Chl Dpth (ft)	10.03	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	40254.3	Conv. (cfs)		40254.3	
Length Wtd. (ft)		Wetted Per. (ft)		132.58	
Min Ch El (ft)	370.00	Shear (lb/sq ft)		3.66	
Alpha	1.00	Stream Power (lb/ft s)	368.66	0.00	0.00
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)		45.57	
C & E Loss (ft)	0.06	Cum SA (acres)		19.87	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 140
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
395
390
385
380
375
370
200
220
240
260
280
300
320
340
360
380
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 130

INPUT
Description: 24
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
326.43	382.73	328.03	382	328.72	381.68	332.36	380	334.3	379.11
336.58	378	337.87	377.4	340.95	376	343.31	374.99	353.2	370.84
355.21	370	382.88	370	386.41	370.37	387.71	370.48	391.09	370.85
400.35	372	404.15	372.27	406.89	372.36	413.04	372.62	443.91	374
449.03	375.07	452.96	376	458.27	377.31	467.76	379.61	469.36	380
470.51	380.27	478.69	382	493.61	383.6				

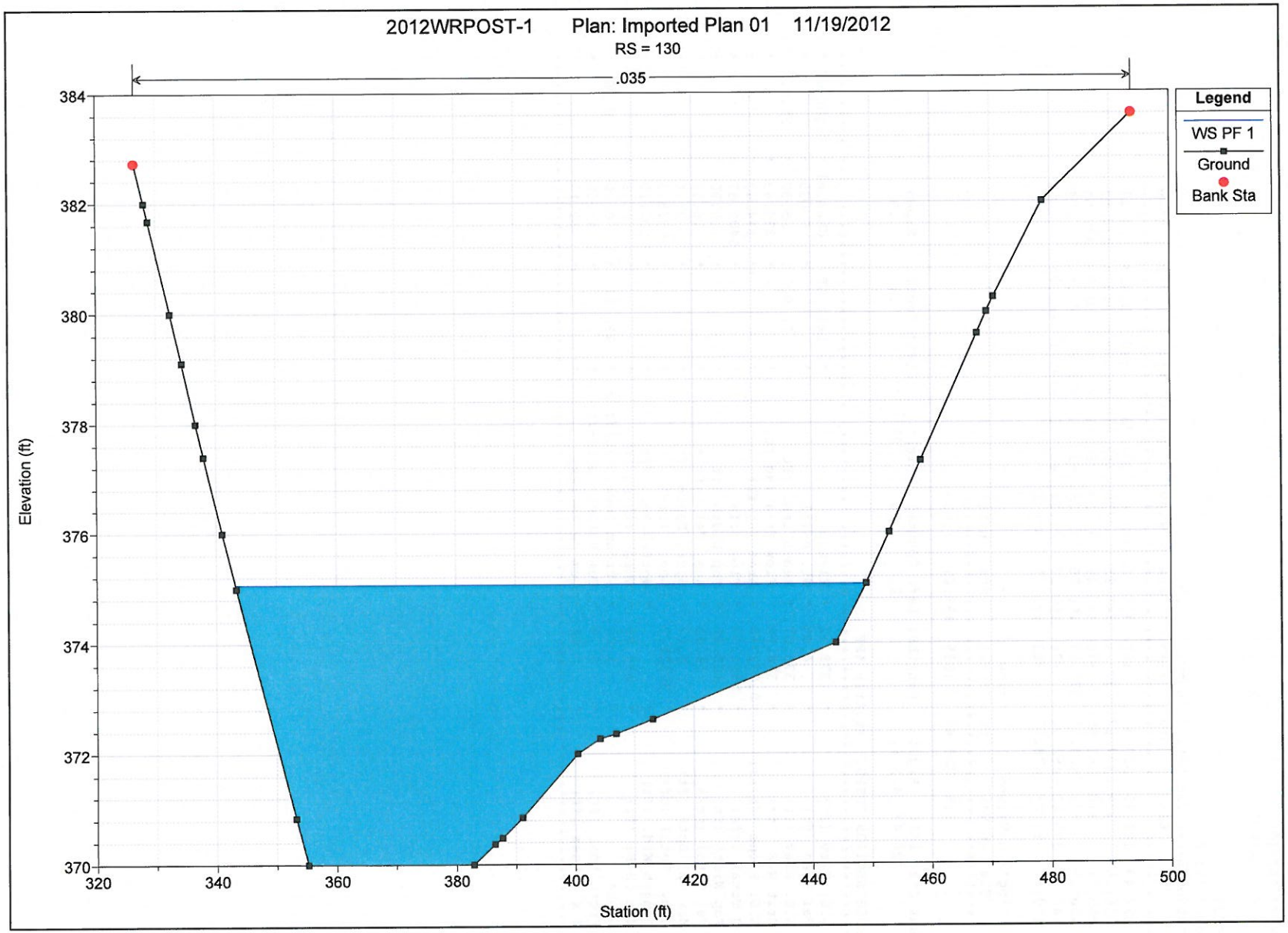
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	326.43	.035	493.61	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
326.43	493.61	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	379.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.05	Wt. n-Val.		0.035	
W.S. Elev (ft)	375.07	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	376.29	Flow Area (sq ft)		334.43	
E.G. Slope (ft/ft)	0.031760	Area (sq ft)		334.43	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	105.90	Top Width (ft)		105.90	
Vel Total (ft/s)	16.15	Avg. Vel. (ft/s)		16.15	
Max Chl Dpth (ft)	5.07	Hydr. Depth (ft)		3.16	
Conv. Total (cfs)	30315.3	Conv. (cfs)		30315.3	
Length Wtd. (ft)		Wetted Per. (ft)		107.19	
Min Ch El (ft)	370.00	Shear (lb/sq ft)		6.19	
Alpha	1.00	Stream Power (lb/ft s)	493.61	0.00	0.00
Frctn Loss (ft)	0.75	Cum Volume (acre-ft)		43.03	
C & E Loss (ft)	0.02	Cum SA (acres)		19.17	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 130
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
384
382
380
378
376
374
372
370
320
340
360
380
400
420
440
460
480
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 120

INPUT
Description: 34
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
283.44	386	286.24	384.81	287.97	384	292.01	382.18	292.35	382
292.72	381.8	294.47	381.07	299.67	378.74	301.54	378	302.97	377.34
303.68	377.05	305.82	376.12	306.1	376	307.43	374.8	309.16	374
313.83	373.26	317.22	372.63	318.05	372.48	320.33	372	336.55	372
340.75	371.96	340.94	372	353.94	372	355.15	371.69	356.49	371.47
361.14	370.78	366.1	370	366.81	369.83	378.93	369.57	380.05	369.62
391.54	370	392.95	370.27	393.24	370.39	396.5	372	397.86	372.63
400.3	374	420.81	374	422.01	373.51	425.43	372	426.22	372
441.67	371.91	442.85	371.9	445.81	371.9	446.16	371.91	458.72	371.91
460.43	371.92	488.17	371.39	489.98	371.42	495.84	371.45	497.77	371.48
499.58	371.54	507.93	371.95	509.22	372	512.84	372.72	517.4	373.38
518.95	373.62	519.7	373.76	521.95	374	526.34	374.99	528.04	375.41
530.1	376	536.4	377.62	537.92	378	542.75	379.3		

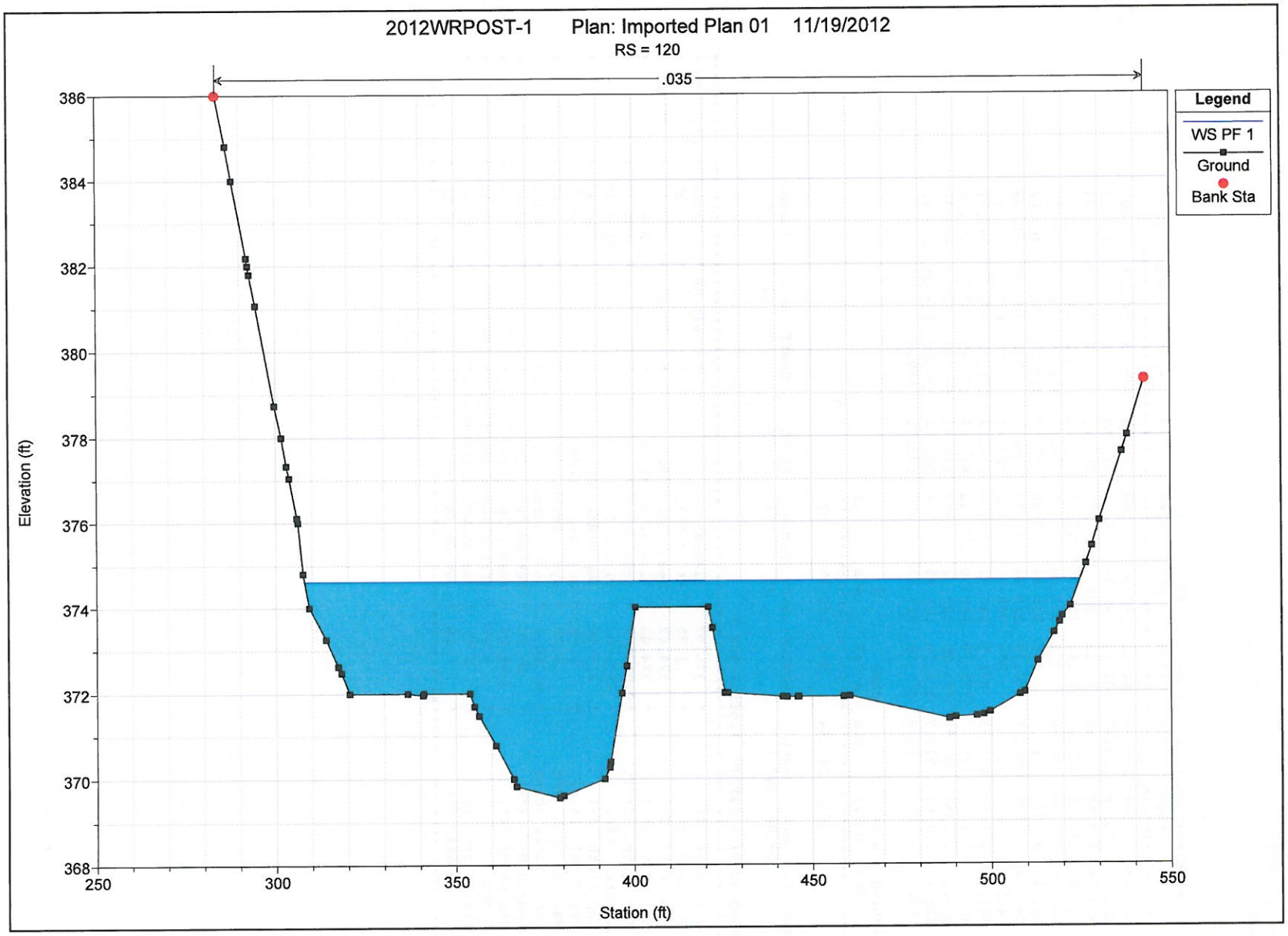
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	283.44	.035	542.75	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
283.44	542.75	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	375.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.035	
W.S. Elev (ft)	374.62	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	374.62	Flow Area (sq ft)		579.45	
E.G. Slope (ft/ft)	0.013177	Area (sq ft)		579.45	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	216.86	Top Width (ft)		216.86	
Vel Total (ft/s)	9.32	Avg. Vel. (ft/s)		9.32	
Max Chl Dpth (ft)	5.05	Hydr. Depth (ft)		2.67	
Conv. Total (cfs)	47064.5	Conv. (cfs)		47064.5	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		218.97	
Min Ch El (ft)	369.57	Shear (lb/sq ft)		2.18	
Alpha	1.00	Stream Power (lb/ft s)	542.75	0.00	0.00
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)		40.16	
C & E Loss (ft)	0.18	Cum SA (acres)		18.13	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 120
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
386
384
382
380
378
376
374
372
370
368
250
300
350
400
450
500
550
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 110

INPUT
Description: 44
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
279.48	380.34	286.75	380	293.63	378.9	297.96	378	302.31	376.98
306.61	376	316.49	374.87	324.4	374	334.62	373.46	351.38	372.52
356.56	372.24	358.09	372.16	360.75	372	361.87	371.95	370.91	371.04
382.48	370	388.73	368.06	388.92	368	389.12	367.97	403.33	366
409.53	366	415.06	367.78	415.76	368	421.62	370	427.22	371.96
427.33	372	440.84	372	442.63	371.73	443.81	371.57	444.7	371.47
445.39	371.42	446.15	371.39	453.24	371.18	454	371.21	455.92	371.26
464.74	371.42	466.02	371.45	467.09	371.51	473.58	372	473.63	372.02
480.41	374	484.24	375.84	484.56	376	484.83	376.13	488.78	378
489.73	378.46	493.83	380.39						

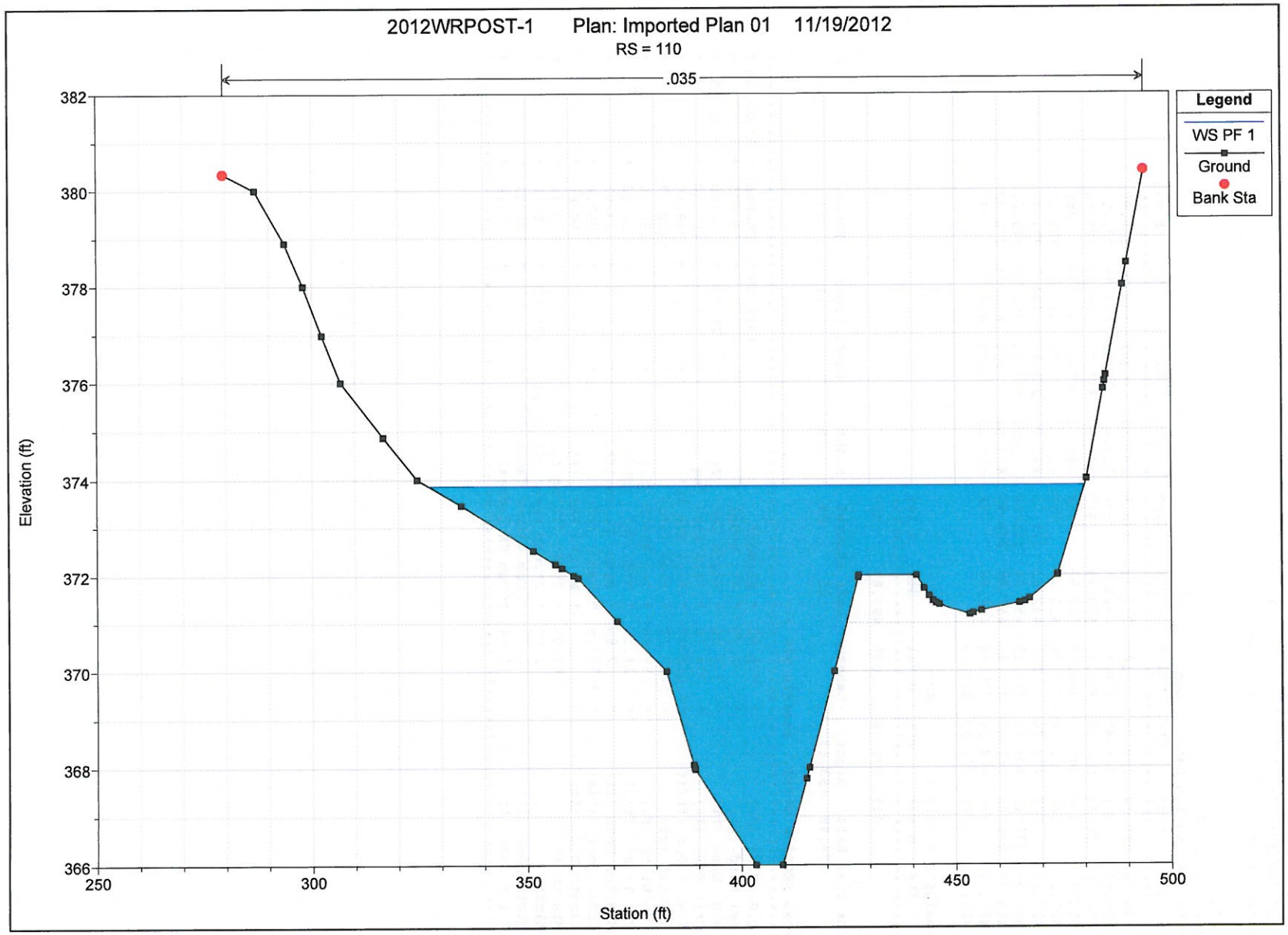
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	279.48	.035	493.83	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
279.48	493.83	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	375.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.05	Wt. n-Val.		0.035	
W.S. Elev (ft)	373.86	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	374.18	Flow Area (sq ft)		469.80	
E.G. Slope (ft/ft)	0.016707	Area (sq ft)		469.80	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	152.96	Top Width (ft)		152.96	
Vel Total (ft/s)	11.50	Avg. Vel. (ft/s)		11.50	
Max Chl Dpth (ft)	7.86	Hydr. Depth (ft)		3.07	
Conv. Total (cfs)	41797.8	Conv. (cfs)		41797.8	
Length Wtd. (ft)		Wetted Per. (ft)		154.86	
Min Ch El (ft)	366.00	Shear (lb/sq ft)		3.16	
Alpha	1.00	Stream Power (lb/ft s)	493.83	0.00	0.00
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)		37.11	
C & E Loss (ft)	0.04	Cum SA (acres)		17.14	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 110
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
382
380
378
376
374
372
370
368
366
250
300
350
400
450
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 100

INPUT
Description: 54
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
215.41	374.37	216.37	374.34	217.45	374.27	220.63	374	232.88	372.33
234.61	372.07	235.08	372	247.32	370.12	248.25	370	292.97	368.33
293.6	368.3	293.92	368.29	294.11	368.29	294.57	368.28	294.84	368.27
295.06	368.27	295.24	368.26	295.43	368.25	295.8	368.24	295.9	368.23
296.12	368.23	296.32	368.22	296.41	368.22	310.62	368.15	370.09	368
374.42	366.15	374.81	366	383.73	364.07	383.99	364	392.97	362.65
394.94	362.45	396.34	362.33	397.61	362.15	397.7	362.14	397.77	362.13
399.75	362.11	400.08	362.13	400.44	362.14	400.85	362.16	401.66	362.24
419.94	364	420.2	364.18	420.45	364.38	421.01	364.85	422.27	366
422.84	366.5	424.49	368	425.33	368.75	425.9	369.13	426.63	370
438.7	370	441.88	369.85	462.19	368.53	468.34	368.44	473.67	368.38
477.53	368.28	489.78	368	495.12	367.87	498.24	367.77	499.45	367.72
513.12	367.79	513.53	367.83	521.13	367.97	522.3	368	526.62	368.74
529.96	370	531.24	371.1	531.96	371.66	532.5	372	533.7	372.13
539.7	372.61								

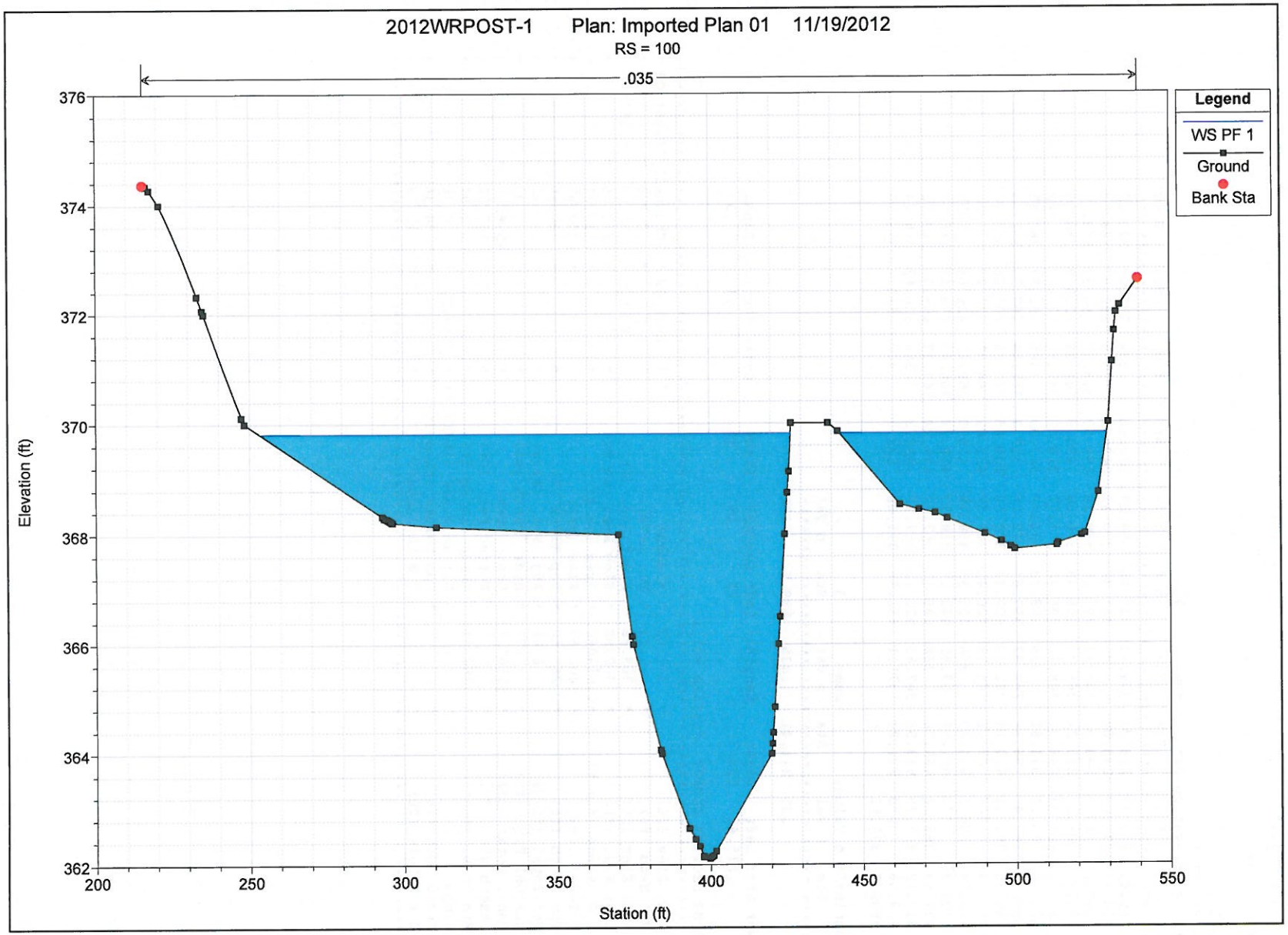
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	215.41	.035	539.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215.41	539.7	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	371.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.21	Wt. n-Val.		0.035	
W.S. Elev (ft)	369.82	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	369.82	Flow Area (sq ft)		612.35	
E.G. Slope (ft/ft)	0.014060	Area (sq ft)		612.35	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	260.50	Top Width (ft)		260.50	
Vel Total (ft/s)	8.82	Avg. Vel. (ft/s)		8.82	
Max Chl Dpth (ft)	7.71	Hydr. Depth (ft)		2.35	
Conv. Total (cfs)	45562.9	Conv. (cfs)		45562.9	
Length Wtd. (ft)		Wetted Per. (ft)		263.92	
Min Ch El (ft)	362.11	Shear (lb/sq ft)		2.04	
Alpha	1.00	Stream Power (lb/ft s)	539.70	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		34.36	
C & E Loss (ft)		Cum SA (acres)		16.13	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 100
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
376
374
372
370
368
366
364
362
200
250
300
350
400
450
500
550
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 90

INPUT
Description: 64
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
179.79	374.24	180.55	374	187.81	372.31	189.06	372	196.26	370.27
197.31	370	210.65	368.23	211.88	368	220.27	367.51	247.03	366
247.55	365.9	259.7	364	263.2	362.42	264.07	362	265.74	361.15
268.05	360	268.34	359.88	270.34	359.19	271.14	358.96	271.84	358.74
271.9	358.62	278.14	358.7	278.43	358.83	278.66	358.88	287.02	360
292.36	362	297.32	363.83	297.77	364	297.99	364.09	303.18	366
309.03	366.79	311.01	367.07	311.6	367.16	313.95	367.46	314.86	367.59
315.51	367.69	315.95	367.74	316.1	367.76	316.26	367.79	316.44	367.82
317.76	367.82	317.84	367.81	318	367.8	318.35	367.79	318.51	367.78
318.68	367.77	318.82	367.75	318.95	367.71	319.04	367.69	319.56	367.63
320.22	367.55	320.35	367.54	323.47	367.4	323.94	367.4	328.87	367.19
329.21	367.17	331.18	367.1	331.85	367.06	348.3	366	377.9	364.6
390.92	364.57	392.75	364.57	394.01	364.56	395.38	364.56	396.44	364.55
397.06	364.55	452.19	364.13	467.81	364.4	490.45	364.98	504.25	364.82
506.7	364.85	510.27	364.91	543.61	364.61	580.52	365.24	606.18	364.33
617.28	364.06	617.89	364.06	619.88	364.05	620.79	364	627.24	364.04
628.18	364.04	630.57	364.06	635.57	364.09	641.75	364.14	646.19	364.16
652.34	364.17	655.85	364.19	658.43	364.2	659.92	364.21	660.94	364.22
662.03	364.21	663.61	364.2	668	364.18	679.13	365.63	685.71	366
687.62	366.88	690.14	368	690.92	368.35	691.94	368.8	694.65	369.97
694.72	370	699.17	371.92	699.36	372	703.69	373.87	704	374
708.21	375.82	708.64	376	712.73	377.76	713.27	378	713.9	378.27
717.91	380	750	380.4						

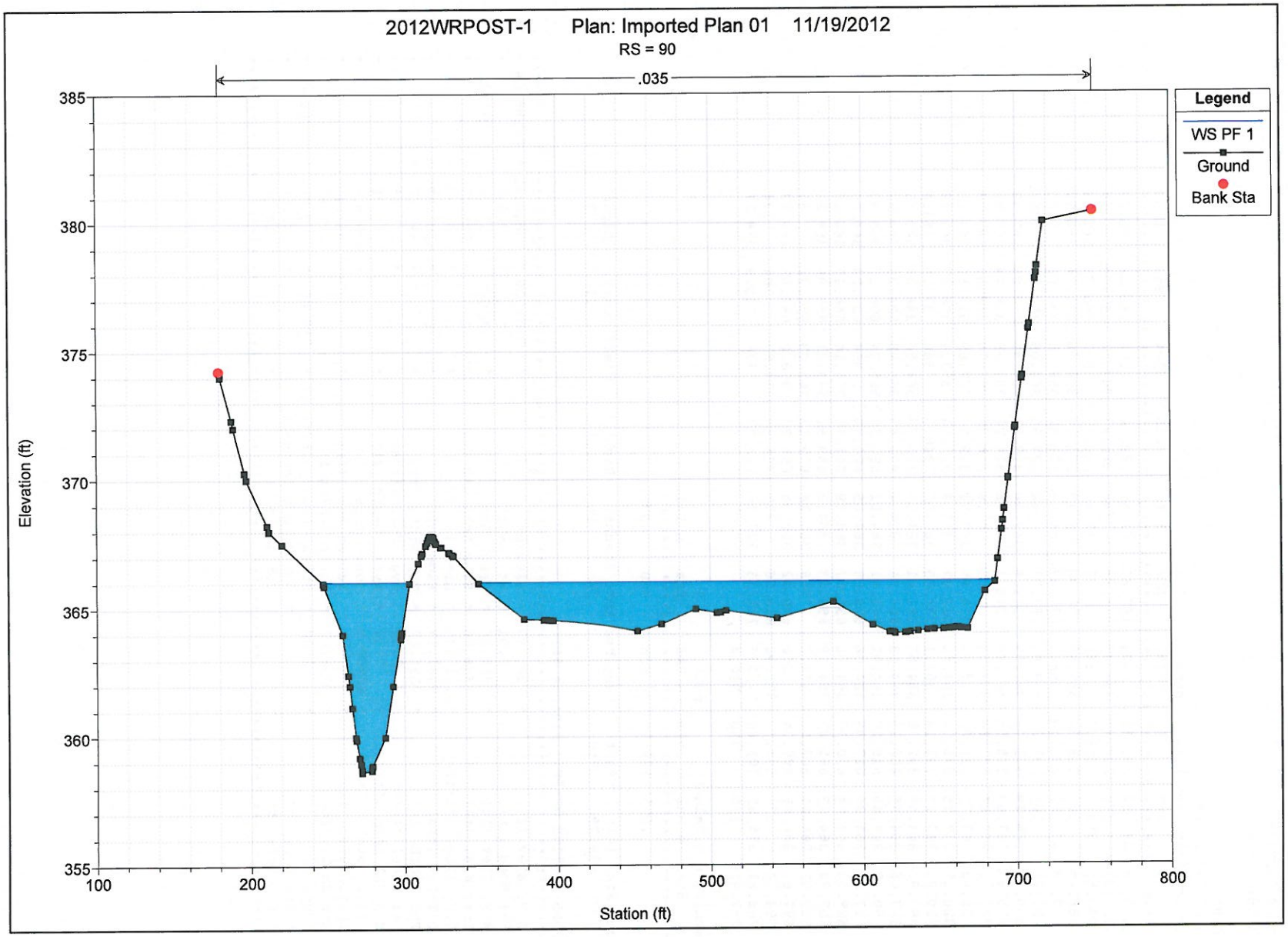
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	179.79	.035	750	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
179.79	750	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	366.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.035	
W.S. Elev (ft)	366.06	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	366.06	Flow Area (sq ft)		706.37	
E.G. Slope (ft/ft)	0.015145	Area (sq ft)		706.37	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	396.07	Top Width (ft)		396.07	
Vel Total (ft/s)	7.65	Avg. Vel. (ft/s)		7.65	
Max Chl Dpth (ft)	7.44	Hydr. Depth (ft)		1.78	
Conv. Total (cfs)	43900.9	Conv. (cfs)		43900.9	
Length Wtd. (ft)		Wetted Per. (ft)		398.80	
Min Ch El (ft)	358.62	Shear (lb/sq ft)		1.67	
Alpha	1.00	Stream Power (lb/ft s)	750.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		30.64	
C & E Loss (ft)		Cum SA (acres)		14.05	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 90
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
385
380
375
370
365
360
355
100
200
300
400
500
600
700
800
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 80

INPUT
Description: 74
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
189.17	368.82	193.32	368	202.02	366.56	205.53	366	206.71	365.8
212.46	364.88	216.8	364.17	217.96	364	226.06	362.06	226.32	362
226.51	361.9	230.1	360	232.55	358.73	234.16	358	246.71	358
247.48	358.31	251.79	360	254.95	361.18	257.13	362	259.72	363
262.36	364	270.79	364.13	318.38	364.02	318.7	364	384.2	362.55
384.42	362.54	384.56	362.54	384.86	362.53	386.54	362.48	386.92	362.47
387.02	362.47	388.79	362.46	389.29	362.46	390.01	362.45	440.15	362.23
443.28	362.19	456.74	362.14	462.24	362.11	488.22	361.88	529.86	361.84
534.35	361.93	550.53	362.18	563.94	362.36	569.63	362.42	572.72	362.43
575.05	362.43	577.25	362.51	590.28	363.02	648.38	364	649.16	364.31
653.39	366	653.76	366.15	658	367.84	658.41	368	658.49	368.03
663.54	370	664.73	370.46	673.8	374	686.09	374.14	695.03	374.22
696.32	374.23	696.63	374.24	742.83	374.69	743.02	374.7	750	374.76

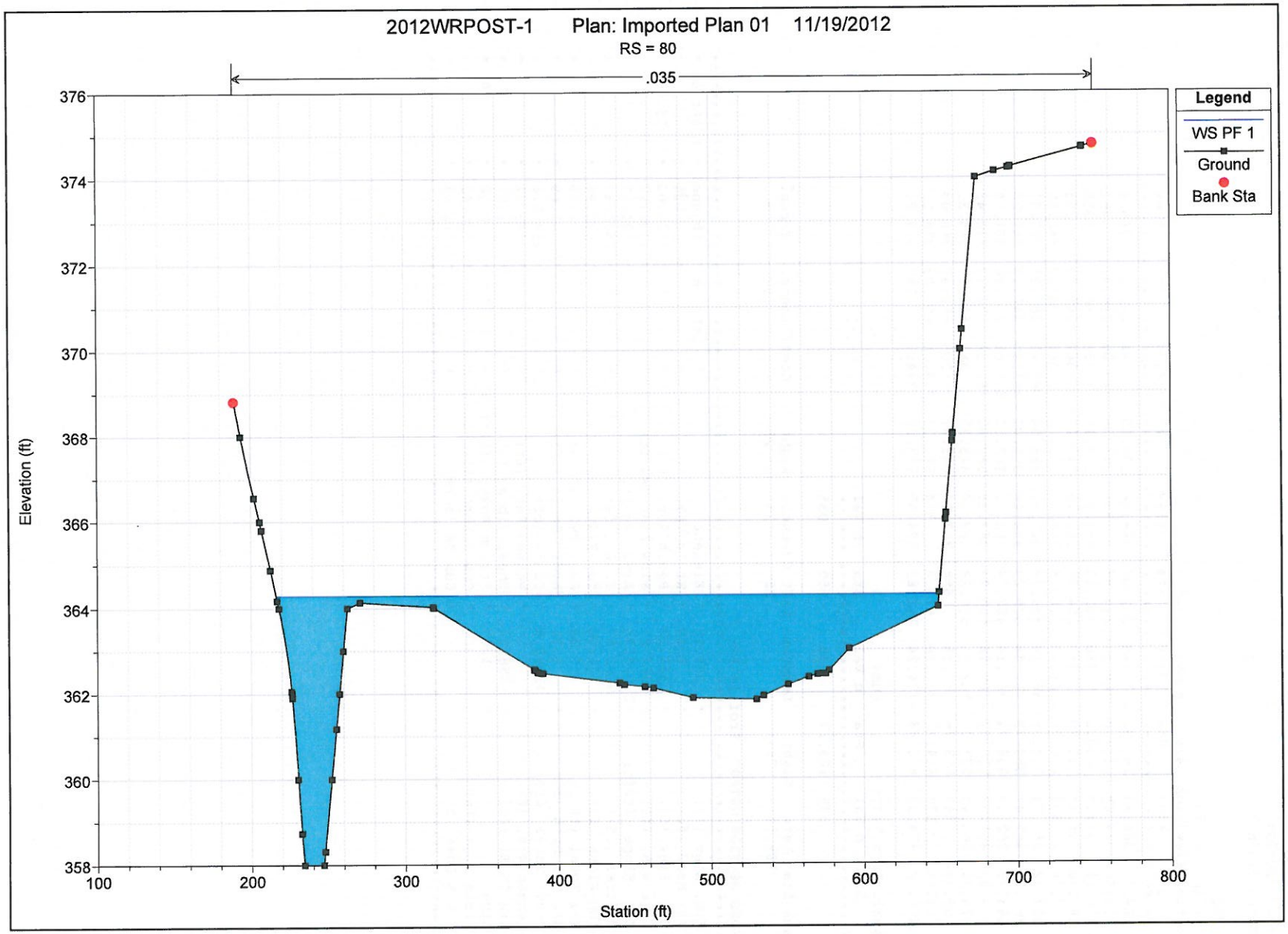
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	189.17	.035	750	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
189.17	750	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	365.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.85	Wt. n-Val.		0.035	
W.S. Elev (ft)	364.28	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	364.28	Flow Area (sq ft)		731.17	
E.G. Slope (ft/ft)	0.015176	Area (sq ft)		731.17	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	432.98	Top Width (ft)		432.98	
Vel Total (ft/s)	7.39	Avg. Vel. (ft/s)		7.39	
Max Chl Dpth (ft)	6.28	Hydr. Depth (ft)		1.69	
Conv. Total (cfs)	43855.8	Conv. (cfs)		43855.8	
Length Wtd. (ft)		Wetted Per. (ft)		435.41	
Min Ch El (ft)	358.00	Shear (lb/sq ft)		1.59	
Alpha	1.00	Stream Power (lb/ft s)	750.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		26.43	
C & E Loss (ft)		Cum SA (acres)		11.43	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 80
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
376
374
372
370
368
366
364
362
360
358
100
200
300
400
500
600
700
800
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 70

INPUT
Description: 84
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
215.04	366	222.42	365.48	229.07	365.05	232.6	364.88	235.26	364.81
237.59	364.77	240.28	364.73	249.1	364	255.88	363.83	270.06	363.19
276.84	362.95	280.06	362.85	284.11	362.76	295.14	362	299.09	360.67
301.05	360	301.81	359.75	307.03	358	309.56	357.71	311	357.46
311.5	357.35	311.54	357.28	311.86	357.25	312.17	357.18	323.34	357.11
324.85	357.28	326.24	357.47	327.7	357.76	329.19	358	330.57	358.64
333.61	360	336.44	361.34	337.9	362	339	362.2	352.51	364
353.38	364.04	358	364.28	359.72	364.39	360.24	364.46	366.5	364.53
368.71	364.31	371.53	364	385.36	362.82	400.73	362	403.29	361.93
419.65	361.69	480.1	360.58	489.67	360.5	544.08	361.14	550.65	361.32
565.82	362	566.2	362.19	569.86	364	570.37	364.25	573.9	366
574.54	366.32	581.98	370	582.88	370.44	586.02	372	593.62	372.22
627.7	373.34								

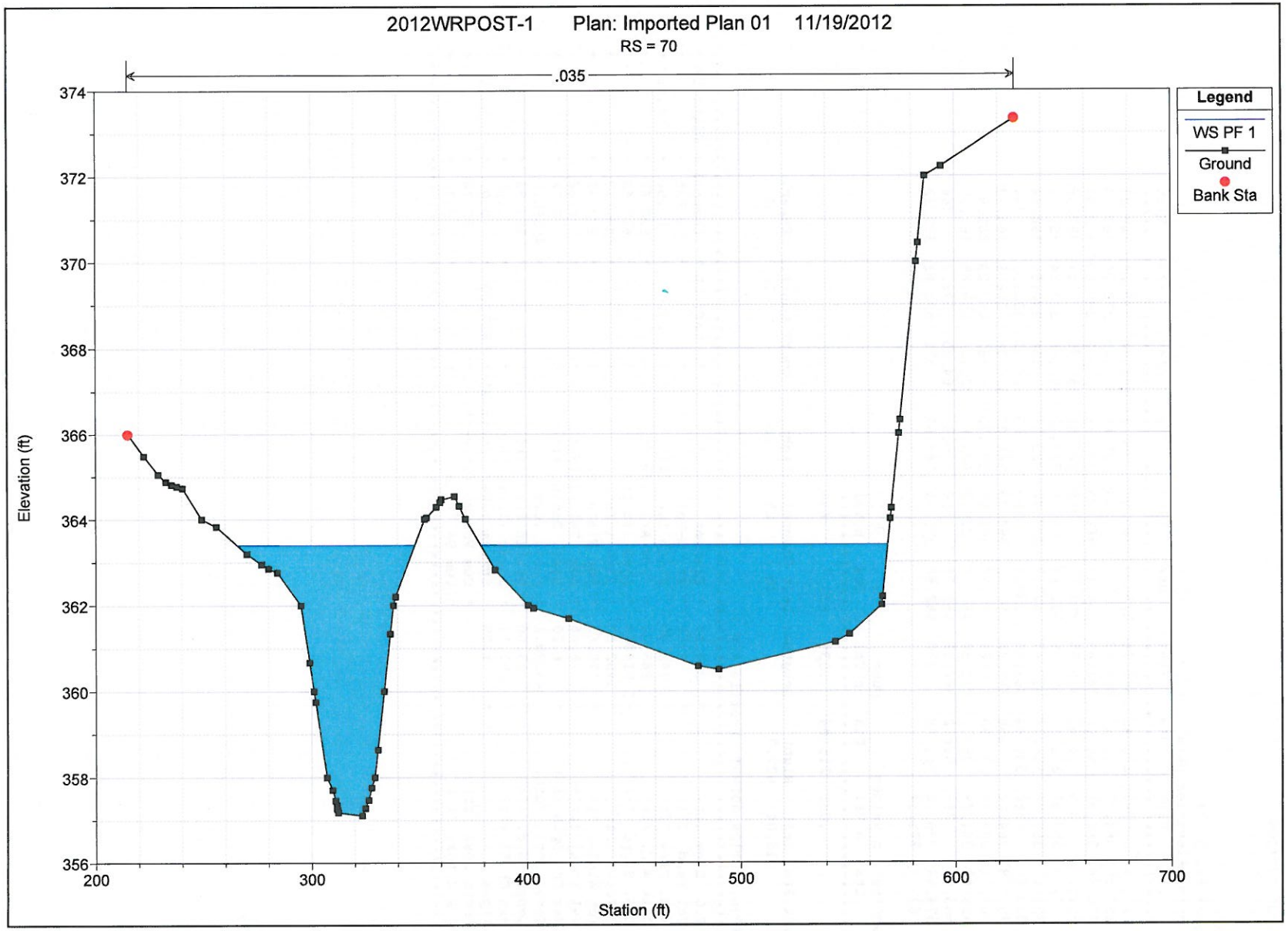
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	215.04	.035	627.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215.04	627.7	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	364.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.17	Wt. n-Val.		0.035	
W.S. Elev (ft)	363.40	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	363.40	Flow Area (sq ft)		622.62	
E.G. Slope (ft/ft)	0.014043	Area (sq ft)		622.62	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	272.63	Top Width (ft)		272.63	
Vel Total (ft/s)	8.68	Avg. Vel. (ft/s)		8.68	
Max Chl Dpth (ft)	6.29	Hydr. Depth (ft)		2.28	
Conv. Total (cfs)	45590.1	Conv. (cfs)		45590.1	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		274.88	
Min Ch El (ft)	357.11	Shear (lb/sq ft)		1.99	
Alpha	1.00	Stream Power (lb/ft s)	627.70	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		22.74	
C & E Loss (ft)		Cum SA (acres)		9.70	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 70
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
374
372
370
368
366
364
362
360
358
356
200
300
400
500
600
700
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 60

INPUT
Description: 94
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
233.08	367.28	241.11	366	243.71	365.41	250.47	364	253.91	362
255.65	360.98	257.45	360	259.03	359.07	260.96	358	262.18	357.26
264.49	356	264.94	355.74	265.13	355.43	266.02	355.22	266.36	355.08
266.45	355.05	267.41	354.97	268.09	354.91	275.86	354.99	275.95	355.01
277.87	355.15	279.31	355.26	280.99	355.41	283.31	355.7	285.66	355.93
286.28	356	286.82	356.41	289.51	358	290.65	358.79	292.62	360
299.89	360.27	304.48	360.46	332	360	332.82	360.04	333.55	360
339.63	359.83	359.2	359.25	363.59	359.14	364.95	359.1	365.97	359.06
375.79	358.74	418.64	358.46	486.35	358.64	489.93	358.83	495.78	360
503.41	363.71	504.02	364	507.63	365.75	508.14	366	511.84	367.8
512.26	368	516.06	369.84	516.38	370	539.71	370.53		

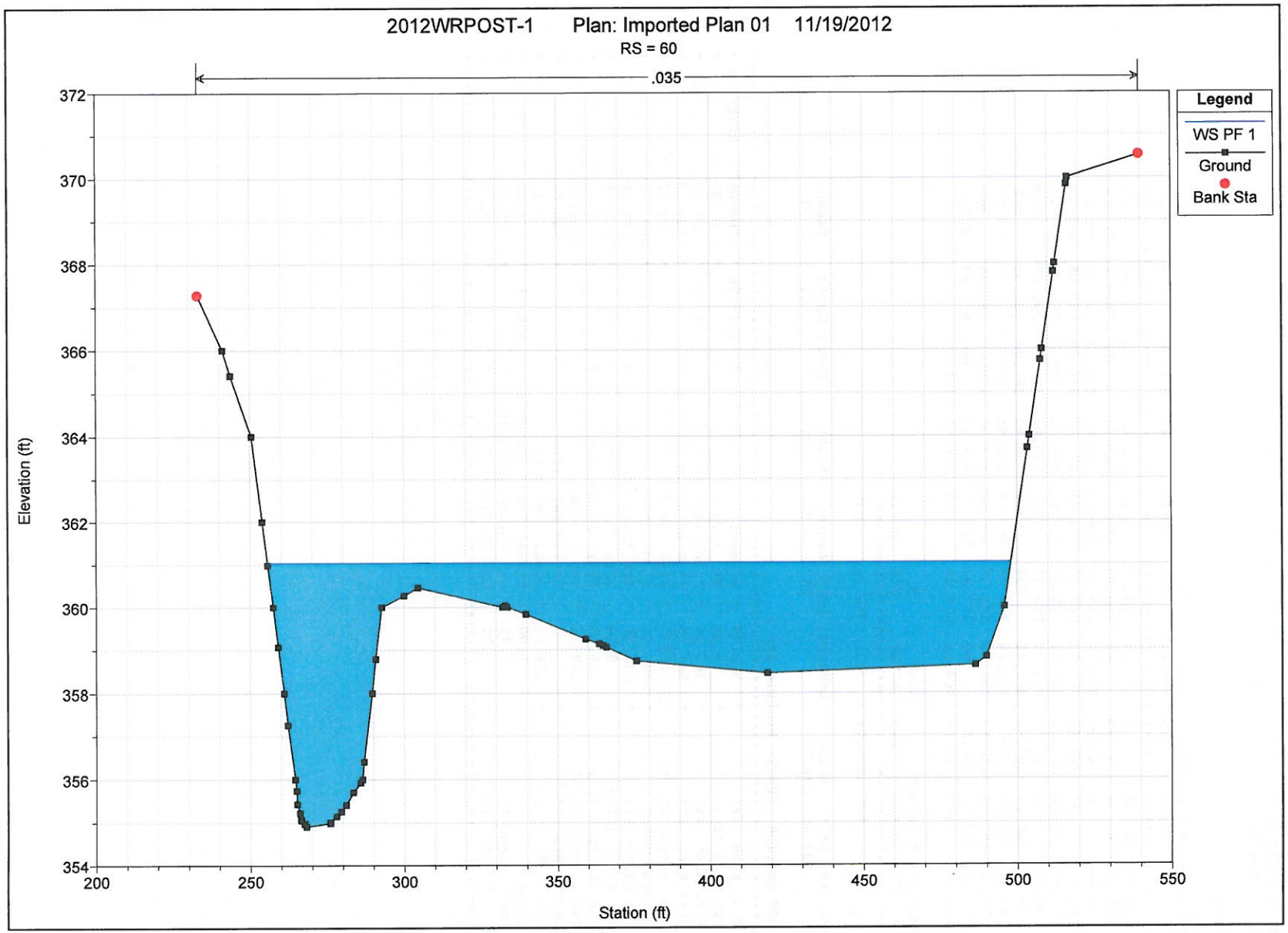
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	233.08	.035	539.71	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
233.08	539.71	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	362.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.42	Wt. n-Val.		0.035	
W.S. Elev (ft)	361.04	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	361.19	Flow Area (sq ft)		564.13	
E.G. Slope (ft/ft)	0.016792	Area (sq ft)		564.13	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	242.38	Top Width (ft)		242.38	
Vel Total (ft/s)	9.58	Avg. Vel. (ft/s)		9.58	
Max Chl Dpth (ft)	6.13	Hydr. Depth (ft)		2.33	
Conv. Total (cfs)	41691.2	Conv. (cfs)		41691.2	
Length Wtd. (ft)		Wetted Per. (ft)		245.62	
Min Ch El (ft)	354.91	Shear (lb/sq ft)		2.41	
Alpha	1.00	Stream Power (lb/ft s)	539.71	0.00	0.00
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)		19.31	
C & E Loss (ft)	0.01	Cum SA (acres)		8.26	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 60
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
372
370
368
366
364
362
360
358
356
354
200
250
300
350
400
450
500
550
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 50

INPUT
Description: 104
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
97.67	364	110.39	362.44	113.43	362	127.98	360	131.89	359.7
143.38	358.61	155.96	358.02	156.44	358	156.53	357.96	161.04	356
165.07	354.21	165.58	354	166.79	353.46	170.03	352	174.68	352
176.31	352.31	184.93	354	187.16	355	189.52	356	191.7	357
193.87	358	195.29	358.32	195.92	358.46	196.46	358.55	211.49	358.54
211.63	358.43	212.1	358.38	213.1	358.32	220	358	246.69	358
252.88	358.07	255.16	358.1	266.3	358.1	268.94	358.09	270.14	358.09
277.82	358	285.23	357.79	330.82	357.47	350.69	357.46	367.27	357.41
422.53	357.64	424.53	357.69	432.58	357.81	434.87	358	437.94	359.52
438.59	360	450.6	366	503.9	367.8				

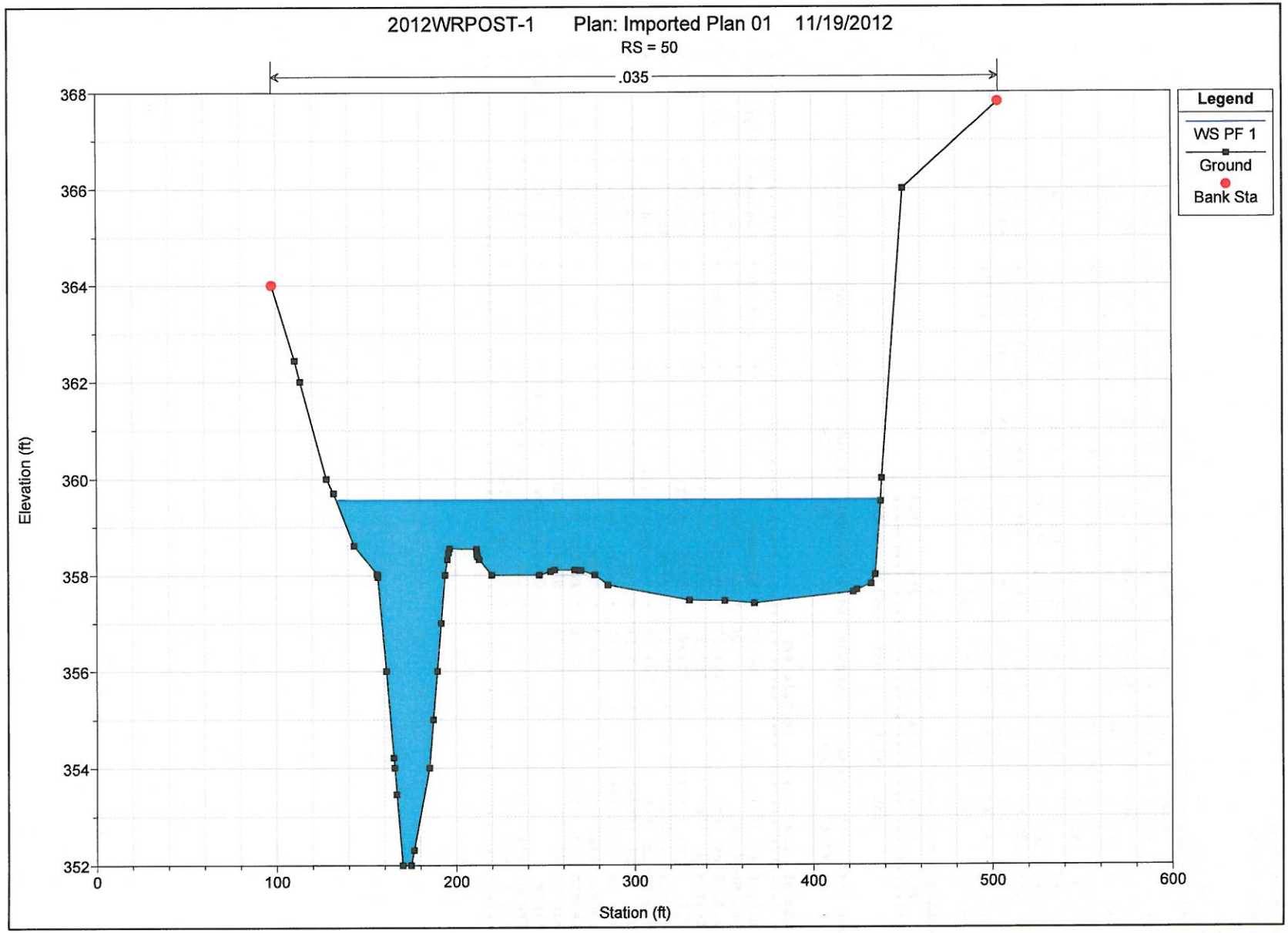
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	97.67	.035	503.9	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
97.67	503.9	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	360.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.		0.035	
W.S. Elev (ft)	359.57	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	359.57	Flow Area (sq ft)		652.65	
E.G. Slope (ft/ft)	0.013945	Area (sq ft)		652.65	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	304.75	Top Width (ft)		304.75	
Vel Total (ft/s)	8.28	Avg. Vel. (ft/s)		8.28	
Max Chl Dpth (ft)	7.57	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	45750.3	Conv. (cfs)		45750.3	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		307.62	
Min Ch El (ft)	352.00	Shear (lb/sq ft)		1.85	
Alpha	1.00	Stream Power (lb/ft s)	503.90	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		15.70	
C & E Loss (ft)		Cum SA (acres)		6.59	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 50
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
352
0
100
200
300
400
500
600
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 40

INPUT
Description: 114
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
91.89	362.5	93.04	362.23	96.97	361.61	101.77	361	109.4	360
111.97	359.65	113.01	359.66	113.71	359.69	113.79	359.72	114.07	359.71
114.26	359.7	114.33	359.69	135.1	358	136.75	356.97	138.29	356
140.26	354.77	141.5	354	142.41	353.43	144.75	352	163.93	352
167.38	353.41	168.72	354	170.57	354.8	173.33	356	175.45	356.87
178.05	358	184.41	358	210.09	356	235.52	355.67	280.65	355.27
308.33	355.56	311.59	355.58	315.36	355.59	316.15	355.57	336.64	355.7
364.91	356	366.23	356.63	369.12	358	372.23	359.49	373.29	360
377.47	362	381.63	364	383.12	364.06				

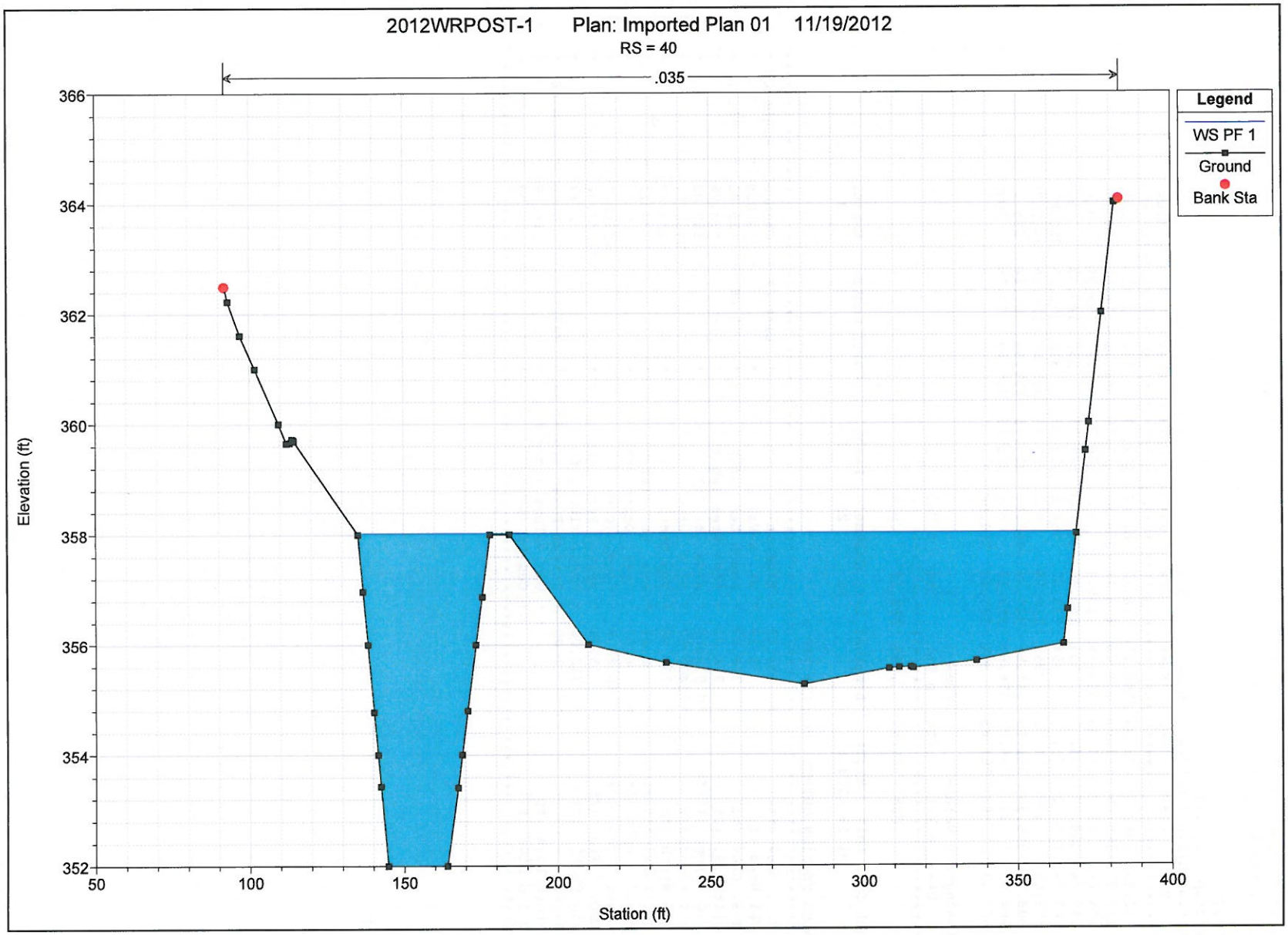
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	91.89	.035	383.12	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91.89	383.12	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	359.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.29	Wt. n-Val.		0.035	
W.S. Elev (ft)	358.03	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	358.03	Flow Area (sq ft)		593.08	
E.G. Slope (ft/ft)	0.013624	Area (sq ft)		593.08	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	234.48	Top Width (ft)		234.48	
Vel Total (ft/s)	9.11	Avg. Vel. (ft/s)		9.11	
Max Chl Dpth (ft)	6.03	Hydr. Depth (ft)		2.53	
Conv. Total (cfs)	46285.9	Conv. (cfs)		46285.9	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		237.96	
Min Ch El (ft)	352.00	Shear (lb/sq ft)		2.12	
Alpha	1.00	Stream Power (lb/ft s)	383.12	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		12.09	
C & E Loss (ft)		Cum SA (acres)		4.98	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 40
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
366
364
362
360
358
356
354
352
50
100
150
200
250
300
350
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 30

INPUT
Description: 124
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
103.38	360.79	105.92	360.11	106.38	360	111.41	359.64	113.8	359.48
115.74	359.38	116.32	359.68	119.59	359.54	123.77	359.24	134.49	358
153.17	356.9	167.14	356	174.71	354.36	176.17	354	181.48	352.16
181.92	352	182.27	351.97	185.03	351.68	186.34	351.51	186.85	351.43
187.92	351.11	187.97	350.88	188.17	350.73	195.47	350.73	195.56	350.74
195.75	350.76	196.65	350.93	200.15	351.41	204.85	352	205.05	352.1
208.61	354	211.5	355.51	212.43	356	213.02	356.23	213.26	356.69
213.58	356.91	214.22	357.09	214.66	357.23	214.8	357.23	215	357.21
217.38	357.08	219.22	356.96	220.44	356.84	221.39	356.72	225.26	356.36
227.72	356.11	228.58	356	230.6	355.83	233.08	355.59	253.72	355.08
296.19	354.38	326.62	355.46	347.05	356	349.79	357.36	351.07	358
353.84	359.38	357.89	361.39	359.11	362	369.58	362		

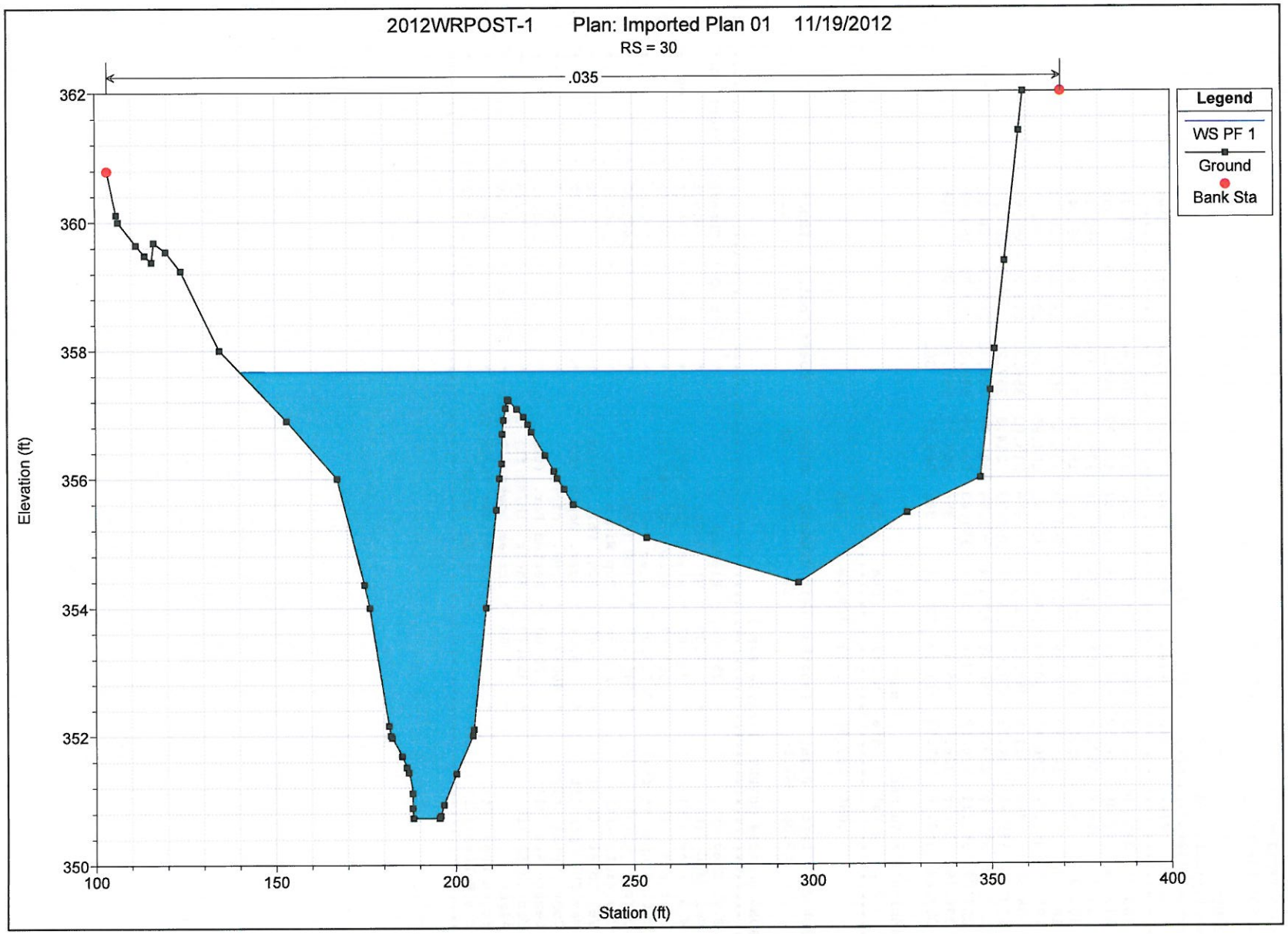
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	103.38	.035	369.58	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
103.38	369.58	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	359.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.39	Wt. n-Val.		0.035	
W.S. Elev (ft)	357.67	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	357.67	Flow Area (sq ft)		571.82	
E.G. Slope (ft/ft)	0.013299	Area (sq ft)		571.82	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	210.36	Top Width (ft)		210.36	
Vel Total (ft/s)	9.45	Avg. Vel. (ft/s)		9.45	
Max Chl Dpth (ft)	6.94	Hydr. Depth (ft)		2.72	
Conv. Total (cfs)	46847.7	Conv. (cfs)		46847.7	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		213.31	
Min Ch El (ft)	350.73	Shear (lb/sq ft)		2.23	
Alpha	1.00	Stream Power (lb/ft s)	369.58	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		8.61	
C & E Loss (ft)		Cum SA (acres)		3.53	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 30
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
362
360
358
356
354
352
350
100
150
200
250
300
350
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 18

INPUT
Description: 136
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
153.66	354.87	154.62	354.96	154.8	354.98	159.5	355.03	159.83	354.99
160.26	354.94	161.61	354.77	163.22	354.59	166.96	354.16	168.5	354
169.5	353.32	171.45	352	173.34	350.79	174.57	350	176.32	348.98
178.05	348	180.32	347.6	181.54	347.35	182.92	347.03	183.53	346.92
185.58	346.63	186.19	346.56	186.7	346.47	191.54	346.46	191.62	346.47
192.57	346.62	195.03	347.02	195.75	347.11	203.63	348	206.21	348.44
214.58	350	218.49	351.2	221.43	352	224.51	353.31	226.17	354
241.48	354	247.23	353.84	271.41	353	341.82	352.56	359.47	352.52
372.6	353.17	378.82	353.59	383.68	354	386.12	355.14	387.97	356
389.81	356.86	396.55	360	398.43	360	448.3	359.23	456.24	359.12
470.14	358.96								

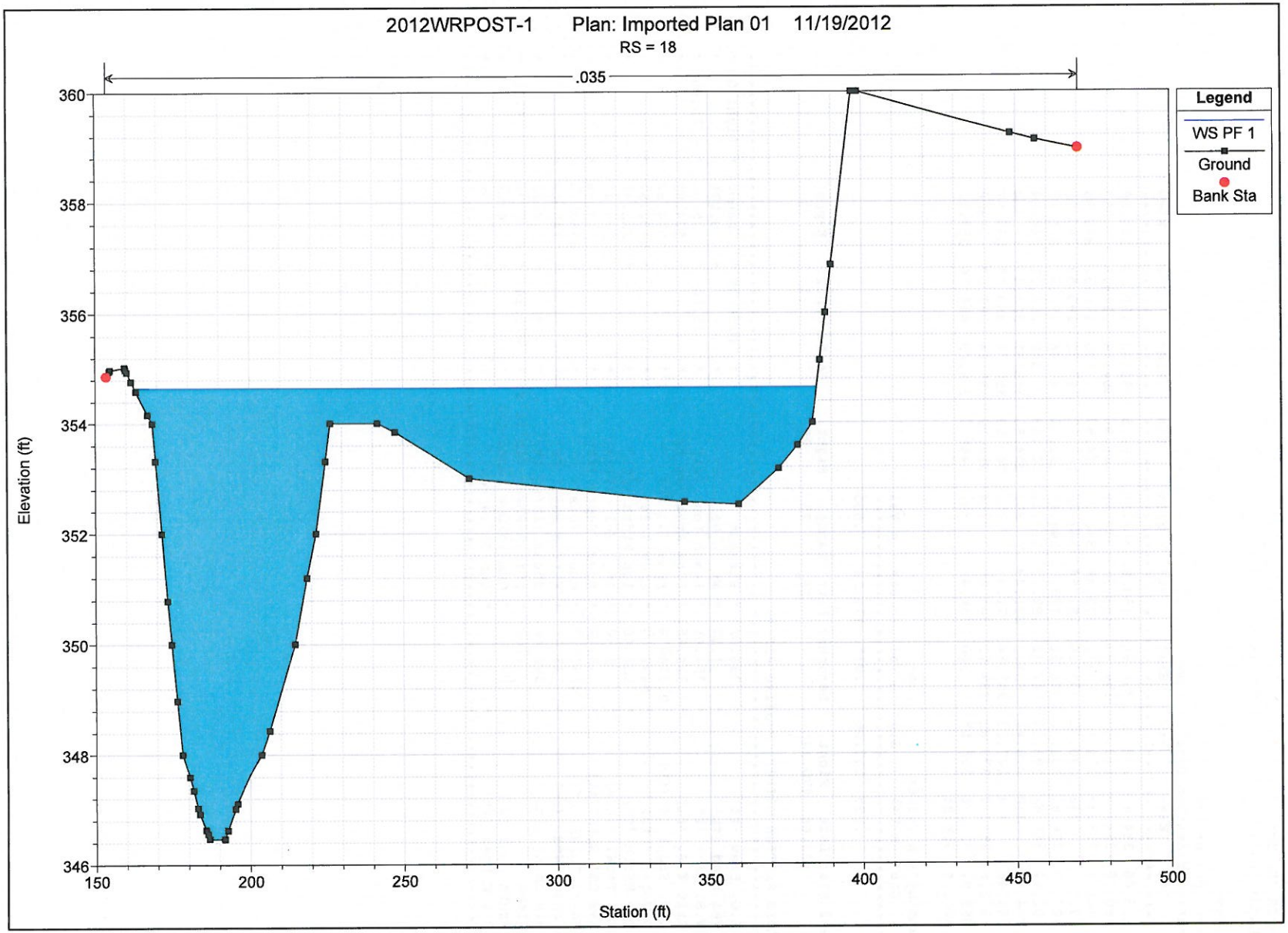
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	153.66	.035	470.14	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
153.66	470.14	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.37	Wt. n-Val.		0.035	
W.S. Elev (ft)	354.65	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	354.65	Flow Area (sq ft)		574.82	
E.G. Slope (ft/ft)	0.014074	Area (sq ft)		574.82	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	222.40	Top Width (ft)		222.40	
Vel Total (ft/s)	9.40	Avg. Vel. (ft/s)		9.40	
Max Chl Dpth (ft)	8.19	Hydr. Depth (ft)		2.58	
Conv. Total (cfs)	45539.7	Conv. (cfs)		45539.7	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		225.49	
Min Ch El (ft)	346.46	Shear (lb/sq ft)		2.24	
Alpha	1.00	Stream Power (lb/ft s)	470.14	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		4.43	
C & E Loss (ft)		Cum SA (acres)		1.59	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 18
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
360
358
356
354
352
350
348
346
150
200
250
300
350
400
450
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 17

INPUT
Description: 137
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
149.3	354.53	160.94	354.63	161.78	354.53	162.84	354.4	163.85	354.27
166.02	354	166.29	353.8	168.78	352	170.44	350.9	172.96	349.54
175.5	348	181.9	346.24	182.76	346	191.53	346	196.49	346.7
205.4	348	208.26	348.66	214.48	350	218.89	351.72	219.67	352
221.38	352.68	224.67	354	243.99	354	269.53	352.99	282.37	352.55
301.49	352.43	353.6	352.3	380.44	353.64	388.41	353.67	389.07	354
392.5	355.68	393.14	356	396.5	357.65	397.22	358	400.5	359.61
401.29	360	408.51	360	503.94	358.58	511.11	358.49		

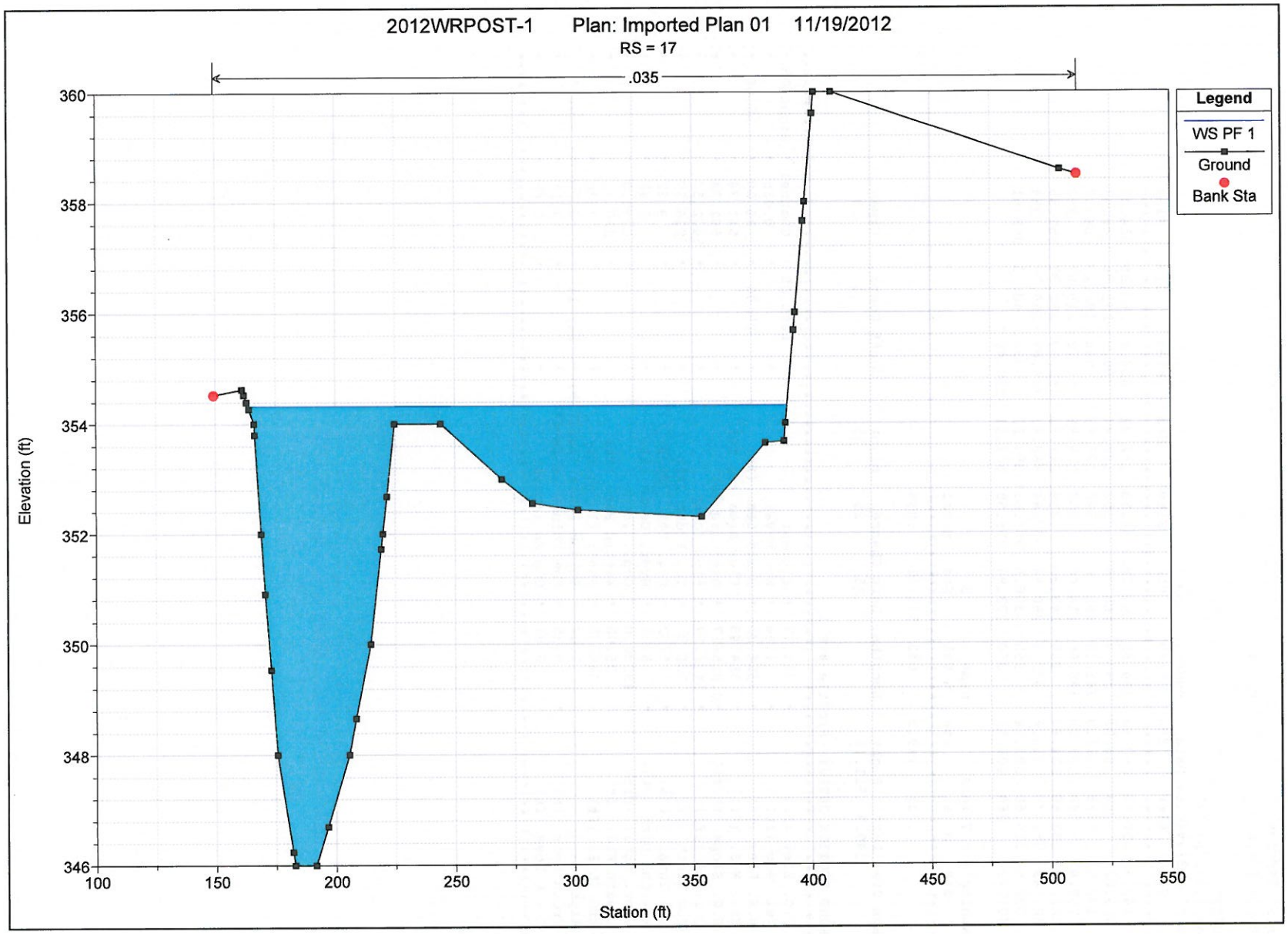
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	149.3	.035	511.11	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
149.3	511.11	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	355.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.		0.035	
W.S. Elev (ft)	354.33	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	354.43	Flow Area (sq ft)		561.34	
E.G. Slope (ft/ft)	0.015617	Area (sq ft)		561.34	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	226.37	Top Width (ft)		226.37	
Vel Total (ft/s)	9.62	Avg. Vel. (ft/s)		9.62	
Max Chl Dpth (ft)	8.33	Hydr. Depth (ft)		2.48	
Conv. Total (cfs)	43232.0	Conv. (cfs)		43232.0	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		229.75	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.38	
Alpha	1.00	Stream Power (lb/ft s)	511.11	0.00	0.00
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)		4.11	
C & E Loss (ft)	0.01	Cum SA (acres)		1.46	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 17
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
360
358
356
354
352
350
348
346
100
150
200
250
300
350
400
450
500
550
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 16

INPUT
Description: 138
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
143.43	354	143.6	354.02	143.75	354.06	162.38	354.22	163.73	354.07
164.31	354	165.23	353.29	166.96	352	169.12	350.44	169.78	350
170.7	349.6	173.93	348	180.24	346.18	180.82	346	194.78	346
205.35	347.77	206.63	348	207.18	348.16	214.04	350	218.02	351.59
219.1	352	219.89	352.31	223.84	354	238.2	354	243.8	353.78
293.1	352.23	294.92	352.21	297.46	352.2	345.58	352.08	346.03	352.08
346.61	352.09	347.46	352.09	347.74	352.08	359.13	352.07	390.23	352.2
393.89	354	394.71	354.4	402.03	358	402.71	358.33	406.11	360
413.94	360								

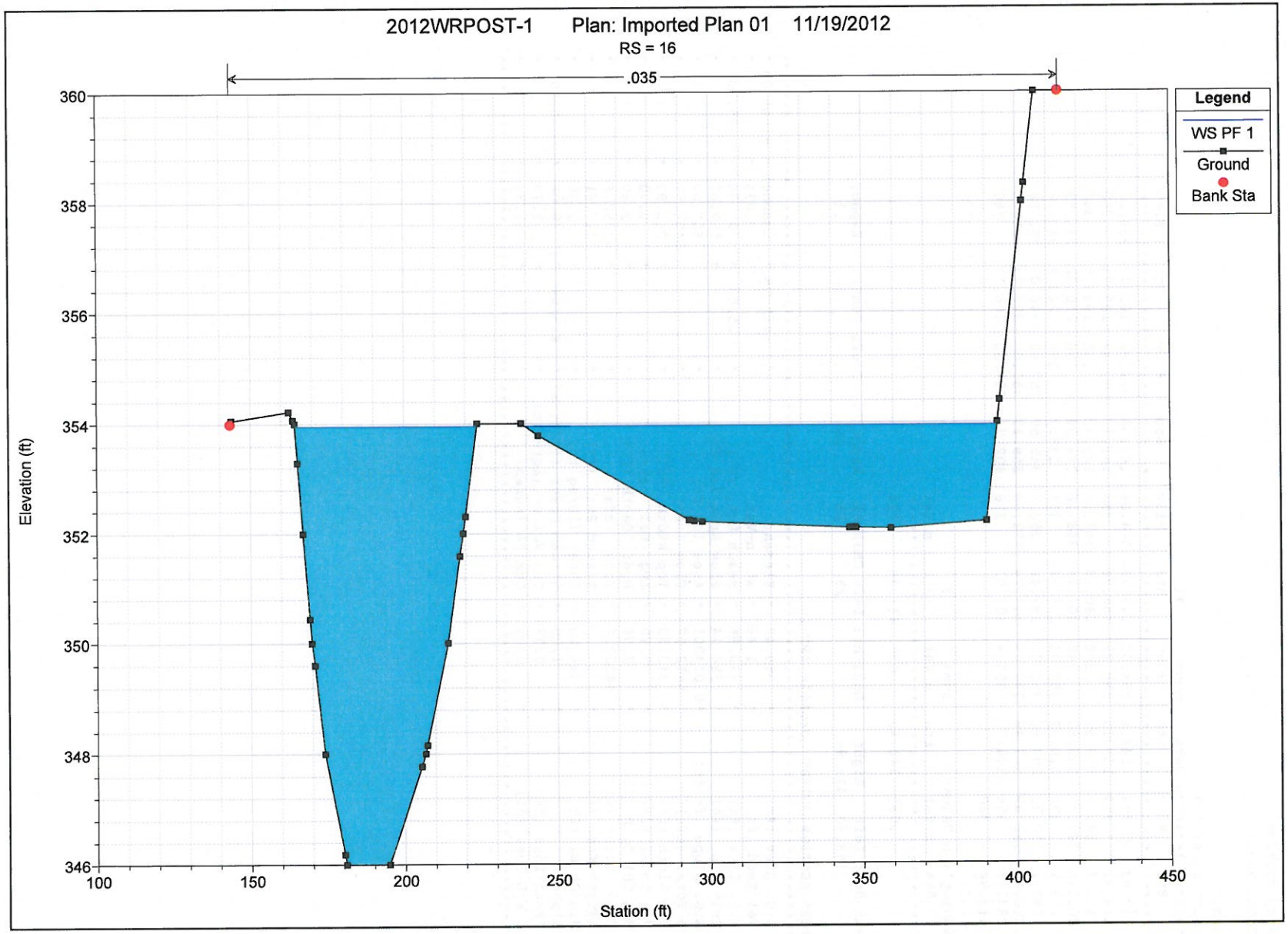
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	143.43	.035	413.94	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
143.43	413.94	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	355.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.46	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.96	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	354.14	Flow Area (sq ft)		557.07	
E.G. Slope (ft/ft)	0.014901	Area (sq ft)		557.07	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	213.93	Top Width (ft)		213.93	
Vel Total (ft/s)	9.70	Avg. Vel. (ft/s)		9.70	
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)		2.60	
Conv. Total (cfs)	44258.6	Conv. (cfs)		44258.6	
Length Wtd. (ft)		Wetted Per. (ft)		217.61	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.38	
Alpha	1.00	Stream Power (lb/ft s)	413.94	0.00	0.00
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)		3.79	
C & E Loss (ft)	0.05	Cum SA (acres)		1.34	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 16
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
360
358
356
354
352
350
348
346
100
150
200
250
300
350
400
450
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 15

INPUT
Description: 139
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
141.74	354	162.25	354	163.89	352.84	165.13	352	166.72	350.88
167.98	350	171.9	348	177.69	346.13	178.09	346	203.31	346
206.47	347.28	208.01	348	210.29	348.93	218.02	351.72	218.84	352
219.82	352.35	224.37	354	230	354	295.12	352.22	297.09	352.16
302.74	352	305.62	351.98	317.63	351.95	321.25	351.96	323.38	351.98
324.14	352	327.44	352.01	333.08	352.01	335.97	352	336.18	352
346.79	351.93	350.42	351.92	353.8	351.92	356.8	351.95	358.48	351.98
359.14	352	394.21	352	395.17	352.47	398.27	354	399.27	354.49
402.32	356	403.36	356.51	406.38	358	407.71	358.66	410.44	360
419.36	360								

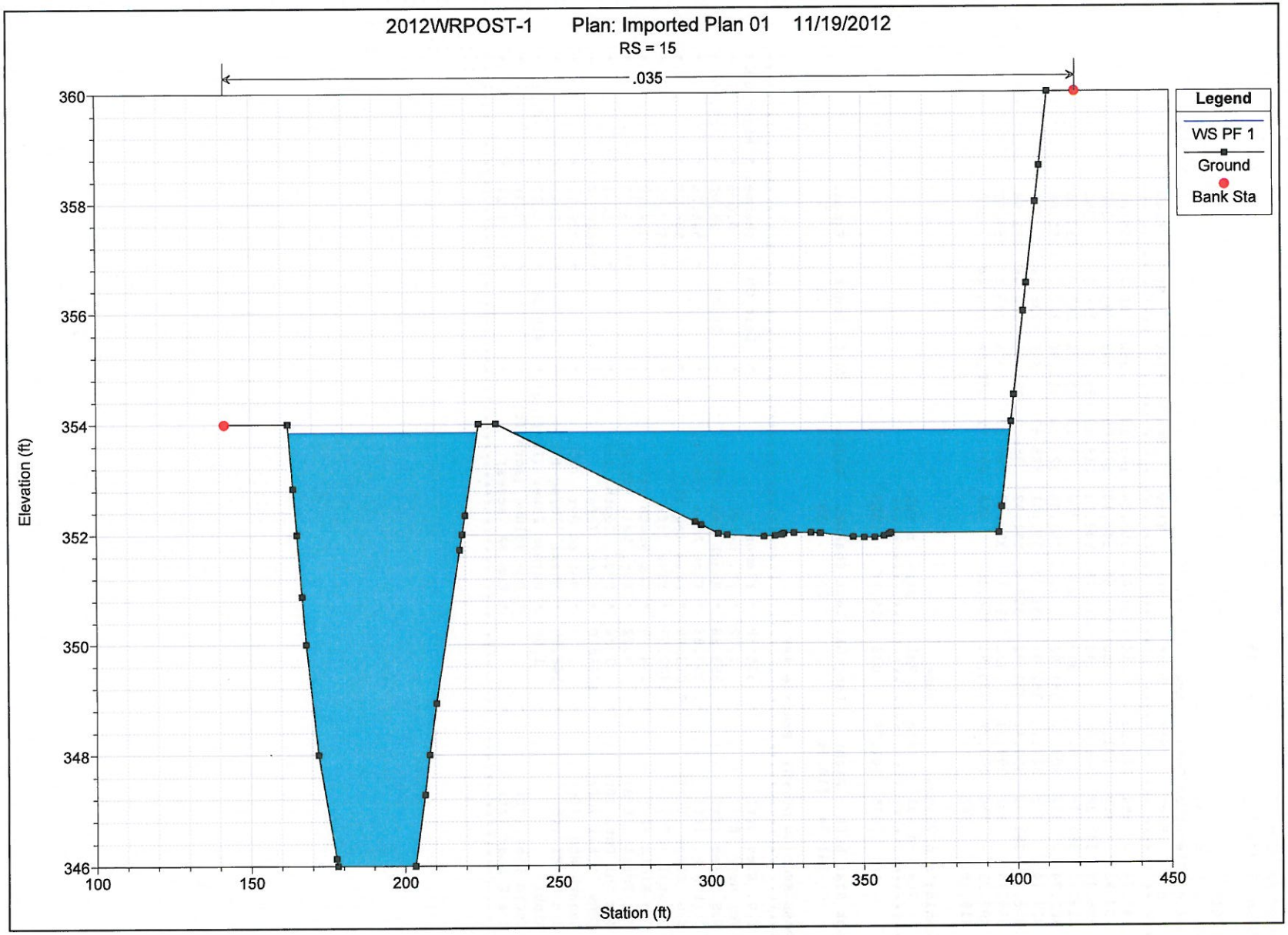
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	141.74	.035	419.36	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
141.74	419.36	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	355.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.32	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.86	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	353.86	Flow Area (sq ft)		586.20	
E.G. Slope (ft/ft)	0.013395	Area (sq ft)		586.20	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	224.28	Top Width (ft)		224.28	
Vel Total (ft/s)	9.22	Avg. Vel. (ft/s)		9.22	
Max Chl Dpth (ft)	7.86	Hydr. Depth (ft)		2.61	
Conv. Total (cfs)	46680.0	Conv. (cfs)		46680.0	
Length Wtd. (ft)		Wetted Per. (ft)		228.20	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.15	
Alpha	1.00	Stream Power (lb/ft s)	419.36	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		3.46	
C & E Loss (ft)		Cum SA (acres)		1.21	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 15
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
360
358
356
354
352
350
348
346
100
150
200
250
300
350
400
450
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 14

INPUT
Description: 140
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
143.18	354	161.27	354	163.76	352.14	163.94	352	164.09	351.88
166.48	350	168.69	348.88	170.22	348	174.84	346.65	177.32	346
205.6	346	208.79	347.69	209.33	348	210	348.32	213.38	350
218.83	351.94	219.02	352	219.35	352.11	219.66	352.23	220.04	352.35
224.13	353.74	227.64	353.86	229.24	353.8	231.65	353.69	238.66	353.38
242.88	353.18	274.86	352.29	277.48	352.27	323.58	352	331.46	351.92
336.51	351.86	337.86	351.83	338.29	351.81	338.87	351.8	339.9	351.79
342.97	351.77	345.3	351.77	345.84	351.78	346.17	351.79	348.86	351.79
351.79	351.77	352.71	351.76	353.57	351.76	354.33	351.77	354.76	351.78
355.46	351.8	356.73	351.82	359.36	351.84	362.42	351.85	363.93	351.84
384.59	352	398.4	352	400.82	353.19	402.45	354	404.91	355.21
406.51	356	409.01	357.23	410.56	358	413.69	359.54	414.62	360
424.77	360	447.19	359.68						

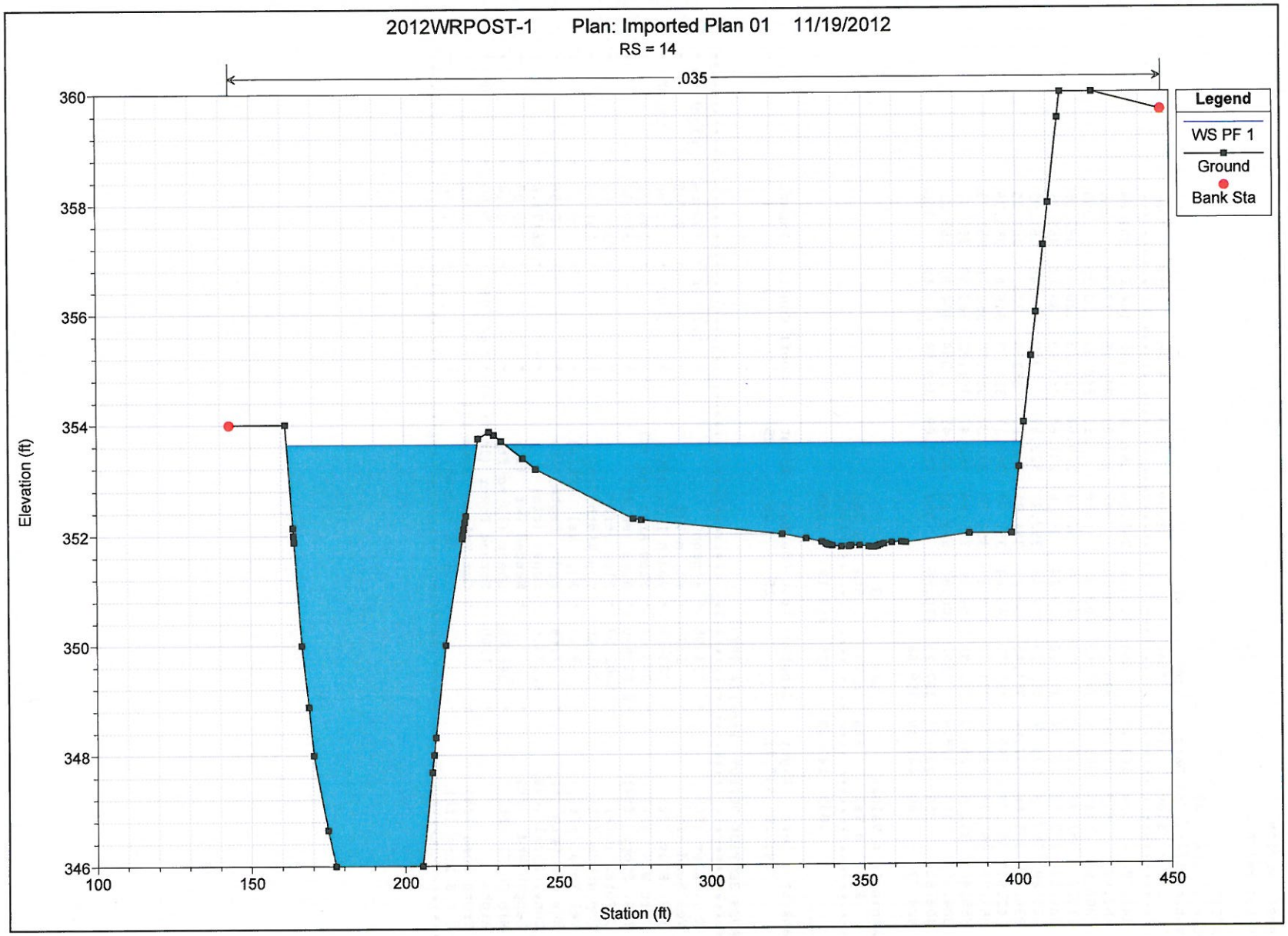
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	143.18	.035	447.19	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
143.18	447.19	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.64	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	353.64	Flow Area (sq ft)		589.33	
E.G. Slope (ft/ft)	0.013690	Area (sq ft)		589.33	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	231.05	Top Width (ft)		231.05	
Vel Total (ft/s)	9.17	Avg. Vel. (ft/s)		9.17	
Max Chl Dpth (ft)	7.64	Hydr. Depth (ft)		2.55	
Conv. Total (cfs)	46173.6	Conv. (cfs)		46173.6	
Length Wtd. (ft)		Wetted Per. (ft)		235.07	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.14	
Alpha	1.00	Stream Power (lb/ft s)	447.19	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		3.12	
C & E Loss (ft)		Cum SA (acres)		1.08	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 14
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
360
358
356
354
352
350
348
346
100
150
200
250
300
350
400
450
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 13

INPUT
Description: 141
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
143.29	354	161.26	354	161.86	353.47	163.52	352	164.81	350.8
165.71	350	166.09	349.65	167.74	348	173.16	346.79	176.86	346
199.84	346	206.31	347.39	208.47	348	209.81	348.45	214.34	350
218.7	351.7	219.44	352	245	352.38	249.65	352.44	252.97	352.45
253.89	352.45	255.31	352.43	255.44	352.42	256.76	352.4	258.97	352.39
263.63	352.39	265.44	352.38	312.21	352	315.1	351.96	323.1	351.93
339.78	351.65	394.23	351.95	400.83	352	402.58	352	406.46	353.91
406.63	354	410.56	355.93	410.69	356	414.65	357.95	414.74	358
415.22	358.23	415.75	358.26	416.09	358.26	420.12	359.04	420.86	359
422.72	359.18	423.81	359.26	424.76	359.31	425.67	359.34	428.17	359.33
429.01	359.29	447.74	359.07						

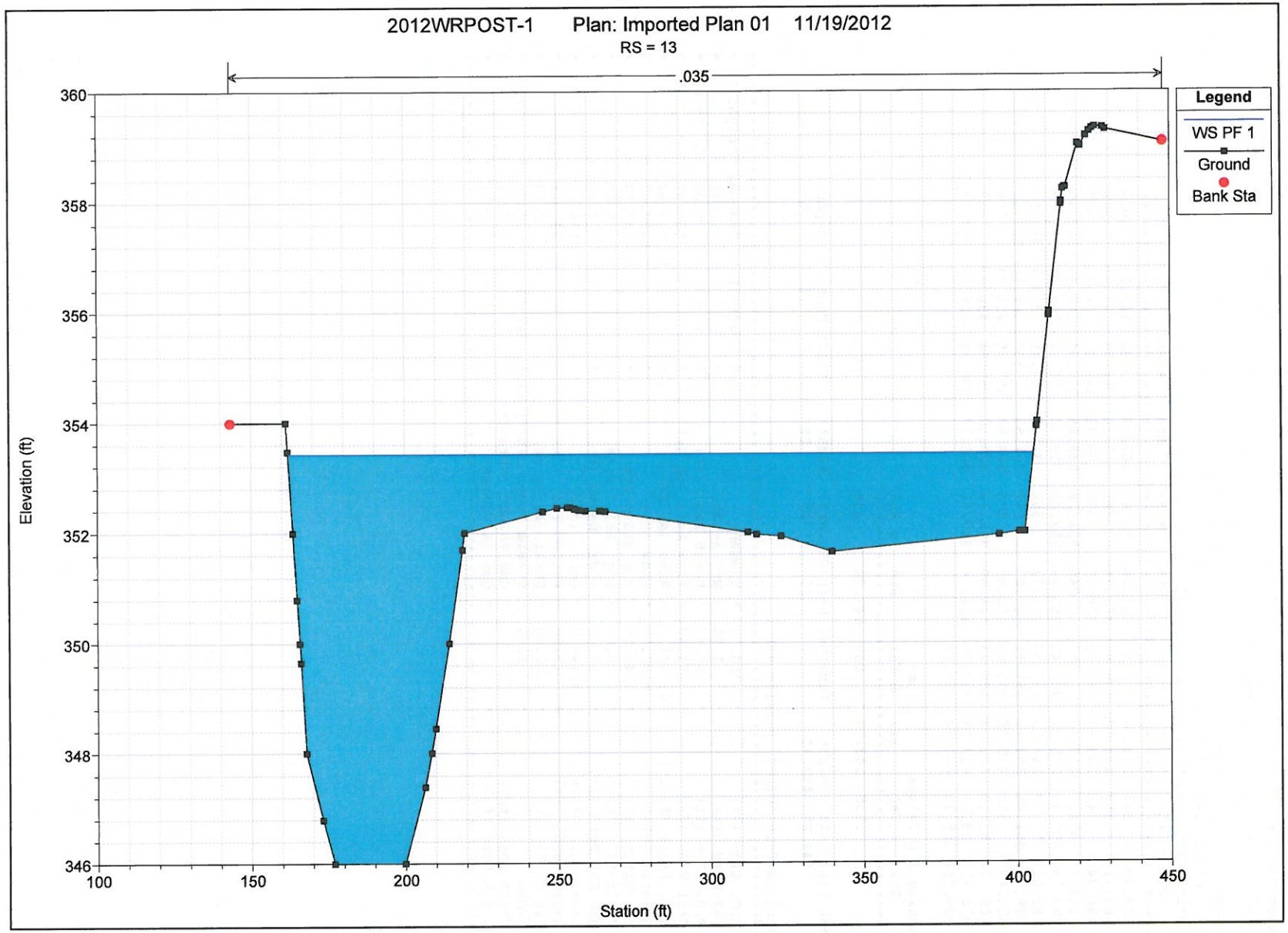
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	143.29	.035	447.74	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
143.29	447.74	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.28	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.43	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	353.43	Flow Area (sq ft)		595.60	
E.G. Slope (ft/ft)	0.014133	Area (sq ft)		595.60	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	243.57	Top Width (ft)		243.57	
Vel Total (ft/s)	9.07	Avg. Vel. (ft/s)		9.07	
Max Chl Dpth (ft)	7.43	Hydr. Depth (ft)		2.45	
Conv. Total (cfs)	45444.0	Conv. (cfs)		45444.0	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		247.21	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.13	
Alpha	1.00	Stream Power (lb/ft s)	447.74	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		2.78	
C & E Loss (ft)		Cum SA (acres)		0.95	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 13
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
360
358
356
354
352
350
348
346
100
150
200
250
300
350
400
450
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 12

INPUT
Description: 142
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
142.2	354	149.86	354	153.09	353.62	157.53	353.15	158.8	353.21
159.54	354	160.76	354	161.04	353.71	163.11	352	163.85	351.27
165.06	350	166.34	348.72	167.03	348	172.04	346.48	172.85	346
193.55	346	194.4	346.11	202.27	347.05	209.12	348	211.62	348.8
215.08	350	218.07	351.17	220.41	352	228.62	352.11	235.2	352.21
249.8	352.25	253.81	352.25	260.06	352.15	260.63	352.1	266.46	352.05
276.14	352	278.7	352	291.77	351.9	296.54	351.9	304.15	351.81
316.1	351.59	316.75	351.58	317.14	351.57	317.73	351.57	318.97	351.55
406.91	352	410.51	353.77	410.97	354	412.29	354.65	415.13	356
419.83	357.23	422.41	357.5	425.26	357.66	426.06	357.79	426.5	357.8
426.78	357.8	428.64	357.42	433.92	357.38	434.72	357.38	474.9	354.59
535.88	351.44	538.01	351.35	543.24	351.15	546.4	351.44	547.18	351.51
550.25	352	551.99	352.43	553.99	354	560.64	355.99	560.71	356
565.16	356.91	566.83	357.26	568.31	357.2	568.59	357.49		

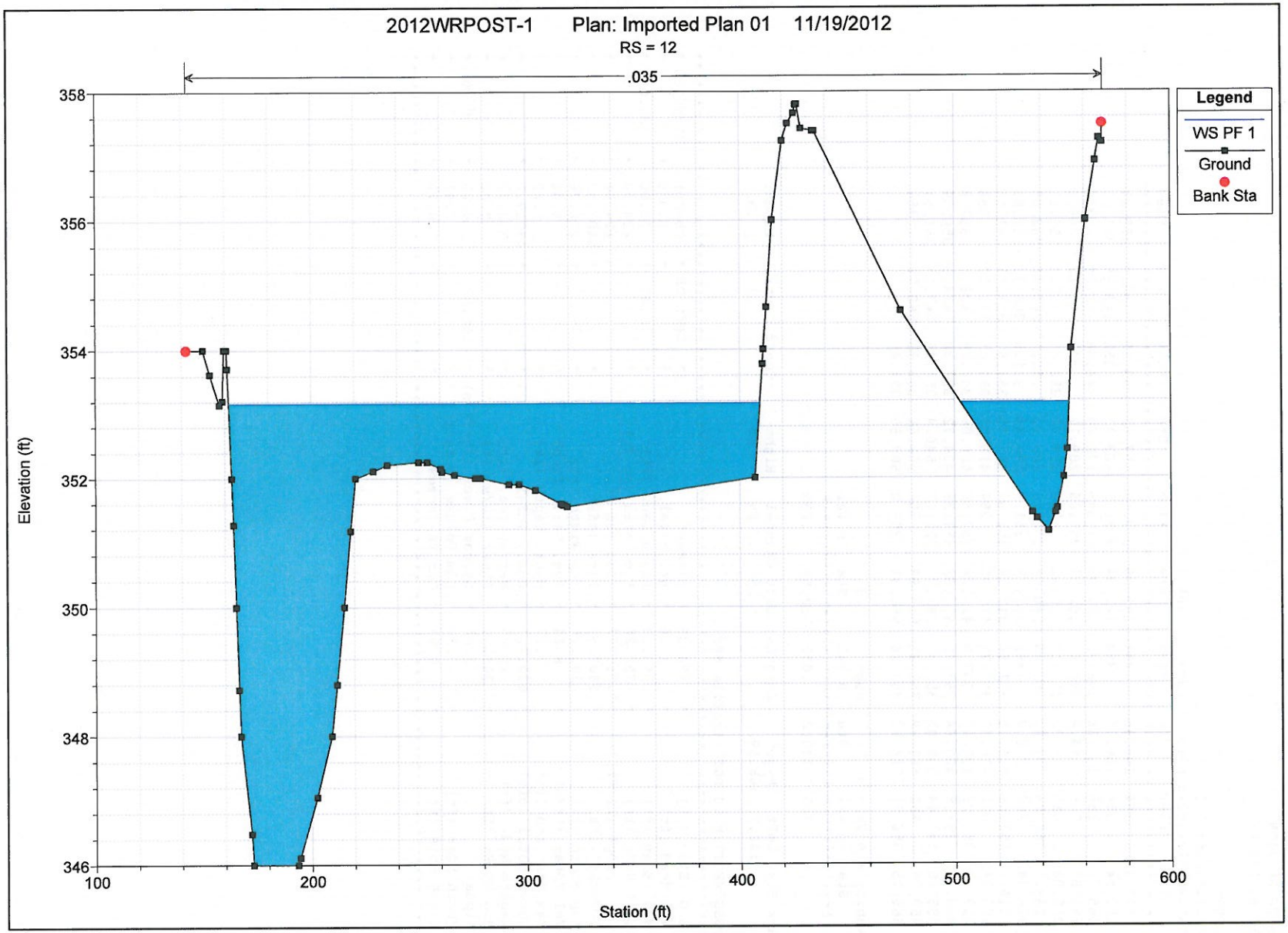
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	142.2	.035	568.59	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
142.2	568.59	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.16	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.17	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	353.20	Flow Area (sq ft)		624.96	
E.G. Slope (ft/ft)	0.015773	Area (sq ft)		624.96	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	298.76	Top Width (ft)		298.76	
Vel Total (ft/s)	8.64	Avg. Vel. (ft/s)		8.64	
Max Chl Dpth (ft)	7.17	Hydr. Depth (ft)		2.09	
Conv. Total (cfs)	43017.1	Conv. (cfs)		43017.1	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		302.73	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.03	
Alpha	1.00	Stream Power (lb/ft s)	568.59	0.00	0.00
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)		2.43	
C & E Loss (ft)	0.05	Cum SA (acres)		0.79	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 12
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
358
356
354
352
350
348
346
100
200
300
400
500
600
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 11

INPUT
Description: 143
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
149.58	353.2	161.6	352	162.61	350.97	163.61	350	164.21	349.41
165.63	348	166.92	346.7	167.54	346	204.8	346	205.77	346.31
210.62	348	214.55	349.36	216.25	350	221.04	351.72	221.8	352
222.39	352.16	226.7	352	246.63	352.05	253.74	352.05	256.88	352
269.53	352	272.36	351.98	280.15	351.89	280.51	351.87	285.01	351.76
286.99	351.75	288.13	351.72	288.69	351.72	291.96	351.71	293.9	351.71
294.62	351.7	368.67	351.79	371.78	351.8	411.27	352	413.08	352.89
413.55	353.06	415.8	354	415.92	354.06	416.05	354.07	421.47	354.26

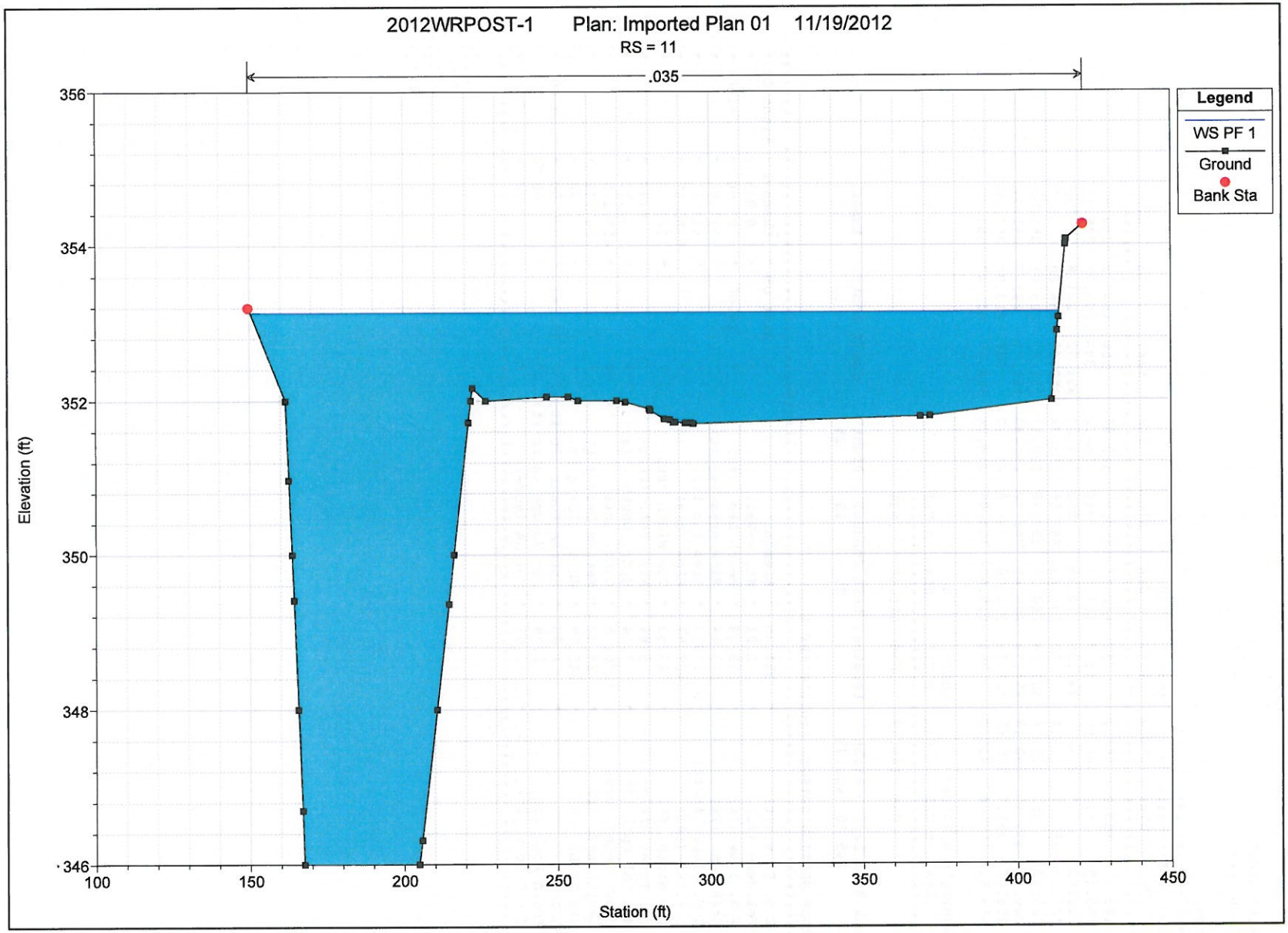
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	149.58	.035	421.47	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
149.58	421.47	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.21	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.14	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	353.14	Flow Area (sq ft)		611.01	
E.G. Slope (ft/ft)	0.014413	Area (sq ft)		611.01	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	263.53	Top Width (ft)		263.53	
Vel Total (ft/s)	8.84	Avg. Vel. (ft/s)		8.84	
Max Chl Dpth (ft)	7.14	Hydr. Depth (ft)		2.32	
Conv. Total (cfs)	45001.5	Conv. (cfs)		45001.5	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		267.41	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.06	
Alpha	1.00	Stream Power (lb/ft s)	421.47	0.00	0.00
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)		2.08	
C & E Loss (ft)	0.01	Cum SA (acres)		0.63	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 11
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
100
150
200
250
300
350
400
450
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 10

INPUT
Description: 144
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
134.76	353.04	148.6	352.81	160.85	352	162.12	350.62	162.72	350
163.95	348.48	164.41	348	166.03	346.14	166.15	346	202.23	346
205.94	346.62	212.06	348	214.79	349.21	216.6	350	220.01	351.53
221.16	352	223.76	353.15	225.58	354	226.39	354.21	227.82	354.38
229.69	354.42	231.6	354.36	233.09	354.19	234.21	354	235.3	353.83
239.96	353.18	242.85	352.95	248.89	352.29	250.71	352	254.03	351.97
256.42	351.93	256.87	351.92	257.58	351.92	264.42	351.9	268.47	351.88
397.76	352	411.58	350.85	413.95	350.65	414.99	350.56	418.28	350
481	350	483.71	350.17	494.6	350.87	496.12	351	496.37	351.02
530.95	354								

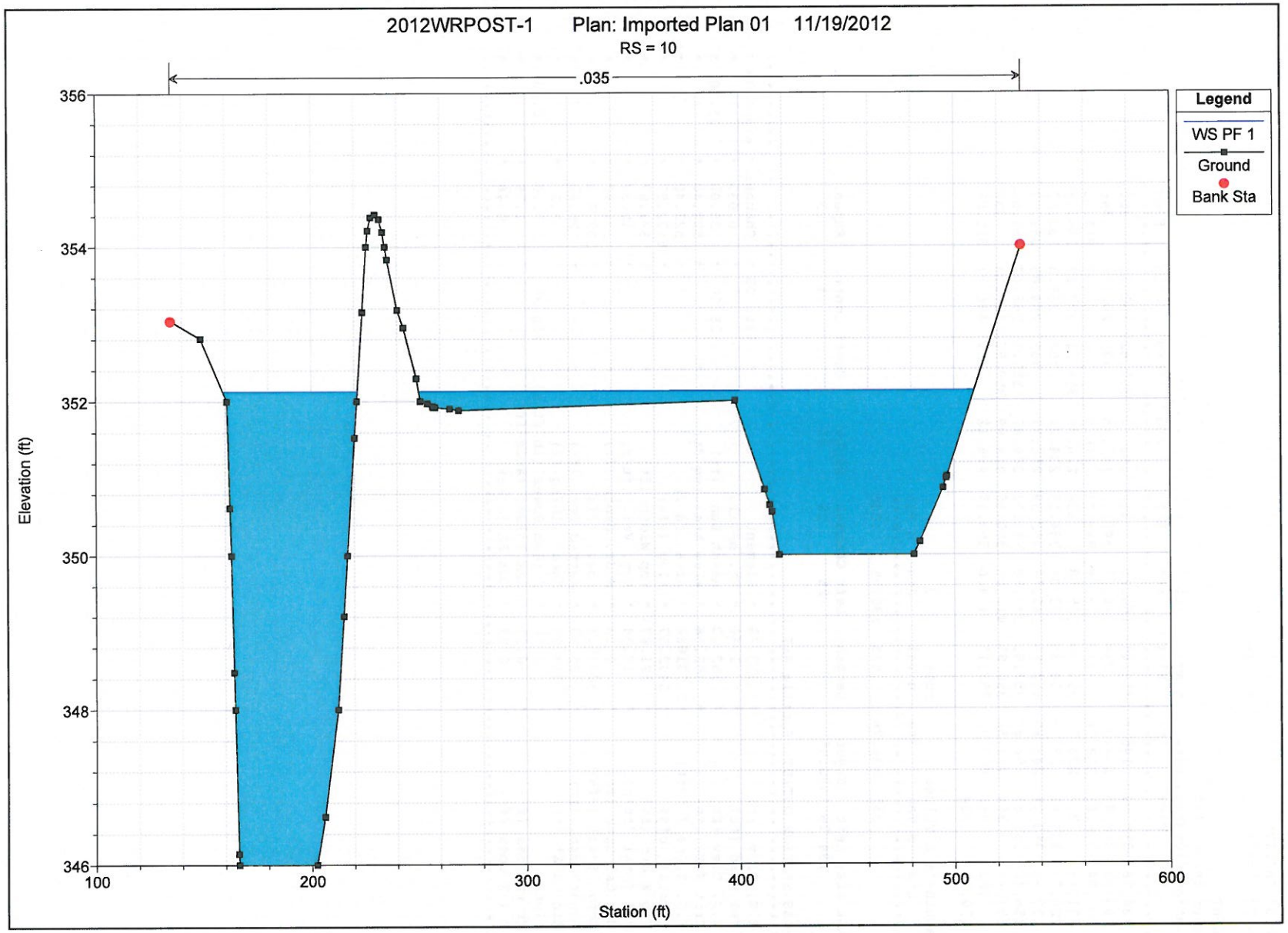
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	134.76	.035	530.95	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
134.76	530.95	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.66	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.13	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	352.56	Flow Area (sq ft)		522.40	
E.G. Slope (ft/ft)	0.031626	Area (sq ft)		522.40	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	321.87	Top Width (ft)		321.87	
Vel Total (ft/s)	10.34	Avg. Vel. (ft/s)		10.34	
Max Chl Dpth (ft)	6.13	Hydr. Depth (ft)		1.62	
Conv. Total (cfs)	30379.3	Conv. (cfs)		30379.3	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		325.86	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		3.17	
Alpha	1.00	Stream Power (lb/ft s)	530.95	0.00	0.00
Frctn Loss (ft)	0.51	Cum Volume (acre-ft)		1.75	
C & E Loss (ft)	0.04	Cum SA (acres)		0.46	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 10
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
100
200
300
400
500
600
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 9

INPUT
Description: 145
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
133.86	354.07	134.52	354.09	135.92	354.1	137.47	354.08	138.66	354.05
139.8	354	151.31	354	154.5	353.99	155.22	354	166.82	354
167.66	353.59	170.53	352	172.79	350.95	174.6	350	176.87	348.87
178.68	348	181.49	346.63	182.77	346	204.2	346	206.32	346.59
211.54	348	213.37	348.81	218.72	351.26	220.41	352	221.82	352.61
224.85	354	225.84	354.35	226.73	354.64	226.8	354.65	226.86	354.65
228.2	354.57	229.71	354.49	231.56	354.42	234.22	354.34	234.86	354.31
235.57	354.28	236.28	354.23	236.98	354.14	237.99	354	243.18	352.45
244.61	352.26	246.1	352	272.24	352	315.47	349.21	318.67	349
348.6	349	348.92	349.05	369.54	350	408.48	352.82	410.49	353
411.75	353.11	421.79	354						

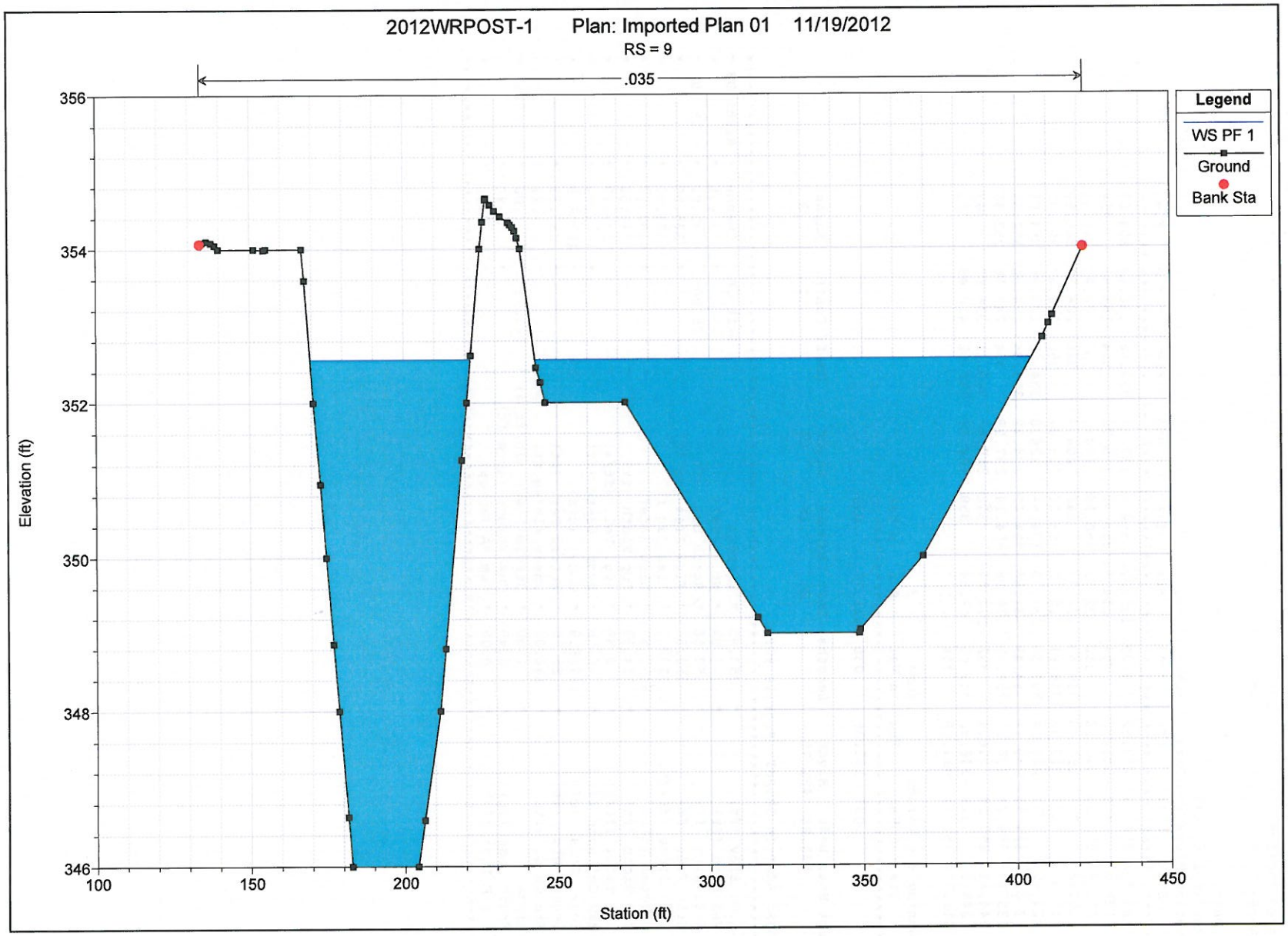
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	133.86	.035	421.79	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
133.86	421.79	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	353.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.37	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.56	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	352.56	Flow Area (sq ft)		575.50	
E.G. Slope (ft/ft)	0.013350	Area (sq ft)		575.50	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	214.33	Top Width (ft)		214.33	
Vel Total (ft/s)	9.39	Avg. Vel. (ft/s)		9.39	
Max Chl Dpth (ft)	6.56	Hydr. Depth (ft)		2.69	
Conv. Total (cfs)	46758.9	Conv. (cfs)		46758.9	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		217.38	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.21	
Alpha	1.00	Stream Power (lb/ft s)	421.79	0.00	0.00
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)		1.44	
C & E Loss (ft)	0.09	Cum SA (acres)		0.31	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 9
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
100
150
200
250
300
350
400
450
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 8

INPUT
Description: 146
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
129.67	354.66	129.72	354.67	129.91	354.66	130.05	354.66	130.17	354.65
130.23	354.65	163.11	354	167.87	354	169.79	353.1	171.86	352
174.52	350.73	175.93	350	177.04	349.44	180.01	348	181.19	347.42
184.02	346	208.37	346	209.19	346.24	209.83	346.41	210.93	346.64
215.62	347.85	217.33	347.85	218.73	347.77	219.36	347.63	219.97	347.28
221.44	347.02	221.72	347.2	221.75	347.31	222.04	347.44	222.66	347.61
228.31	348.87	228.53	348.91	228.66	348.93	228.75	348.95	229.03	349
230.83	349	231.65	349.05	261.78	351	262.29	351.38	266.58	351.31
285.96	352.56	291.43	352.92	292.74	353	308.22	354	496.19	354

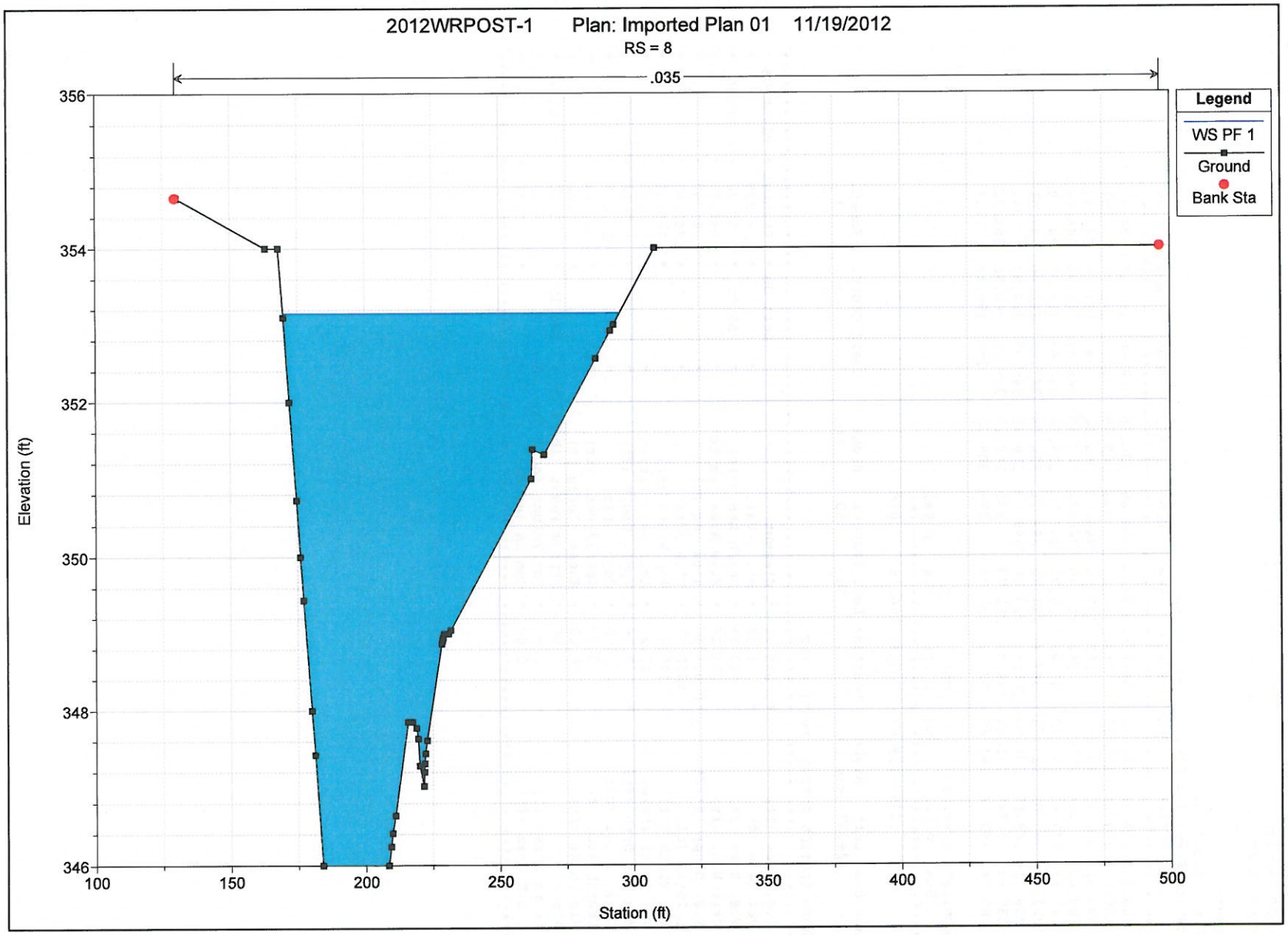
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	129.67	.035	496.19	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129.67	496.19	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	355.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.95	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.16	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	353.16	Flow Area (sq ft)		481.57	
E.G. Slope (ft/ft)	0.011950	Area (sq ft)		481.57	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	125.49	Top Width (ft)		125.49	
Vel Total (ft/s)	11.22	Avg. Vel. (ft/s)		11.22	
Max Chl Dpth (ft)	7.16	Hydr. Depth (ft)		3.84	
Conv. Total (cfs)	49422.5	Conv. (cfs)		49422.5	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		128.13	
Min Ch El (ft)	346.00	Shear (lb/sq ft)		2.80	
Alpha	1.00	Stream Power (lb/ft s)	496.19	0.00	0.00
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)		1.13	
C & E Loss (ft)	0.06	Cum SA (acres)		0.21	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 8
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
100
150
200
250
300
350
400
450
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 6

INPUT
Description: 148
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
103.66	354	166.32	354	167.5	353.38	169.81	352	170.66	351.34
173.14	350	174.18	349.29	176.93	348	178.71	347.24	181.08	346
182.04	345.19	193.73	345.05	197.15	344.79	199.66	344.64	201.36	344.51
202.91	344.42	203.13	344.4	203.43	344.37	203.51	344.36	203.56	344.33
207.08	344.32	207.39	344.37	207.61	344.43	207.66	344.44	207.75	344.45
207.85	344.46	208.14	344.55	208.29	344.58	208.87	344.64	209.03	344.66
209.17	344.69	209.24	344.81	209.38	344.85	211.8	346	214.05	347.21
217.14	348	220.32	349.28	221.49	350	225.17	351.34	226.08	352
227.78	353	229.18	354	333.94	354				

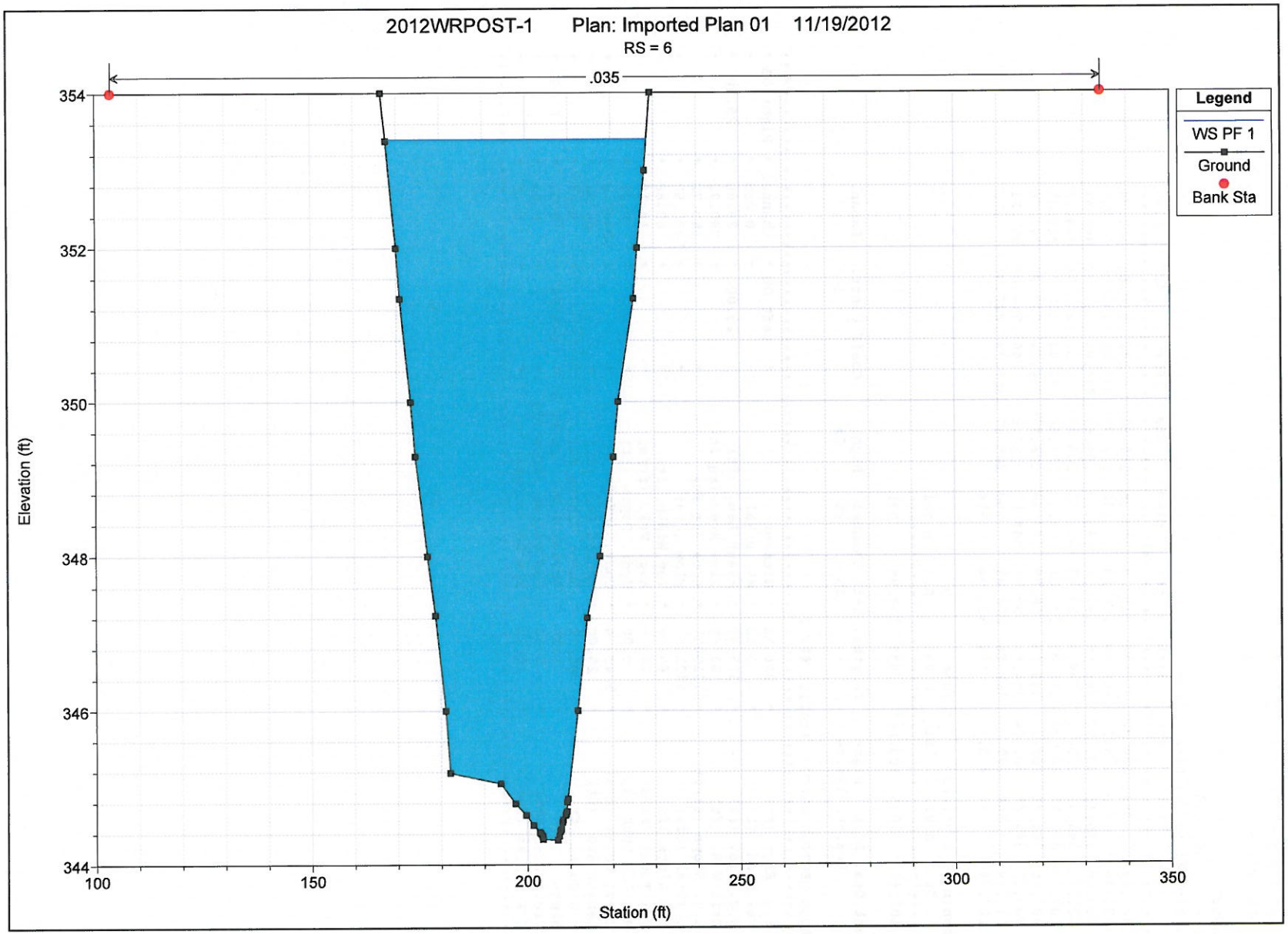
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
103.66	.035	103.66	.035	333.94	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
103.66	333.94	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.13	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.40	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	353.40	Flow Area (sq ft)		380.72	
E.G. Slope (ft/ft)	0.010627	Area (sq ft)		380.72	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	60.88	Top Width (ft)		60.88	
Vel Total (ft/s)	14.19	Avg. Vel. (ft/s)		14.19	
Max Chl Dpth (ft)	9.08	Hydr. Depth (ft)		6.25	
Conv. Total (cfs)	52407.4	Conv. (cfs)		52407.4	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		65.21	
Min Ch El (ft)	344.32	Shear (lb/sq ft)		3.87	
Alpha	1.00	Stream Power (lb/ft s)	333.94	0.00	0.00
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)		0.64	
C & E Loss (ft)	0.12	Cum SA (acres)		0.10	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 6
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
344
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 5

INPUT
Description: 149
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
110.5	354	167.68	354	169.34	353.18	170.42	352.73	171.41	352
173.63	350.27	174.05	350	174.75	349.58	177.43	348	180.28	346.45
181.36	346	181.79	345.65	184.79	344	207.02	344	211.18	345.67
211.94	346	213.63	346.72	215.04	347.27	216.87	348	218.61	348.69
220.91	349.58	222.06	350	224.98	351.18	226.88	352	228.39	352.85
229.2	353.25	229.53	353.46	229.67	353.59	229.72	353.81	229.81	353.84
229.95	353.87	230.06	353.9	230.14	353.91	230.27	353.92	230.39	353.91
230.8	353.91	230.89	353.9	231.05	353.88	231.76	353.83	232.06	353.8
232.5	353.78	233.1	353.74	234.63	353.66	235.63	353.61	237.9	353.49

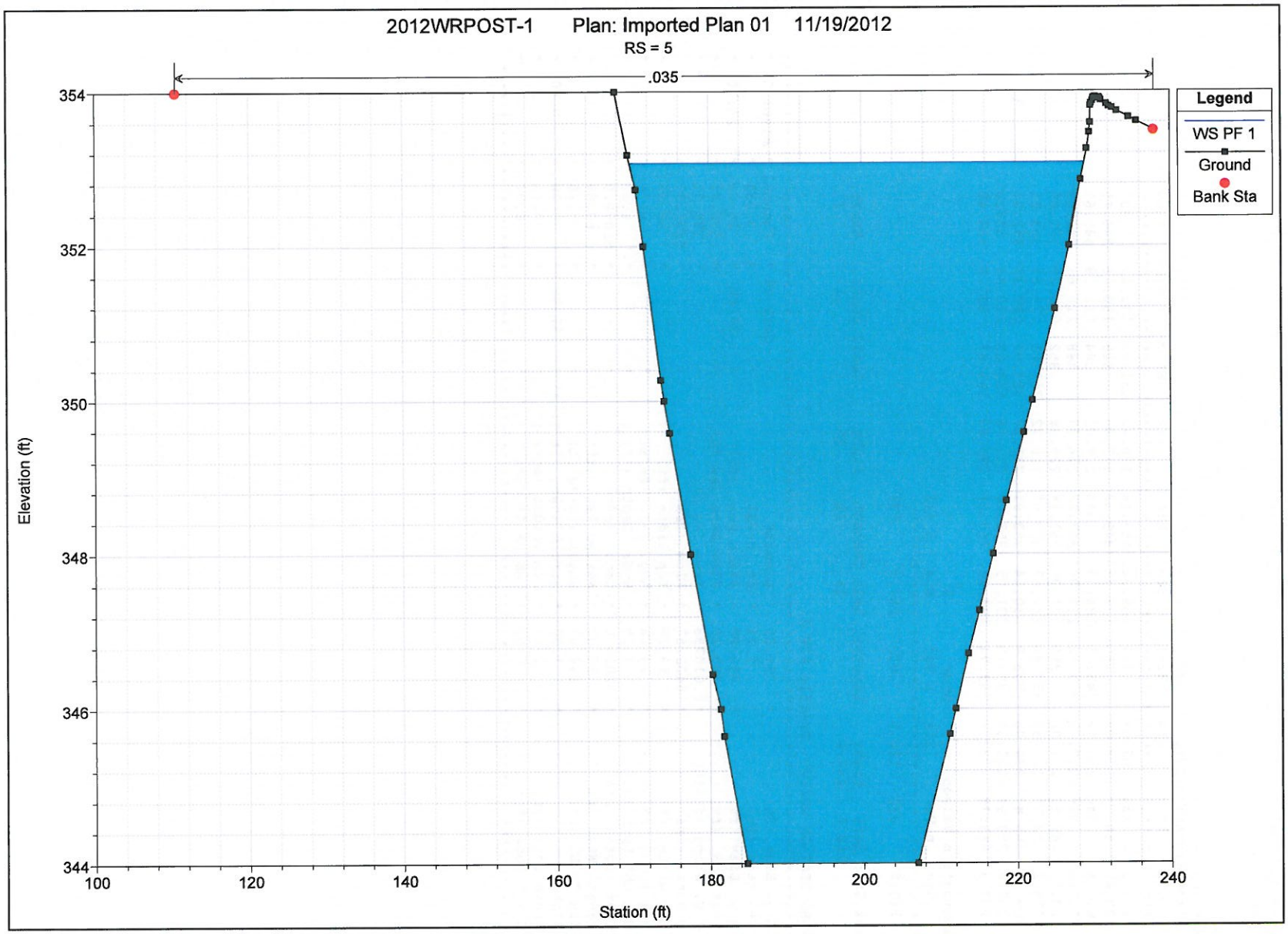
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
110.5	.035	110.5	.035	237.9	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
110.5	237.9	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.21	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.08	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	353.10	Flow Area (sq ft)		375.71	
E.G. Slope (ft/ft)	0.010753	Area (sq ft)		375.71	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	59.26	Top Width (ft)		59.26	
Vel Total (ft/s)	14.38	Avg. Vel. (ft/s)		14.38	
Max Chl Dpth (ft)	9.08	Hydr. Depth (ft)		6.34	
Conv. Total (cfs)	52099.0	Conv. (cfs)		52099.0	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		63.65	
Min Ch El (ft)	344.00	Shear (lb/sq ft)		3.96	
Alpha	1.00	Stream Power (lb/ft s)	237.90	0.00	0.00
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)		0.42	
C & E Loss (ft)	0.01	Cum SA (acres)		0.07	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 5
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
344
100
120
140
160
180
200
220
240
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 4

INPUT
Description: 150
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
168.9	354.21	171.73	354.11	173.98	354	175.02	353.35	177.32	352
178.45	351.3	180.66	350	181.85	349.25	184.03	348	185.24	347.25
187.54	346	189.65	344.78	191.47	344	209.52	344	211.75	344.65
216.56	346	220.17	347.41	221.84	348	223.35	348.94	224.3	349.63
224.93	350	227.15	351.04	229.33	352	229.82	352.18	235.12	354
241.82	354								

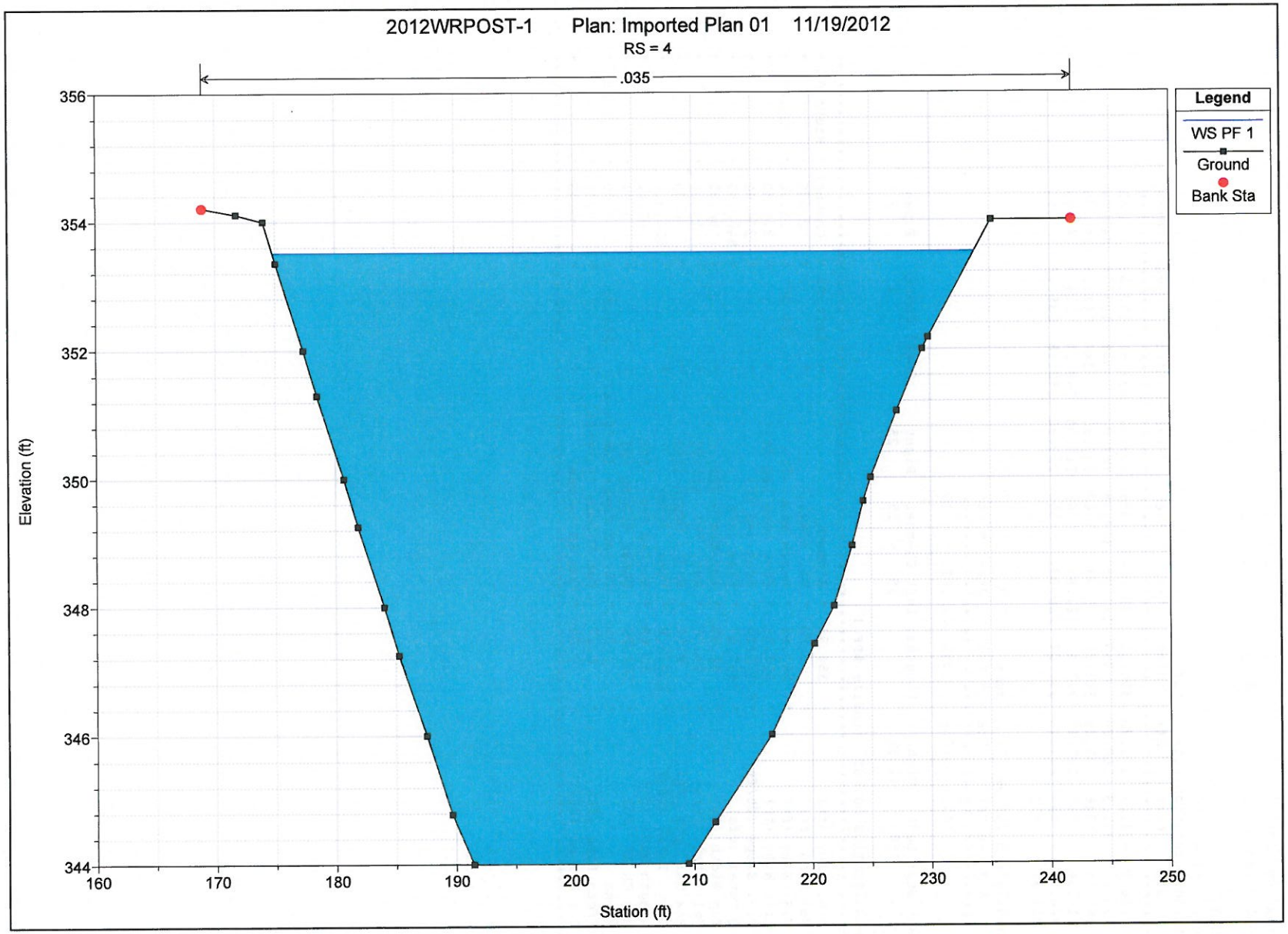
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	168.9	.035	241.82	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
168.9	241.82	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.20	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.51	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	353.51	Flow Area (sq ft)		376.50	
E.G. Slope (ft/ft)	0.010625	Area (sq ft)		376.50	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	58.95	Top Width (ft)		58.95	
Vel Total (ft/s)	14.35	Avg. Vel. (ft/s)		14.35	
Max Chl Dpth (ft)	9.51	Hydr. Depth (ft)		6.39	
Conv. Total (cfs)	52413.8	Conv. (cfs)		52413.8	
Length Wtd. (ft)	25.00	Wetted Per. (ft)		63.41	
Min Ch El (ft)	344.00	Shear (lb/sq ft)		3.94	
Alpha	1.00	Stream Power (lb/ft s)	241.82	0.00	0.00
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)		0.21	
C & E Loss (ft)	0.00	Cum SA (acres)		0.03	


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 4
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
356
354
352
350
348
346
344
160
170
180
190
200
210
220
230
240
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 3

INPUT
Description: 151
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
167.55	352.94	168.78	352.95	170.37	352.88	171.78	352.79	173.64	352.69
175.33	352.62	176.69	352.55	177.98	352.38	179.98	352	181.48	351.07
183.24	350	183.9	349.55	186.44	348	187.64	347.17	189.63	346
190.98	345.09	192.81	344	215.6	344	220.05	345.76	220.26	345.84
220.66	346	220.88	346.07	225.92	348	228.94	349.06	233.39	350.8
238.23	352.43	239.14	352.54	240.57	352.53				

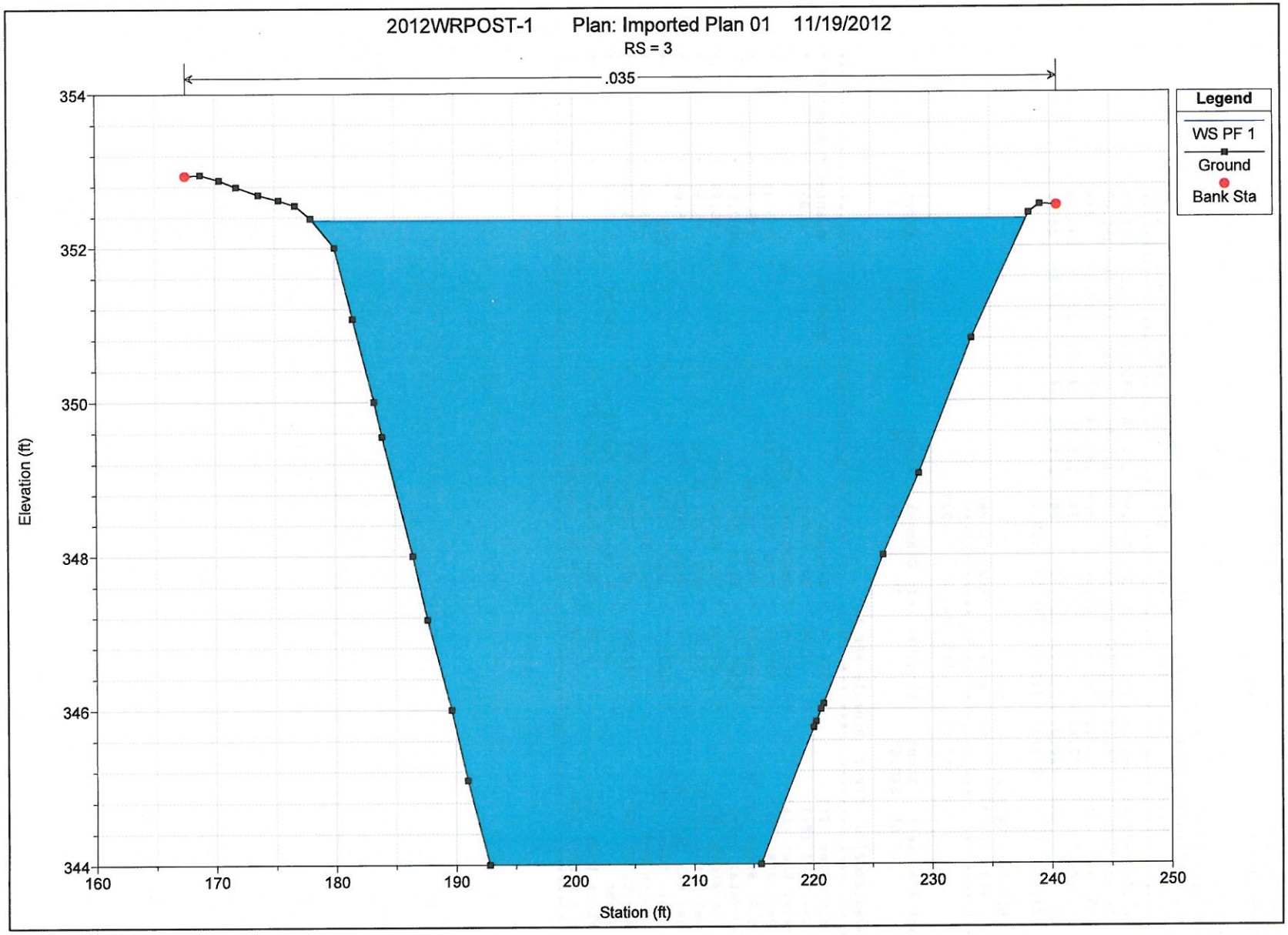
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
	.035	167.55	.035	240.57	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167.55	240.57	75	75	75	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.96	Wt. n-Val.		0.035	
W.S. Elev (ft)	352.36	Reach Len. (ft)			
Crit W.S. (ft)	353.33	Flow Area (sq ft)		338.35	
E.G. Slope (ft/ft)	0.015290	Area (sq ft)		338.35	
Q Total (cfs)	5402.57	Flow (cfs)		5402.57	
Top Width (ft)	59.94	Top Width (ft)		59.94	
Vel Total (ft/s)	15.97	Avg. Vel. (ft/s)		15.97	
Max Chl Dpth (ft)	8.36	Hydr. Depth (ft)		5.64	
Conv. Total (cfs)	43691.7	Conv. (cfs)		43691.7	
Length Wtd. (ft)		Wetted Per. (ft)		63.78	
Min Ch El (ft)	344.00	Shear (lb/sq ft)		5.06	
Alpha	1.00	Stream Power (lb/ft s)	240.57	0.00	0.00
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)			
C & E Loss (ft)	0.08	Cum SA (acres)			


2012WRPOST-1 Plan: Imported Plan 01 11/19/2012
RS = 3
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
354
352
350
348
346
344
160
170
180
190
200
210
220
230
240
250
Station (ft)

Basin 103 Pre HEC-RAS Analysis
100-Year Storm Event

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: Basin103-pre-1
Project File : Basin103-pre-1.prj
Run Date and Time: 6/13/2013 11:09:40 AM

Project in English units

Project Description:
******* Autodesk, Inc. HEC-2 Input Data file ********
****
Minimum Data Input **********

****

****

PLAN DATA

Plan Title: Imported Plan 01
Plan File : C:\Shapouri&Associates\Active Projects\Warner Ranch\Hydrology\Hecras 2012\Basin 103 Pre\Basin103-pre-1.p01

Geometry Title: Imported Geom 01
Geometry File : C:\Shapouri&Associates\Active Projects\Warner Ranch\Hydrology\Hecras 2012\Basin 103 Pre\Basin103-pre-1.g01

Flow Title : Imported Flow 01
Flow File : C:\Shapouri&Associates\Active Projects\Warner Ranch\Hydrology\Hecras 2012\Basin 103 Pre\Basin103-pre-1.f01

Plan Summary Information:

Number of:	Cross Sections =	38	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

FLOW DATA

Flow Data (cfs)

River	Reach	RS	PF 1
RIVER-1	Reach-1	85	248.3

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1	Critical	

GEOMETRY DATA
REACH: Reach-1 RS: 85

INPUT
Description: 1
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	447.77	2.07	446.23	2.44	446	3.37	445.44	5.65	444
9.06	442.02	12.16	440.35	12.85	440	15.48	438.6	16.65	438
18.94	436.79	20.48	436	30.17	434.47	43.89	432.14	44.72	432
44.97	431.85	45.36	431.65	47.36	430.56	47.8	430.29	48.05	430.11
48.11	430.06	48.24	430.05	48.47	430.06	48.57	430.07	49.14	430.16
50.47	430.4	54.06	431.06	56.64	431.51	58.97	432	59.9	432.62
60.86	433.35	61.44	434	61.95	434.48	62.09	434.61	64.15	436
65.56	436.82	67.26	438	69.77	439.51	70.74	440	72.82	441.15
74.74	442	76.35	442.7	79.31	444	83.77	445.98	83.83	446.01
87.95	448	88.03	448.04	90.6	449.33	91.91	449.98	92.8	450.4
96.14	452	96.4	452.13	98.01	452.76	100.32	453.66	101.31	454
106.99	456	107.81	456.29	108.62	456.59	112.85	458	117.67	459.64
120.79	460.87	123.7	462	124.66	462.42	125.2	462.64	125.99	462.93
126.51	463.09	128.38	463.62	129.83	464	132.93	464.85	136.87	465.61
140.66	465.85	148.85	465.61	150.78	465.58				

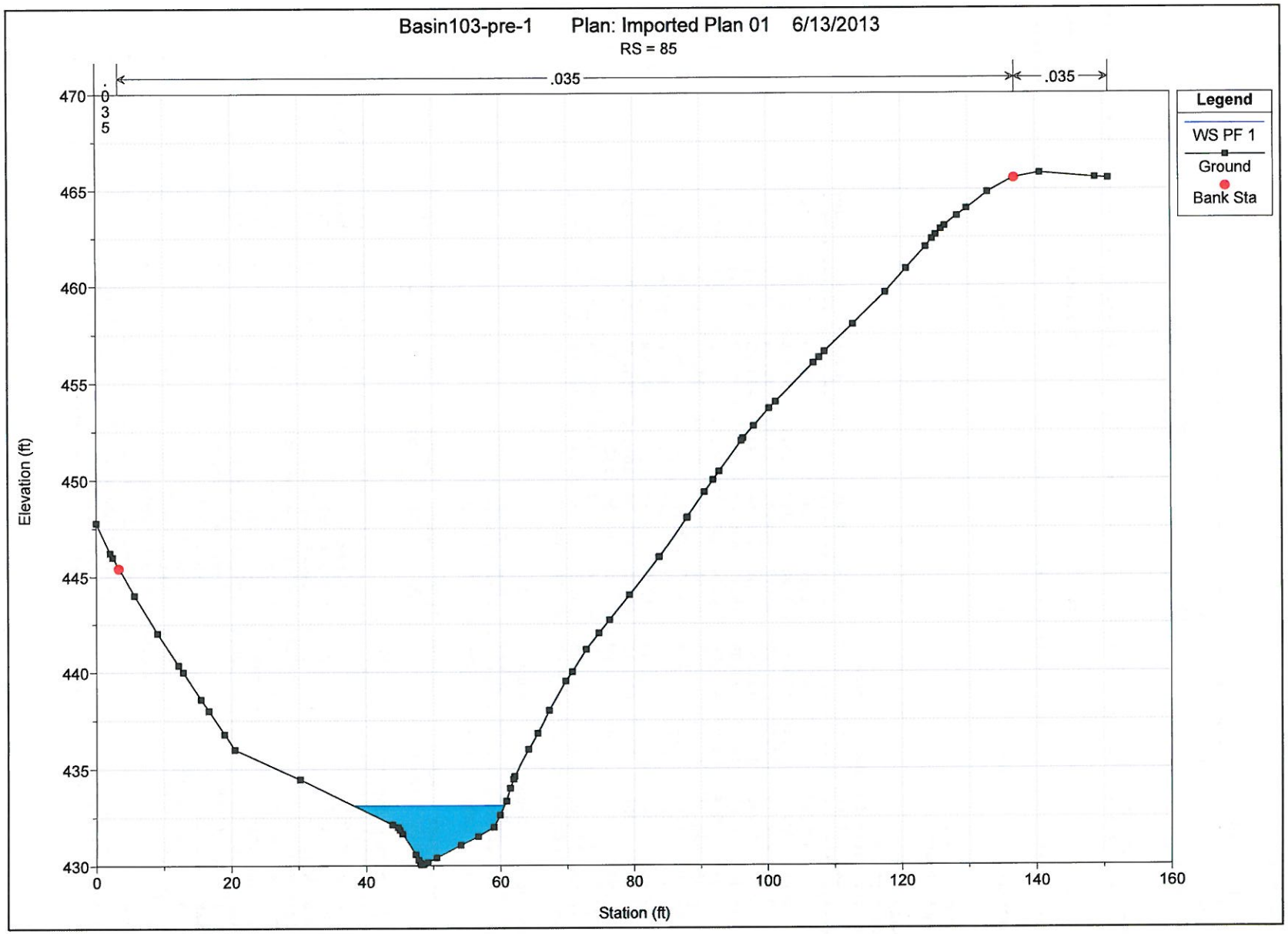
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	3.37	.035	136.87	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3.37	136.87	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	433.90	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.78	Wt. n-Val.		0.035		
W.S. Elev (ft)	433.13	Reach Len. (ft)	50.00	50.00	50.00	
Crit W.S. (ft)	433.13	Flow Area (sq ft)		35.13		
E.G. Slope (ft/ft)	0.016343	Area (sq ft)		35.13		
Q Total (cfs)	248.30	Flow (cfs)		248.30		
Top Width (ft)	22.49	Top Width (ft)		22.49		
Vel Total (ft/s)	7.07	Avg. Vel. (ft/s)		7.07		
Max Chl Dpth (ft)	3.08	Hydr. Depth (ft)		1.56		
Conv. Total (cfs)	1942.3	Conv. (cfs)		1942.3		
Length Wtd. (ft)	50.00	Wetted Per. (ft)		23.64		
Min Ch El (ft)	430.05	Shear (lb/sq ft)		1.52		
Alpha	1.00	Stream Power (lb/ft s)	150.78	0.00	0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.01	1.88		
C & E Loss (ft)		Cum SA (acres)	0.01	3.46		


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 85
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
470
465
460
455
450
445
440
435
430
0
20
40
60
80
100
120
140
160
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 84

INPUT
Description: 2
Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	446.94	1.58	446	3.35	444.88	4.84	444	6.75	442.79
8.07	442	10.51	440.44	11.2	440	14.1	438.22	14.4	438
15.04	437.56	15.16	437.5	15.23	437.47	15.31	437.44	15.46	437.38
15.64	437.31	16.01	437.13	18.09	436	19.83	435.28	22.54	434
22.73	433.91	26.4	432	28.44	431.19	31.41	430	31.89	429.89
35.81	428.86	37.31	428.53	38.01	428.4	38.24	428.34	38.35	428.31
38.49	428.32	38.69	428.34	38.95	428.35	39.21	428.37	39.43	428.38
39.78	428.41	39.97	428.43	40.82	428.6	41.33	428.76	46.24	429.8
47.24	430	50.34	430.69	55.9	432	57.88	432.4	60.87	432.76
61.25	432.81	62.26	432.96	63.48	433.12	67.63	433.62	71.52	434
78.25	434.94	85.97	436	90.73	437.08	95.45	438	95.6	438.04
95.9	438.09	100.98	439.04	104.51	439.56	107.59	440	114.01	441.07
115.09	441.26	115.49	441.29	118.4	441.53	118.83	441.56	121.42	441.66
131.68	442	132.22	442.02	132.29	442.03	139.22	442.23	139.9	442.23
151.73	442.09	152.28	442.08	155.31	442	157.67	441.96		

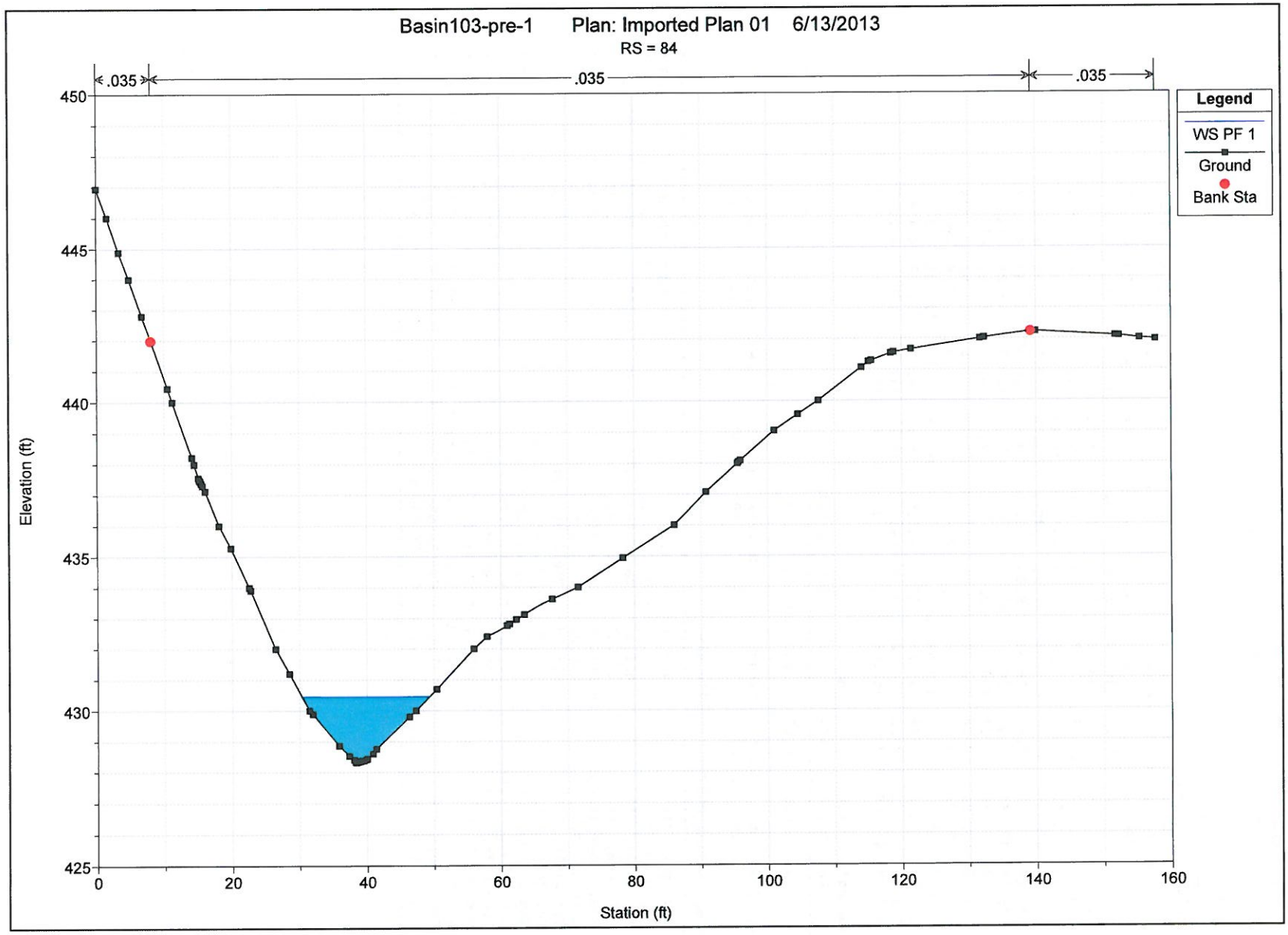
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	8.07	.035	139.22	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8.07	139.22	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	432.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.93	Wt. n-Val.		0.035	
W.S. Elev (ft)	430.46	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	431.07	Flow Area (sq ft)		22.26	
E.G. Slope (ft/ft)	0.058068	Area (sq ft)		22.26	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	19.03	Top Width (ft)		19.03	
Vel Total (ft/s)	11.16	Avg. Vel. (ft/s)		11.16	
Max Chl Dpth (ft)	2.15	Hydr. Depth (ft)		1.17	
Conv. Total (cfs)	1030.4	Conv. (cfs)		1030.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		19.55	
Min Ch El (ft)	428.31	Shear (lb/sq ft)		4.13	
Alpha	1.00	Stream Power (lb/ft s)	157.67	0.00	0.00
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)	0.01	1.85	
C & E Loss (ft)	0.12	Cum SA (acres)	0.01	3.43	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 84
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
450
445
440
435
430
425
0
20
40
60
80
100
120
140
160
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 83

INPUT
Description: 3
Station Elevation Data num= 115

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	449.62	.69	449.24	3.14	448	4.05	447.19	5.56	446
7.48	444.12	7.59	444	7.77	443.79	9.41	442	10.4	440.85
11.13	440	12.76	438.11	12.87	438	12.99	437.83	13.46	437.29
14.79	436	15.58	435.08	16.5	434	17.27	433.07	18.37	432
19.38	430.99	20.39	430	21.23	429.54	24.67	428.16	25.06	428
26.96	427.74	28.49	427.51	29.6	427.36	31.29	427.18	32.12	427.06
32.76	426.94	34.21	426.61	34.6	426.47	34.83	426.44	35.27	426.38
35.68	426.34	36.03	426.35	36.31	426.37	36.44	426.4	36.51	426.42
36.61	426.43	36.77	426.44	37.02	426.45	38.25	426.53	38.45	426.55
38.61	426.57	39.1	426.61	39.24	426.63	39.3	426.65	41.59	427.43
43.37	428	54.31	429.9	54.77	430	55.06	430.02	55.14	430.03
62.63	430.49	67.76	430.77	69.55	430.86	76.76	431.19	85.15	431.46
88.15	431.59	99.37	432	101.38	432.1	102.02	432.12	112.99	432.58
117.07	432.72	122.23	432.84	128.42	432.97	131.74	433.05	134.15	433.12
142.88	433.43	144.51	433.51	148.77	433.68	155.66	434	157.29	434.09
157.42	434.09	160.51	434.17	162.87	434.21	164.29	434.24	164.94	434.24
166.24	434.27	167.3	434.24	167.65	434.24	167.98	434.23	168.16	434.23
168.32	434.24	168.61	434.26	169.11	434.28	169.81	434.31	175.51	434.49
177.07	434.53	177.96	434.54	178.95	434.54	185.54	434.58	187.02	434.62
191.14	434.65	192.45	434.67	194.02	434.71	197.32	434.7	199.76	434.81
202.92	434.98	203.59	435	207.84	435.26	208.48	435.29	209.22	435.33
210.87	435.41	214.46	435.55	220.89	435.77	226.19	435.99	226.24	435.99
226.34	436	229.87	436.29	239.34	437.56	240.92	437.75	241.89	437.86

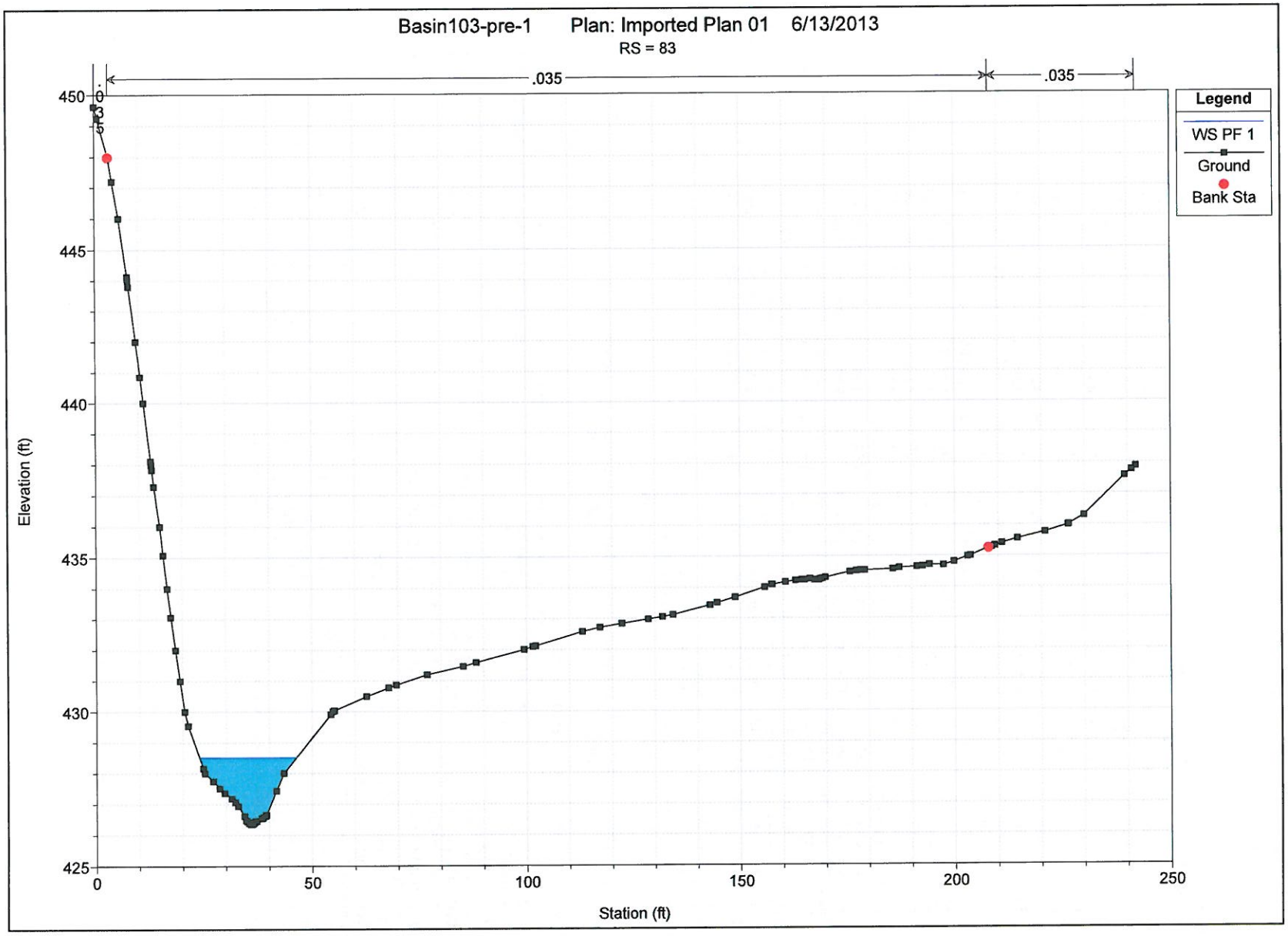
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	3.14	.035	207.84	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3.14	207.84	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	429.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.33	Wt. n-Val.		0.035	
W.S. Elev (ft)	428.51	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	428.91	Flow Area (sq ft)		26.79	
E.G. Slope (ft/ft)	0.038995	Area (sq ft)		26.79	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	22.53	Top Width (ft)		22.53	
Vel Total (ft/s)	9.27	Avg. Vel. (ft/s)		9.27	
Max Chl Dpth (ft)	2.17	Hydr. Depth (ft)		1.19	
Conv. Total (cfs)	1257.4	Conv. (cfs)		1257.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		23.05	
Min Ch El (ft)	426.34	Shear (lb/sq ft)		2.83	
Alpha	1.00	Stream Power (lb/ft s)	241.89	0.00	0.00
Frctn Loss (ft)	2.36	Cum Volume (acre-ft)	0.01	1.82	
C & E Loss (ft)	0.18	Cum SA (acres)	0.01	3.41	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 83
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
445
440
435
430
425
0
50
100
150
200
250

CROSS SECTION
REACH: Reach-1 RS: 82

INPUT
Description: 4
Station Elevation Data num= 126

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	452.24	.51	452	1.25	451.61	4.37	450	8.88	448.02
12.73	446.22	13.24	446	14.51	445.46	17.77	444	18.6	443.51
19.7	442.78	20.51	442	20.89	441.59	22.38	440	22.77	439.58
24.3	438	24.81	437.4	26.06	436	27.01	434.95	28.02	434
29.6	432.45	30.01	432	30.61	431.34	31.91	430	33.43	428.56
34.2	428	36.88	426.62	38.34	426	44.06	424.94	45.8	424.65
49.14	424.58	49.39	424.88	49.71	424.98	50.3	425.1	56.44	426
59.3	426.34	60.42	426.46	63.05	426.78	66.18	427.14	72.45	428
75.42	428.16	78.25	428.28	78.96	428.3	86.57	428.53	87.36	428.54
88.96	428.57	90.34	428.62	91.55	428.68	95.82	429.01	97.88	429.11
101.84	429.39	103.26	429.48	105.57	429.64	108.9	429.75	109.32	429.77
109.54	429.78	109.66	429.78	109.74	429.79	109.82	429.79	109.91	429.8
110.04	429.8	111	429.83	114.15	429.86	120.44	429.99	120.55	429.99
121.48	430	125.46	430.01	126.34	430.07	126.4	430.07	139.3	430.35
139.46	430.36	139.74	430.36	143.29	430.47	143.93	430.47	144.67	430.46
151.63	430.71	152.68	430.69	153.93	430.68	155.8	430.73	157.3	430.74
158.74	430.74	160.42	430.72	164.52	430.65	167.7	430.68	168.81	430.67
170.55	430.67	171.57	430.66	175.46	430.66	178.23	430.63	178.93	430.62
179.52	430.6	180.68	430.6	183.49	430.55	186.29	430.45	189.09	430.31
191.98	430.15	192.68	430.16	194.91	430.02	194.98	430.02	195.3	430
196.41	429.98	197.69	429.97	198.97	429.99	199.27	430	200.72	430.12
201.69	430.19	209.9	430.91	212.35	431.03	215.57	431.27	217.73	431.4
219.13	431.46	222.48	431.52	223.27	431.53	225.62	431.52	233.75	431.56
236.66	431.69	239.18	431.88	239.6	431.88	241.09	432	242.21	432.16
255.66	434	259.23	435.01	261.8	436	266.33	437.62	267.31	438
271.09	439.28								

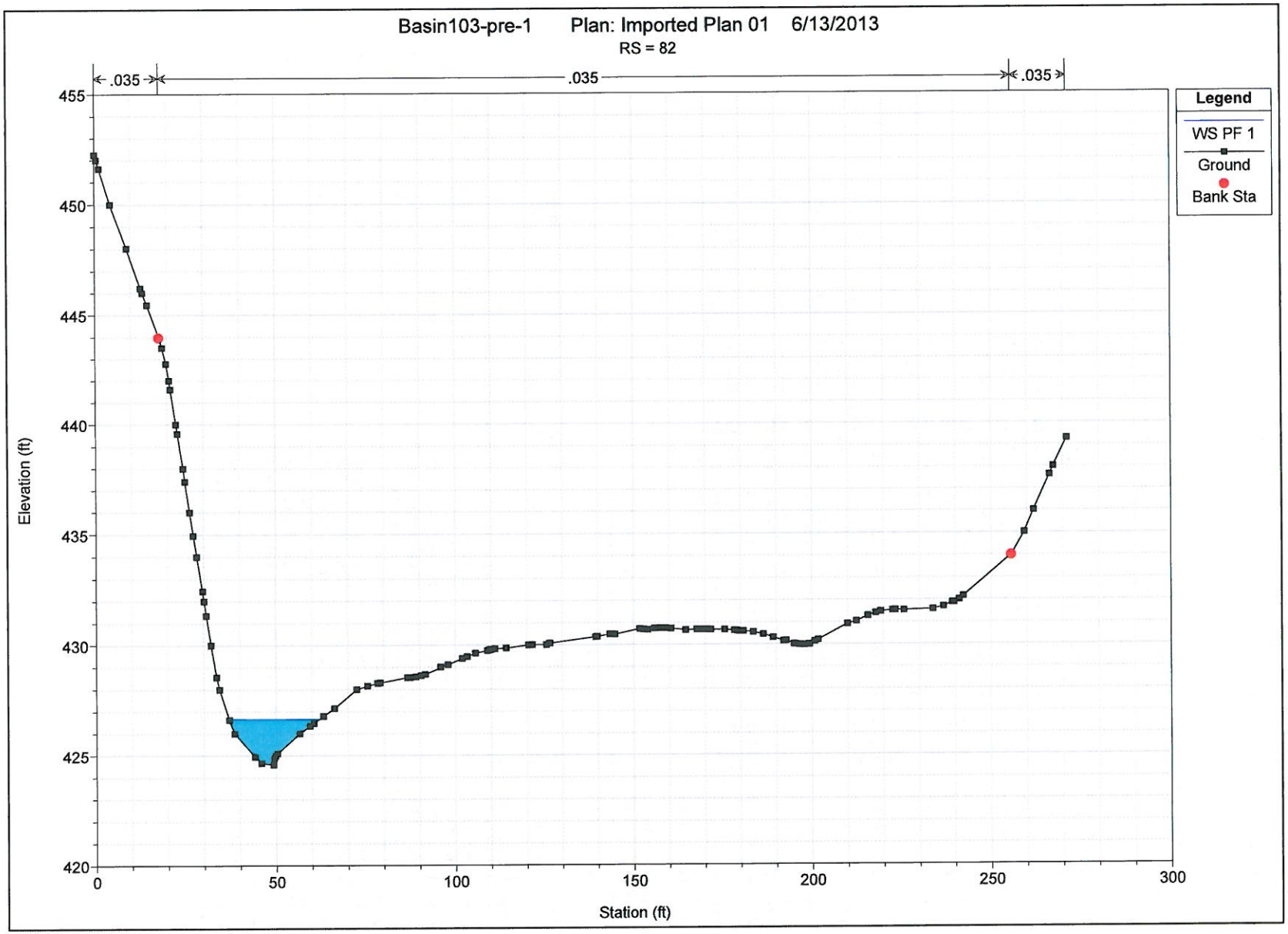
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	17.77	.035	255.66	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17.77	255.66	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	427.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.21	Wt. n-Val.		0.035	
W.S. Elev (ft)	426.66	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	427.02	Flow Area (sq ft)		28.16	
E.G. Slope (ft/ft)	0.038449	Area (sq ft)		28.16	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	25.30	Top Width (ft)		25.30	
Vel Total (ft/s)	8.82	Avg. Vel. (ft/s)		8.82	
Max Chl Dpth (ft)	2.08	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	1266.3	Conv. (cfs)		1266.3	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		25.83	
Min Ch El (ft)	424.58	Shear (lb/sq ft)		2.62	
Alpha	1.00	Stream Power (lb/ft s)	271.09	0.00	0.00
Frctn Loss (ft)	1.94	Cum Volume (acre-ft)	0.01	1.79	
C & E Loss (ft)	0.04	Cum SA (acres)	0.01	3.38	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 82
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
455
450
445
440
435
430
425
420
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 81

INPUT
Description: 5
Station Elevation Data num= 103

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	452.52	1.26	452	3.37	451.24	6.34	450	7.98	449.44
11.94	448	16.2	446.57	17.91	446	21.06	444.98	24.02	444
25.74	443.44	30.7	442	33.58	441.1	37.45	440	40.84	438.27
41.31	438	41.7	437.79	44.85	436	47.89	434.29	48.41	434
49.06	433.65	51.81	432	54.82	430.22	55.09	430.05	55.17	430
55.61	429.81	59.77	428	62.96	427.15	67.72	426	75.6	424.16
76.21	424	76.33	423.91	76.41	423.79	78.29	422	82.57	422
82.62	422.01	92.51	424	95.66	424.58	96.88	424.81	101	425.49
103.85	426	109.91	426.79	111.23	426.81	112.75	426.79	114.34	426.78
120.31	427.27	127.79	427.31	127.99	427.32	128.22	427.33	128.55	427.34
129.38	427.35	130.82	427.37	133.09	427.43	137.02	427.49	137.78	427.49
138.35	427.47	138.98	427.44	148.03	427.96	148.08	427.95	148.16	427.95
148.79	428	163.93	428.22	165.97	428.24	166.35	428.25	166.74	428.25
180.77	428.17	183.15	428.14	184.35	428.1	185.31	428.07	189.1	428
189.86	427.97	193.73	427.78	196.83	427.59	202.41	427.14	205.16	426.91
207.09	426.72	207.29	426.72	209.62	426.48	210.02	426.45	210.53	426.46
213.56	426.55	214.17	426.55	215.48	426.56	217.15	426.58	218.64	426.64
224.29	426.83	226.15	426.9	227.03	426.95	227.97	427.04	236.76	428
246.07	428.93	251.23	429.41	252.77	429.51	253.74	429.52	255.37	429.69
257.01	429.66	258.32	429.76	260.46	430	261.37	430.13	261.82	430.24
267.61	431.5	269.88	432	274.33	433.47				

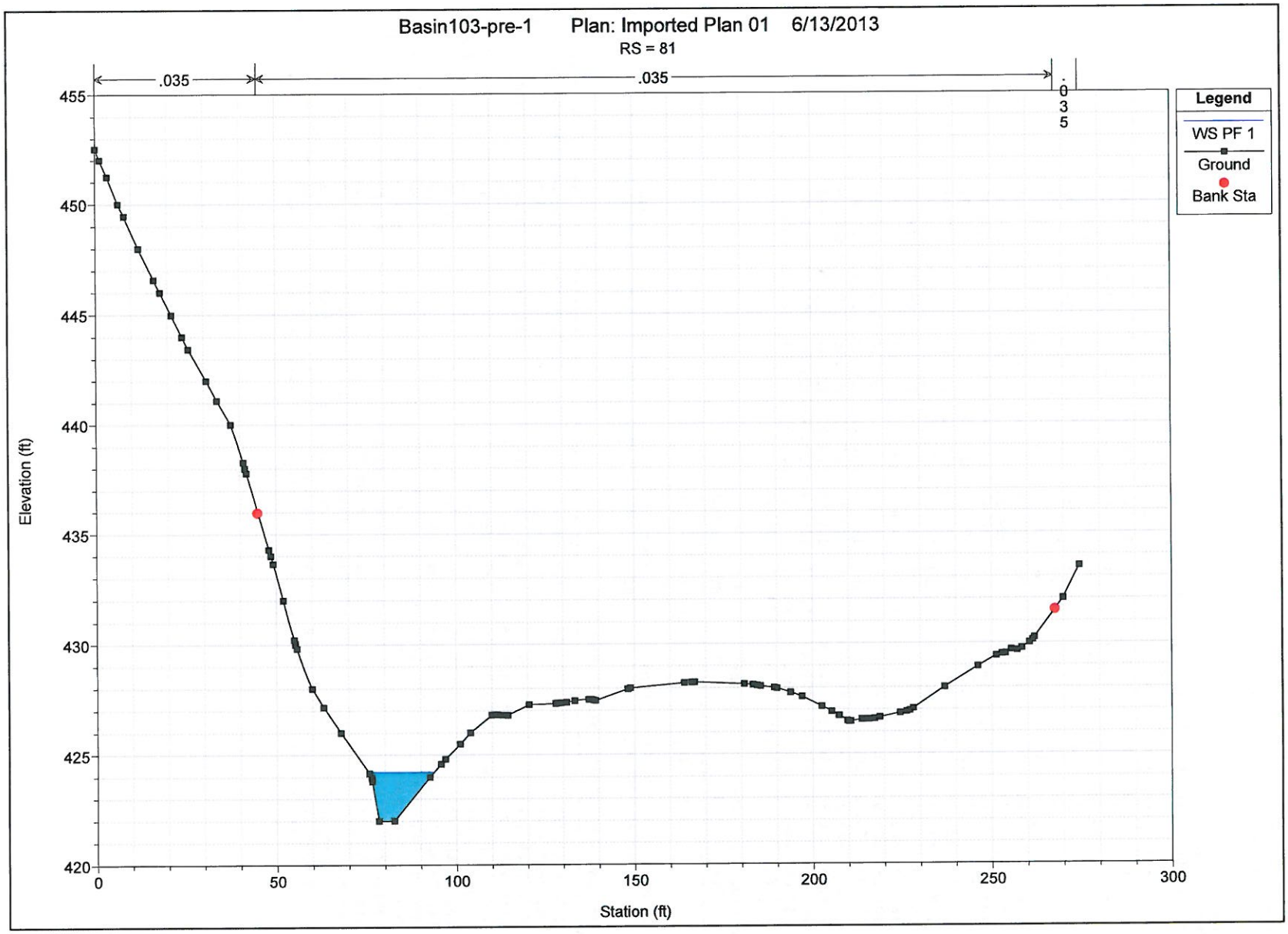
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	44.85	.035	267.61	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
44.85	267.61	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	425.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.60	Wt. n-Val.		0.035	
W.S. Elev (ft)	424.23	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	424.75	Flow Area (sq ft)		24.50	
E.G. Slope (ft/ft)	0.041954	Area (sq ft)		24.50	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	18.41	Top Width (ft)		18.41	
Vel Total (ft/s)	10.14	Avg. Vel. (ft/s)		10.14	
Max Chl Dpth (ft)	2.23	Hydr. Depth (ft)		1.33	
Conv. Total (cfs)	1212.3	Conv. (cfs)		1212.3	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		19.47	
Min Ch El (ft)	422.00	Shear (lb/sq ft)		3.30	
Alpha	1.00	Stream Power (lb/ft s)	274.33	0.00	0.00
Frctn Loss (ft)	2.01	Cum Volume (acre-ft)	0.01	1.76	
C & E Loss (ft)	0.04	Cum SA (acres)	0.01	3.36	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 81
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
455
450
445
440
435
430
425
420
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 80

INPUT
Description: 6
Station Elevation Data num= 116

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	457.19	3	456	5.76	454.96	8.25	454	11.41	452.84
13.51	452	19.29	450	22.89	448.92	25.7	448	27.27	447.48
34.56	445.11	38.02	444	42.41	442.69	44.89	442	51.33	440.02
51.39	440	55.36	438.73	57.32	438	58.44	437.56	62.55	436
65.68	434.44	66.77	434	67.64	433.43	69.84	432	72.42	430.15
72.65	430	72.78	429.9	75.75	428	77.31	426.89	78.73	426
82.87	424.02	82.93	424	86.11	422	88.57	420.66	89.26	420.38
89.55	420.27	89.94	420.23	90.08	420.25	90.58	420.27	90.73	420.28
91.95	420.41	93.62	420.6	93.73	420.62	93.85	420.64	94.2	420.69
96.44	420.95	97.05	420.99	99.82	421.29	101.49	421.48	104.24	421.82
104.38	421.84	105.63	422	111.68	422.52	113.71	422.69	120.46	423.19
120.84	423.22	121.73	423.31	121.91	423.25	122.2	423.21	123.1	423.18
124.52	423.19	126.71	423.26	128.31	423.3	131.04	423.35	132.33	423.38
134.09	423.41	135.54	423.48	138.32	423.48	139.14	423.54	139.57	423.62
140.38	423.62	140.94	423.63	141.41	423.64	142.98	423.67	153.95	423.58
155.01	423.58	173.68	423.97	173.9	423.97	174.01	423.96	174.22	423.95
178.49	424.04	184.65	424.05	184.8	424.05	184.99	424.06	195.21	424
195.34	424	197.12	423.97	205.29	423.9	208.71	423.85	210.18	423.79
210.94	423.73	212.01	423.68	212.84	423.62	213	423.57	215.25	423.53
232.21	423.88	234.87	423.85	235.14	423.85	235.23	423.86	235.46	423.85
237.98	423.97	238.05	423.97	241.2	424	242.89	424	247.93	423.99
254.98	424	255.37	424	259.72	424.06	260.16	424.09	269.31	424.44
271.15	424.62	273.51	424.92	277.01	425.15	280.61	426	280.96	426.12
281.61	426.35								

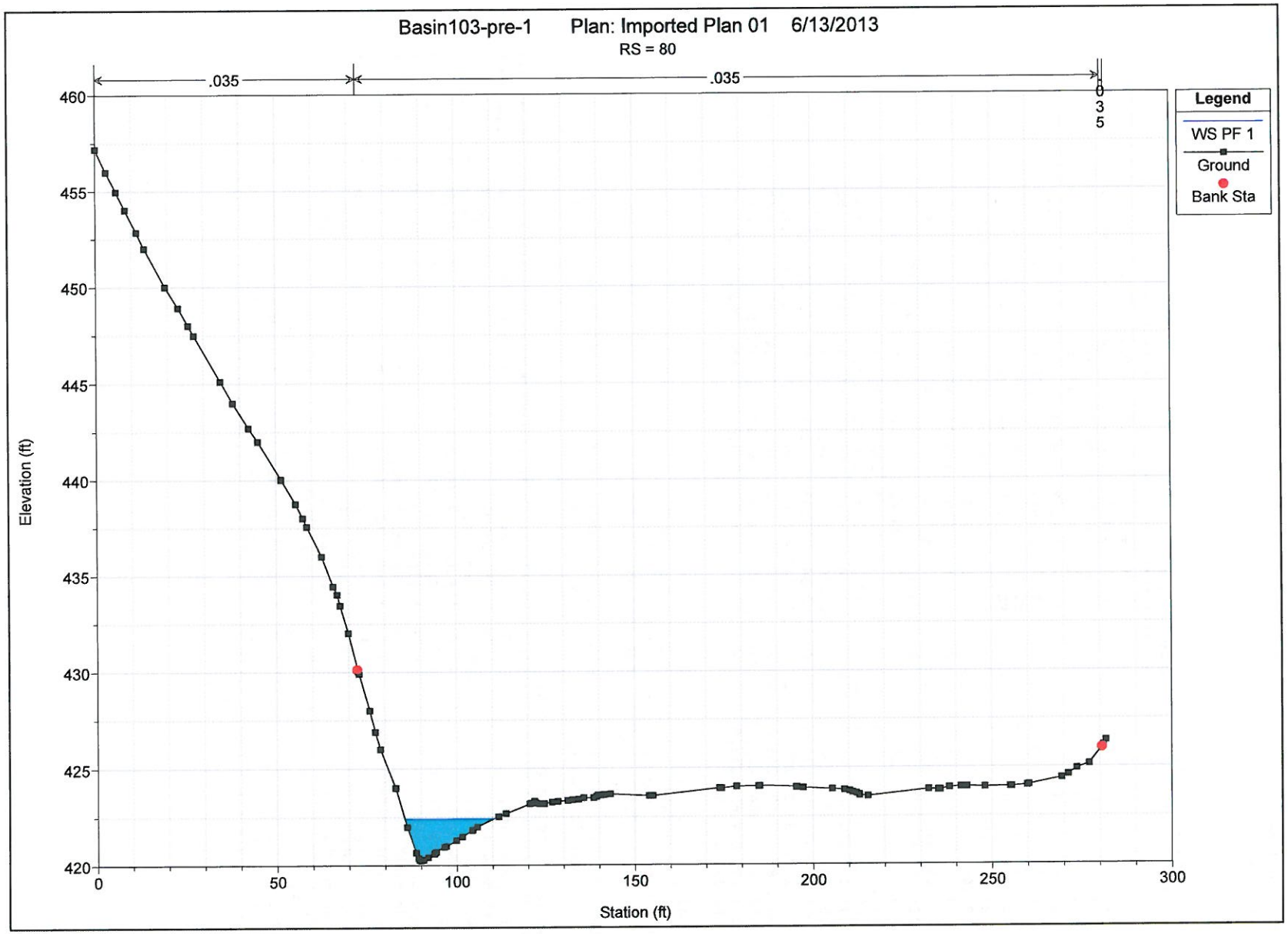
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	72.42	.035	280.61	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
72.42	280.61	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	423.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.24	Wt. n-Val.		0.035	
W.S. Elev (ft)	422.42	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	422.81	Flow Area (sq ft)		27.76	
E.G. Slope (ft/ft)	0.040257	Area (sq ft)		27.76	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	25.13	Top Width (ft)		25.13	
Vel Total (ft/s)	8.94	Avg. Vel. (ft/s)		8.94	
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)		1.10	
Conv. Total (cfs)	1237.5	Conv. (cfs)		1237.5	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		25.80	
Min Ch El (ft)	420.23	Shear (lb/sq ft)		2.70	
Alpha	1.00	Stream Power (lb/ft s)	281.61	0.00	0.00
Frctn Loss (ft)	2.05	Cum Volume (acre-ft)	0.01	1.73	
C & E Loss (ft)	0.11	Cum SA (acres)	0.01	3.33	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 80
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
460
455
450
445
440
435
430
425
420
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 79

INPUT
Description: 7
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	454.65	.59	454.41	1.71	454	2.64	453.64	6.96	452
11.27	450.19	11.5	450.09	11.67	450	11.81	449.93	15.95	448
21.39	446.2	21.92	446	22.76	445.75	29.24	444	32.57	443.03
36.43	442	39.22	441.18	42.95	440	46.26	438.98	49.26	438
52.84	436.9	55.73	436	64.56	434.23	64.68	434.21	66.04	434
76.5	432.25	77.68	432	79.57	431.33	83.76	430	86.69	429.06
89.87	428	90.6	427.72	93.97	426.44	94.9	426	95.26	425.79
95.33	425.78	100.71	424	101.4	423.77	101.59	423.7	101.96	423.58
103.42	423.14	104.81	422.68	105.89	422.37	106.95	422	107.73	421.71
108.93	421.31	109.55	421.15	109.94	421.05	110.27	420.93	110.57	420.78
111.79	420	114.68	419.79	123.43	419.69	126.56	420	130.55	420.17
131.16	420.17	131.43	420.18	132.93	420.23	134.3	420.29	135.9	420.32
144.62	420.74	145.77	420.79	146.91	420.81	148.18	420.81	149.66	420.79
151.01	420.75	151.83	420.74	152.3	420.74	157.96	420.89	158.38	420.89
159.12	420.91	160.36	420.95	163.85	421.02	165.42	421.06	167.11	421.09
168.97	421.14	172.31	421.1	174.38	421.17	176.37	421.26	176.73	421.26
176.98	421.27	177.38	421.28						

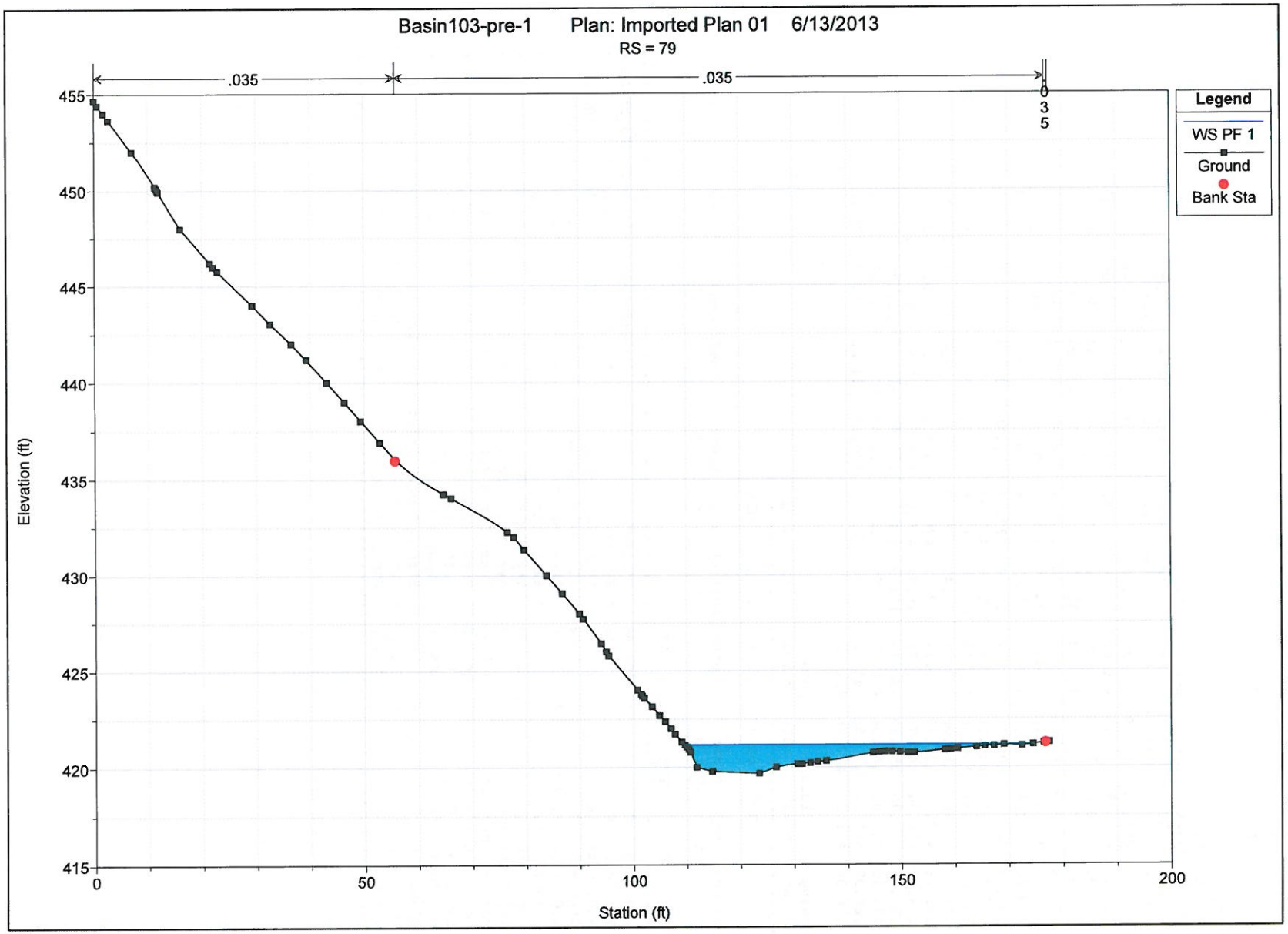
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	55.73	.035	176.73	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
55.73	176.73	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	421.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.		0.035	
W.S. Elev (ft)	421.17	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	421.28	Flow Area (sq ft)		43.48	
E.G. Slope (ft/ft)	0.031128	Area (sq ft)		43.48	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	64.98	Top Width (ft)		64.98	
Vel Total (ft/s)	5.71	Avg. Vel. (ft/s)		5.71	
Max Chl Dpth (ft)	1.48	Hydr. Depth (ft)		0.67	
Conv. Total (cfs)	1407.3	Conv. (cfs)		1407.3	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		65.33	
Min Ch El (ft)	419.69	Shear (lb/sq ft)		1.29	
Alpha	1.00	Stream Power (lb/ft s)	177.38	0.00	0.00
Frctn Loss (ft)	1.76	Cum Volume (acre-ft)	0.01	1.69	
C & E Loss (ft)	0.22	Cum SA (acres)	0.01	3.28	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 79
.035
.035
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
455
450
445
440
435
430
425
420
415
0
50
100
150
200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 78

INPUT
Description: 8
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	451	.4	450.88	3.03	450	5.98	449.12	9.67	448
11.93	447.32	14.79	446.42	15.91	446	17.38	445.5	21.74	444
27.6	442	30.68	440.97	33.5	440	36.48	439.23	41.07	438
47.18	436.83	51.19	436	57.04	434.91	61.36	434	64.61	433.45
73.59	432	82.89	430.09	83.37	430	83.77	429.91	86.8	429.21
91.95	428	96.08	427.23	102.89	426	111.5	424.68	116.06	424
124.03	422	128.51	420	134.34	419.69	134.45	419.68	136.71	419.58
147.77	418.72	150.18	418.57	156.9	418	160.92	417.46	167.16	416.58
172.65	416.99	172.7	417.03	174.42	417.75	174.94	417.95	175.14	418
175.47	418.02	176.26	418.06	177.09	418.1	177.78	418.11	178.48	418.11
179.62	418.14	192.06	418.28	192.47	418.29	194.46	418.33	195.08	418.36
195.87	418.35	196.76	418.33	197.6	418.33	207.76	418.49	208.36	418.47
218.42	418.41	223.86	418.43	231.1	418.53	232.72	418.56	233.92	418.61
234.73	418.62	238.13	418.65	238.57	418.66	238.76	418.67		

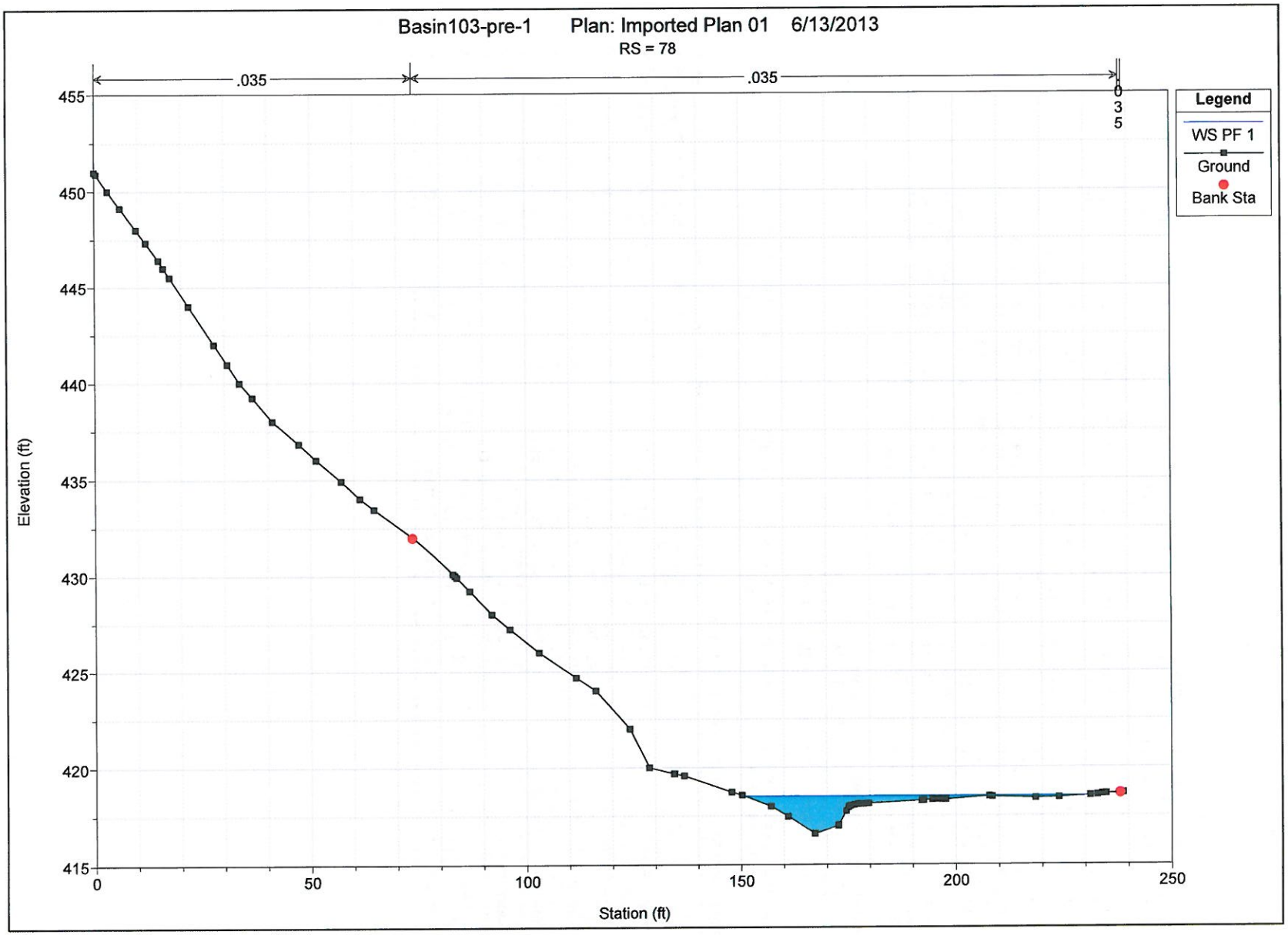
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	73.59	.035	238.13	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
73.59	238.13	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	419.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.		0.035	
W.S. Elev (ft)	418.52	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	418.75	Flow Area (sq ft)		35.40	
E.G. Slope (ft/ft)	0.080356	Area (sq ft)		35.40	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	79.20	Top Width (ft)		79.20	
Vel Total (ft/s)	7.01	Avg. Vel. (ft/s)		7.01	
Max Chl Dpth (ft)	1.94	Hydr. Depth (ft)		0.45	
Conv. Total (cfs)	875.9	Conv. (cfs)		875.9	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		79.54	
Min Ch El (ft)	416.58	Shear (lb/sq ft)		2.23	
Alpha	1.00	Stream Power (lb/ft s)	238.76	0.00	0.00
Frctn Loss (ft)	2.37	Cum Volume (acre-ft)	0.01	1.65	
C & E Loss (ft)	0.03	Cum SA (acres)	0.01	3.20	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 78
.035
.035
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
455
450
445
440
435
430
425
420
415
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 77

INPUT
Description: 9
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	446.32	1.07	446.05	1.27	446.01	9.97	444.09	10.39	444
19.1	442	21.24	441.45	26.41	440	31.02	438.88	34.96	438
45.89	436	54.16	434.51	57.16	434	59.34	433.55	66.79	432
68.57	431.61	76.19	430	83.77	428.85	89.03	428	92.43	427.5
103.67	426	118.78	424.43	123.04	424	140.38	422	150.36	420
161.34	418.44	164.84	418	168.92	417.66	175.5	417.18	180.39	416.93
183.68	416.81	185.6	416.78	186.8	416.79	198.33	416.07	199.02	416
199.86	415.8	200	415.8	203.04	415.04	203.53	414.89	203.72	414.81
203.99	414.44	206.29	414.34	207.18	414.4	207.44	414.42	207.65	414.45
209.11	414.64	209.64	414.7	211.58	414.86	212.48	414.88	213.32	414.94
215.03	415.02	218.08	415.2	218.19	415.21	222.3	415.56	226.06	416
230.41	416.17	246.54	417.05	249.4	417.1	253.67	417.23	273.51	417.76
277.63	417.83	282.4	418	286.93	418.27	289.42	418.44	314.92	419.77
315.98	419.83	318.62	420	339.53	421.77	342.87	422	347.2	422.56
349.2	422.75	352.69	423.13	354.24	423.27				

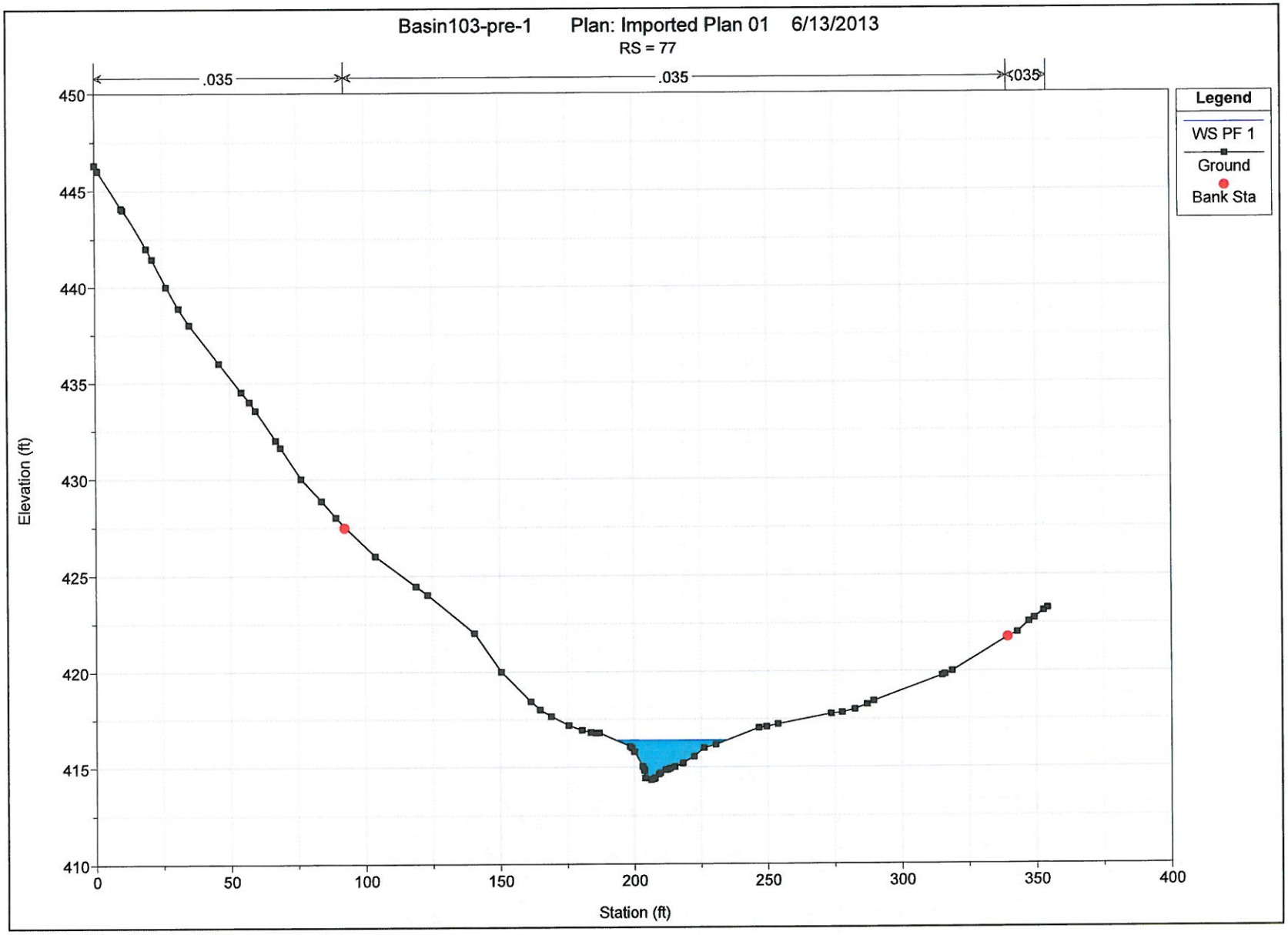
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	92.43	.035	339.53	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
92.43	339.53	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	417.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.		0.035	
W.S. Elev (ft)	416.41	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	416.55	Flow Area (sq ft)		37.99	
E.G. Slope (ft/ft)	0.027331	Area (sq ft)		37.99	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	41.82	Top Width (ft)		41.82	
Vel Total (ft/s)	6.54	Avg. Vel. (ft/s)		6.54	
Max Chl Dpth (ft)	2.07	Hydr. Depth (ft)		0.91	
Conv. Total (cfs)	1501.9	Conv. (cfs)		1501.9	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		42.27	
Min Ch El (ft)	414.34	Shear (lb/sq ft)		1.53	
Alpha	1.00	Stream Power (lb/ft s)	354.24	0.00	0.00
Frctn Loss (ft)	2.18	Cum Volume (acre-ft)	0.01	1.60	
C & E Loss (ft)	0.03	Cum SA (acres)	0.01	3.13	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 77
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
450
445
440
435
430
425
420
415
410
0
50
100
150
200
250
300
350
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 76

INPUT
Description: 10
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	441.76	.14	441.74	9.69	440	15.52	438.99	16.78	438.8
26.52	437.08	32.35	436	44.43	434	55.04	432.51	58.32	432
62.25	431.22	67.98	430	73.99	428.98	75.05	428.81	87.35	426.56
90.71	426	102.23	424.31	104.54	424	118.21	422.33	121.06	422
132.11	420.74	135.13	420.42	136.45	420.31	146.47	418.95	152.58	418
164.01	416.51	168.09	416	175.9	414.99	176.9	414.92	178.24	414.81
183.03	414.31	186.58	414	186.86	413.96	186.92	413.94	187.01	413.92
187.15	413.89	193.57	412.74	194.14	412.58	194.64	412.46	196.57	412
201.02	411.68	204.39	411.22	204.6	411.18	204.79	411.16	205.19	411.14
205.88	411.14	206.75	411.18	207.72	411.25	208.96	411.38	209.03	411.39
210.83	411.77	211.24	411.88	211.91	412	212.82	412.19	222.07	413.02
230.18	413.81	230.27	413.82	230.32	413.83	230.44	413.84	230.79	413.87
233.21	414	238.52	414.4	240.03	414.55	252.17	416	261.41	416.41
264.18	416.5	267.41	416.54	271.48	416.56				

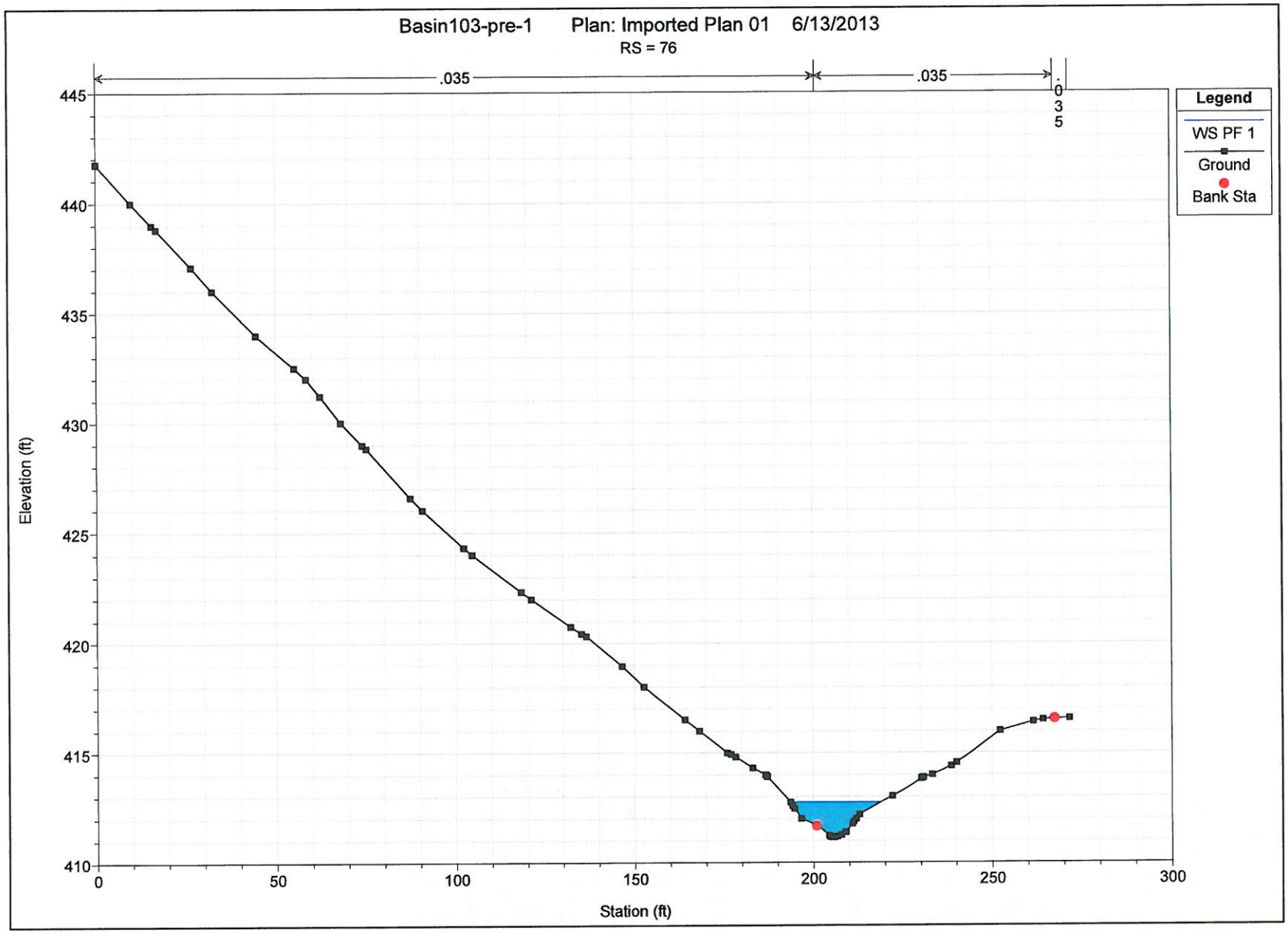
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	201.02	.035	267.41	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
201.02	267.41	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	414.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.97	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	412.76	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	413.36	Flow Area (sq ft)	5.26	16.97	
E.G. Slope (ft/ft)	0.083296	Area (sq ft)	5.26	16.97	
Q Total (cfs)	248.30	Flow (cfs)	50.24	198.06	
Top Width (ft)	25.63	Top Width (ft)	7.54	18.10	
Vel Total (ft/s)	11.17	Avg. Vel. (ft/s)	9.55	11.67	
Max Chl Dpth (ft)	1.62	Hydr. Depth (ft)	0.70	0.94	
Conv. Total (cfs)	860.3	Conv. (cfs)	174.1	686.2	
Length Wtd. (ft)	50.00	Wetted Per. (ft)	7.64	18.26	
Min Ch El (ft)	411.14	Shear (lb/sq ft)	3.58	4.83	
Alpha	1.02	Stream Power (lb/ft s)	271.48	0.00	0.00
Frctn Loss (ft)	2.21	Cum Volume (acre-ft)	0.00	1.57	
C & E Loss (ft)	0.13	Cum SA (acres)	0.00	3.09	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 76
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
445
440
435
430
425
420
415
410
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 75

INPUT
Description: 11
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	437.45	2.58	437.01	8.26	436	12.74	435.15	18.93	434
25.68	432.65	29.52	432	32.05	431.54	41.16	430	43.64	429.74
54.99	428	68.57	426	77.89	424.52	81.33	424	84.75	423.46
93.66	422	96.26	421.59	99.42	421.15	103.02	420.62	108.04	420
125.5	418.15	126.98	418	139.5	416.53	142	416.26	144	416
156.67	414.05	157	414	157.05	413.99	157.28	413.95	164.57	412.7
165.48	412.56	166.17	412.44	166.38	412.4	166.87	412.34	168.88	412
170.96	410.87	171.91	410.31	172.31	410.1	172.48	410	172.9	409.78
176.23	408	181.21	408	182.46	408.35	184.4	408.96	189.54	410
206.12	411.64	208.99	412	215.61	412.22	222.1	412.41	223.18	412.43
226.3	412.51	242.09	413.34	244.65	413.41	249.22	413.52	249.91	413.55
250.63	413.57	260.67	414	264.33	414.3				

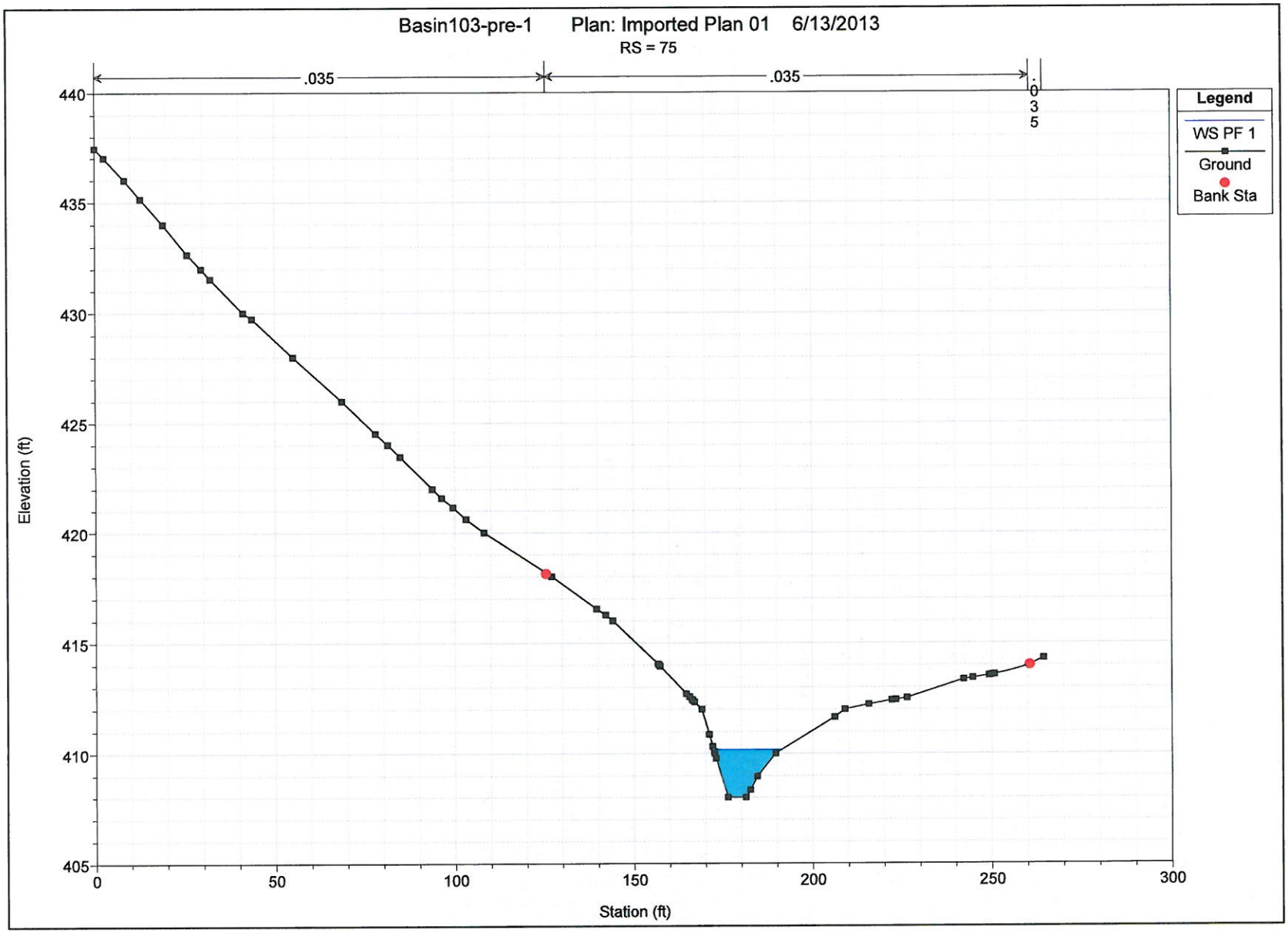
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	125.5	.035	260.67	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
125.5	260.67	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	411.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.54	Wt. n-Val.		0.035	
W.S. Elev (ft)	410.20	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	410.71	Flow Area (sq ft)		24.94	
E.G. Slope (ft/ft)	0.041694	Area (sq ft)		24.94	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	19.46	Top Width (ft)		19.46	
Vel Total (ft/s)	9.96	Avg. Vel. (ft/s)		9.96	
Max Chl Dpth (ft)	2.20	Hydr. Depth (ft)		1.28	
Conv. Total (cfs)	1216.0	Conv. (cfs)		1216.0	
Length Wtd. (ft)		Wetted Per. (ft)		20.27	
Min Ch El (ft)	408.00	Shear (lb/sq ft)		3.20	
Alpha	1.00	Stream Power (lb/ft s)	264.33	0.00	0.00
Frctn Loss (ft)	2.86	Cum Volume (acre-ft)		1.55	
C & E Loss (ft)	0.13	Cum SA (acres)		3.07	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 75
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
440
435
430
425
420
415
410
405
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 74

INPUT
Description: 12
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	437.7	7.53	436.31	9.23	436	9.87	435.87	19.41	434
28.39	432.07	28.7	432	29.42	431.84	37.88	430	48.58	428.81
56.15	428	69.66	426	70.07	425.93	80.81	424	89.53	422.6
93.14	422	96.41	421.41	105.25	420	114.74	418.51	118.09	418
124.63	417.3	135.75	416	137.59	415.75	145.36	414.73	150.44	414
155.43	413.13	161.8	412	162.43	411.33	163.82	410	164.51	409.28
165.92	408	168.35	407.69	168.59	407.66	177.68	407.61	177.89	408
186.09	409.23	191.6	410	198	410.71	199.82	410.79	201.72	410.8
208.35	411.29	208.98	411.34	209.26	411.37	209.74	411.41	209.94	411.42
210.27	411.43	210.46	411.43	210.7	411.44	211.7	411.47	212.47	411.48
213.44	411.47	214.59	411.44	215.91	411.36	218.78	411.17	220.71	411.06
223.94	410.97	229.72	410.74	233.04	410.65	236.82	410.54	240.35	410.5
241.83	410.44	243.19	410.4	244.52	410.39	245.87	410.42	247.33	410.5
250.03	410.53	252.68	410.75	254.61	410.82	255.3	410.86	256.79	410.94
257.44	410.96	263.74	411.2	264.6	411.21	265.73	411.22	268.18	411.29
269.35	411.26	272.36	411.33	273.52	411.25	275.41	411.02	276.59	410.93
278.27	410.91	280.05	410.92	281.38	410.94	283.54	411	284.98	411.06
287.09	411.18	289.78	411.38	296.32	412	297.77	412.12		

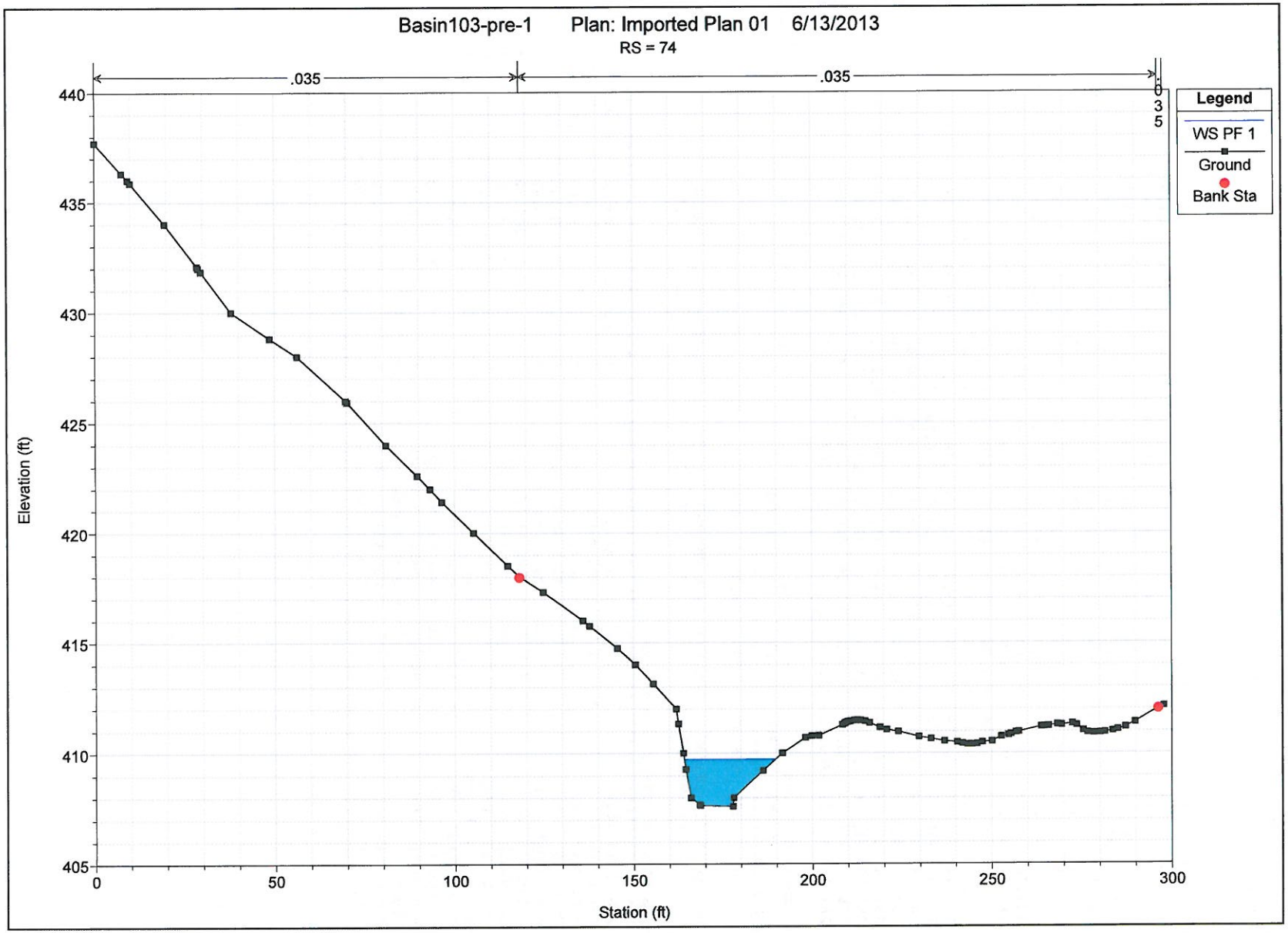
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	118.09	.035	296.32	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
118.09	296.32	5.67	50	160.5	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	410.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.		0.035	
W.S. Elev (ft)	409.74	Reach Len. (ft)	5.67	50.00	160.50
Crit W.S. (ft)	409.74	Flow Area (sq ft)		36.42	
E.G. Slope (ft/ft)	0.017075	Area (sq ft)		36.42	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	25.66	Top Width (ft)		25.66	
Vel Total (ft/s)	6.82	Avg. Vel. (ft/s)		6.82	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.42	
Conv. Total (cfs)	1900.2	Conv. (cfs)		1900.2	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		26.73	
Min Ch El (ft)	407.61	Shear (lb/sq ft)		1.45	
Alpha	1.00	Stream Power (lb/ft s)	297.77	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.51	
C & E Loss (ft)		Cum SA (acres)		3.05	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 74
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
440
435
430
425
420
415
410
405
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 73

INPUT
Description: 13
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	436.71	.45	436.64	4.71	436	13.52	434.75	19.09	434
31.94	432	35.81	431.32	42.32	430	44.32	429.69	55.14	428
63.96	426.71	67.24	426.31	69.46	426	71.61	425.54	77	424.49
79.45	424	84.61	422.7	87.36	422	87.69	421.97	87.82	421.96
88.17	421.92	91.45	421.55	104.98	420	106.23	419.83	121.32	418
134.87	416	137.1	415.83	154.39	414	159.74	412.99	165.08	412
175.72	410.07	176.14	410	183.36	408.73	190.1	408	191.31	407.64
193.99	406.67	195.43	406	206.28	406	209.3	406.81	211.79	407.5
213.73	407.84	214.95	408	215.31	408.01	216.53	408.04	218.37	408.01
218.87	408	221.05	407.89	223.43	407.84	225.2	408	225.28	408.01
225.4	408	232.19	408.22	234.89	408.29	236.74	408.33	238.05	408.34
239.1	408.36	243.67	408.46	244.67	408.48	245.57	408.48	246.96	408.45
252.73	408.27	257.93	408.25	276.28	408.84	279.84	409.08	283.85	409.32
288.29	409.55	291.74	409.74						

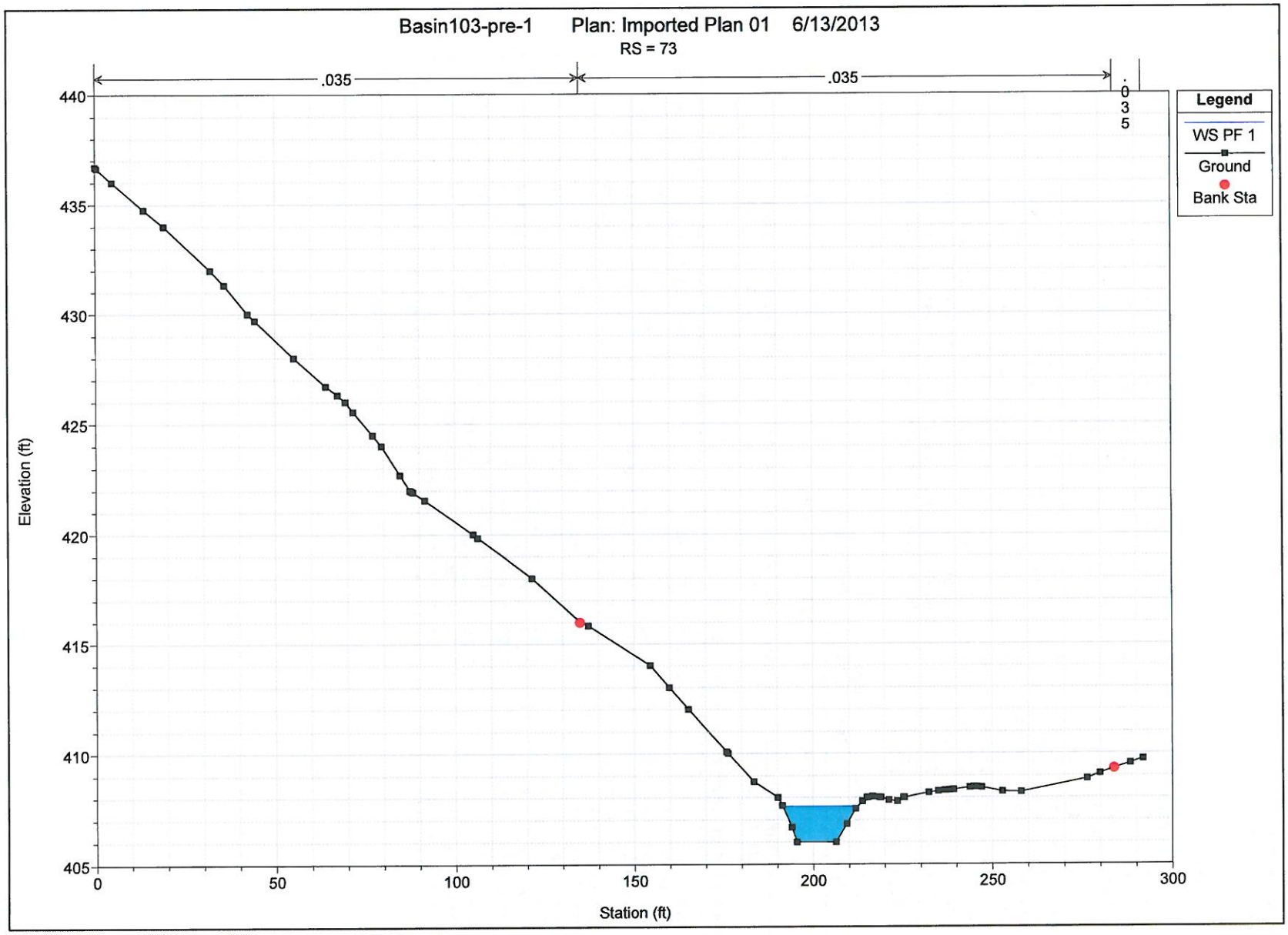
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	134.87	.035	283.85	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
134.87	283.85	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	409.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.		0.035	
W.S. Elev (ft)	407.61	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	408.31	Flow Area (sq ft)		25.39	
E.G. Slope (ft/ft)	0.042714	Area (sq ft)		25.39	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	21.05	Top Width (ft)		21.05	
Vel Total (ft/s)	9.78	Avg. Vel. (ft/s)		9.78	
Max Chl Dpth (ft)	1.61	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	1201.4	Conv. (cfs)		1201.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		21.57	
Min Ch El (ft)	406.00	Shear (lb/sq ft)		3.14	
Alpha	1.00	Stream Power (lb/ft s)	291.74	0.00	0.00
Frctn Loss (ft)	1.28	Cum Volume (acre-ft)		1.48	
C & E Loss (ft)	0.08	Cum SA (acres)		3.02	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 73
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
440
435
430
425
420
415
410
405
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 72

INPUT
Description: 14
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	434.11	.42	434	.87	433.9	9.54	432	13.07	431.29
14.68	430.99	19.61	430	27.55	428.42	29.99	428	33.75	427.19
39.14	426	41.65	425.47	42.95	425.26	49.68	424.24	50.8	424.06
51.18	424	62.99	422.4	65.6	422	77.18	420.04	77.42	420
86.38	418.73	95.47	418.3	97.03	418.18	101.12	418	104.16	417.82
104.68	417.78	105.57	417.69	111.22	417.19	118.38	416.33	121.05	416
124.38	415.6	138.07	414	138.82	413.92	149.66	412.54	154.2	412
160.4	411.15	174.74	409.34	185.87	408	192.82	407.79	216.92	406.32
225.29	406.17	228.62	406.09	231.61	406	232.49	405.3	234.22	404
234.49	403.89	235.66	403.69	237.62	403.58	239.38	403.51	240.13	403.46
240.47	403.41	241.93	403.23	242.2	403.21	242.55	403.21	243.08	403.24
245.78	403.37	248.14	403.55	249	403.71	249.07	403.74	249.27	403.87
249.72	404	249.83	404.09	249.92	404.16	252.56	406	252.94	406.02
254.51	406.06	255.64	406.03	256.28	406	257.17	405.92	259.22	405.88
260.42	406	262.42	406.09	262.66	406.11	262.99	406.14	273.1	406.89
275.45	407.02	276.84	407.06	277.53	407.07	277.62	407.08	277.81	407.1
278.27	407.12	279.44	407.16	281.09	407.22	283	407.28	284.99	407.32
286.7	407.34	292.28	407.35	293.84	407.37	297.53	407.43	301.9	407.64
307.45	408	311.29	408.13	313.12	408.17				

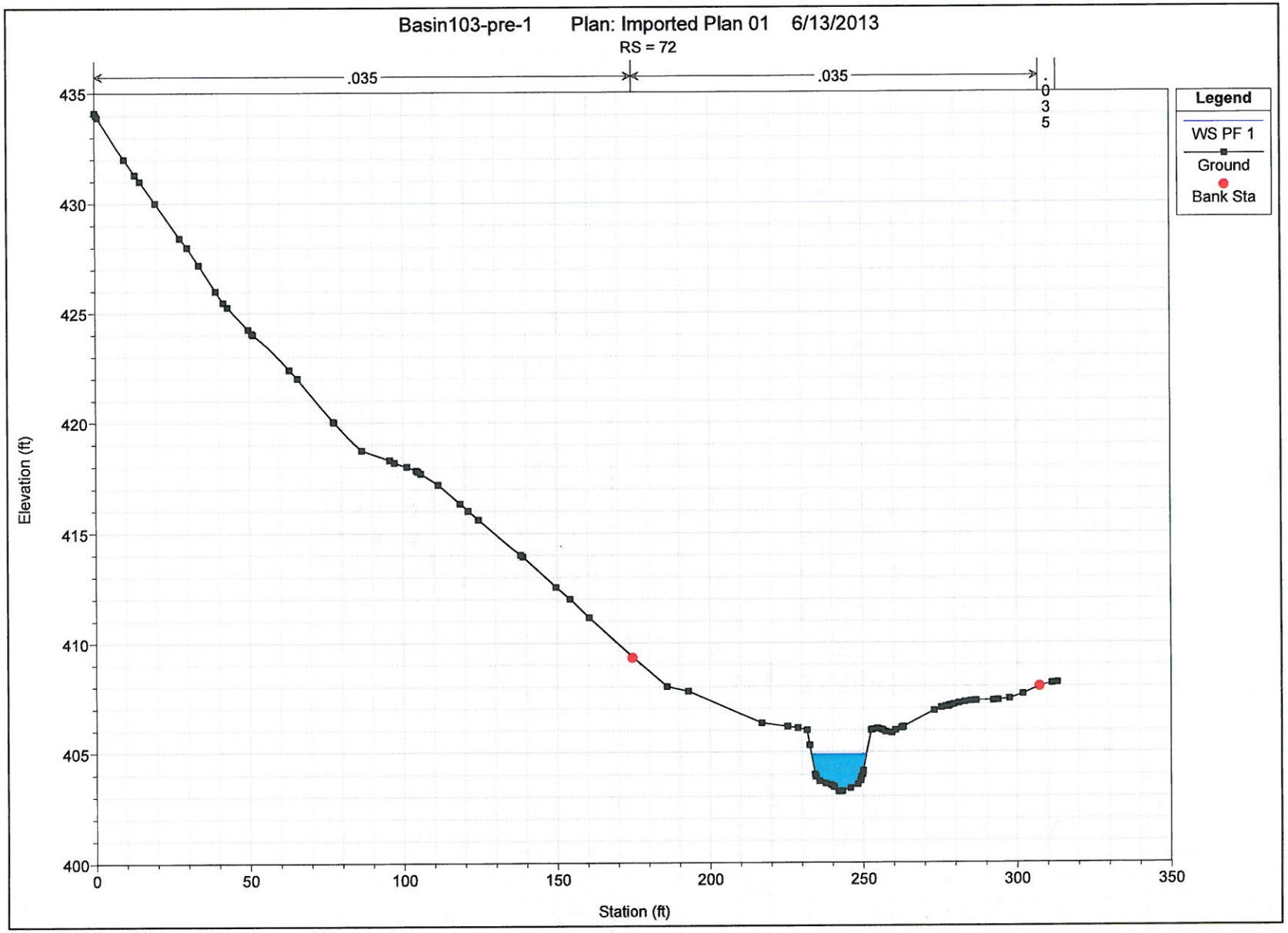
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	174.74	.035	307.45	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
174.74	307.45	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	406.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.84	Wt. n-Val.		0.035	
W.S. Elev (ft)	404.90	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	405.46	Flow Area (sq ft)		22.79	
E.G. Slope (ft/ft)	0.050521	Area (sq ft)		22.79	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	17.95	Top Width (ft)		17.95	
Vel Total (ft/s)	10.89	Avg. Vel. (ft/s)		10.89	
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)		1.27	
Conv. Total (cfs)	1104.7	Conv. (cfs)		1104.7	
Length Wtd. (ft)		Wetted Per. (ft)		18.69	
Min Ch El (ft)	403.21	Shear (lb/sq ft)		3.85	
Alpha	1.00	Stream Power (lb/ft s)	313.12	0.00	0.00
Frctn Loss (ft)	2.32	Cum Volume (acre-ft)		1.45	
C & E Loss (ft)	0.04	Cum SA (acres)		3.00	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 72
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
435
430
425
420
415
410
405
400
0
50
100
150
200
250
300
350

CROSS SECTION
REACH: Reach-1 RS: 71

INPUT
Description: 15
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	427.82	3.61	426.98	8.81	426	13.27	425.06	18.37	424
27.8	422	34.64	420.5	37.09	420	40.73	419.22	43.15	418.81
48.56	418	54.21	417.53	54.43	417.51	54.63	417.49	54.9	417.45
64.21	416	67.4	415.4	70.03	414.92	74.09	414.25	76.04	414
76.37	413.96	76.5	413.96	79.68	413.69	86.82	413.24	91.18	413.04
97.54	412.67	106.37	412	111.24	411.7	112.9	411.66	116.12	411.49
121.74	411.18	131.24	410.82	136.58	410.51	137.51	410.46	141.61	410.11
142.67	410	149.5	409.32	150.64	409.2	154.37	408.76	161.92	408
170.36	407.51	170.47	407.51	177.85	407.05	182.91	407.08	186.46	407.06
189.91	407	194.85	406.83	204.83	406.46	205.17	406.45	214.14	406.13
218.23	406	222.89	405.8	226.35	405.59	239.14	405.01	251.35	404
252.87	402.75	253.81	402	261.09	402	266.36	403.41	269.48	404
271.06	404.06	271.41	404.07	279.12	404.36	280.98	404.44	290.24	404.86
298.55	405.21	306.76	405.59	307.17	405.61	317.71	405.98	317.79	405.99
317.96	405.99	318.22	406	321.18	406.06	324.39	406.1	329.82	406.39
333.7	406.61	336.1	406.74	347.78	407.46	356.25	408	362.7	408.38

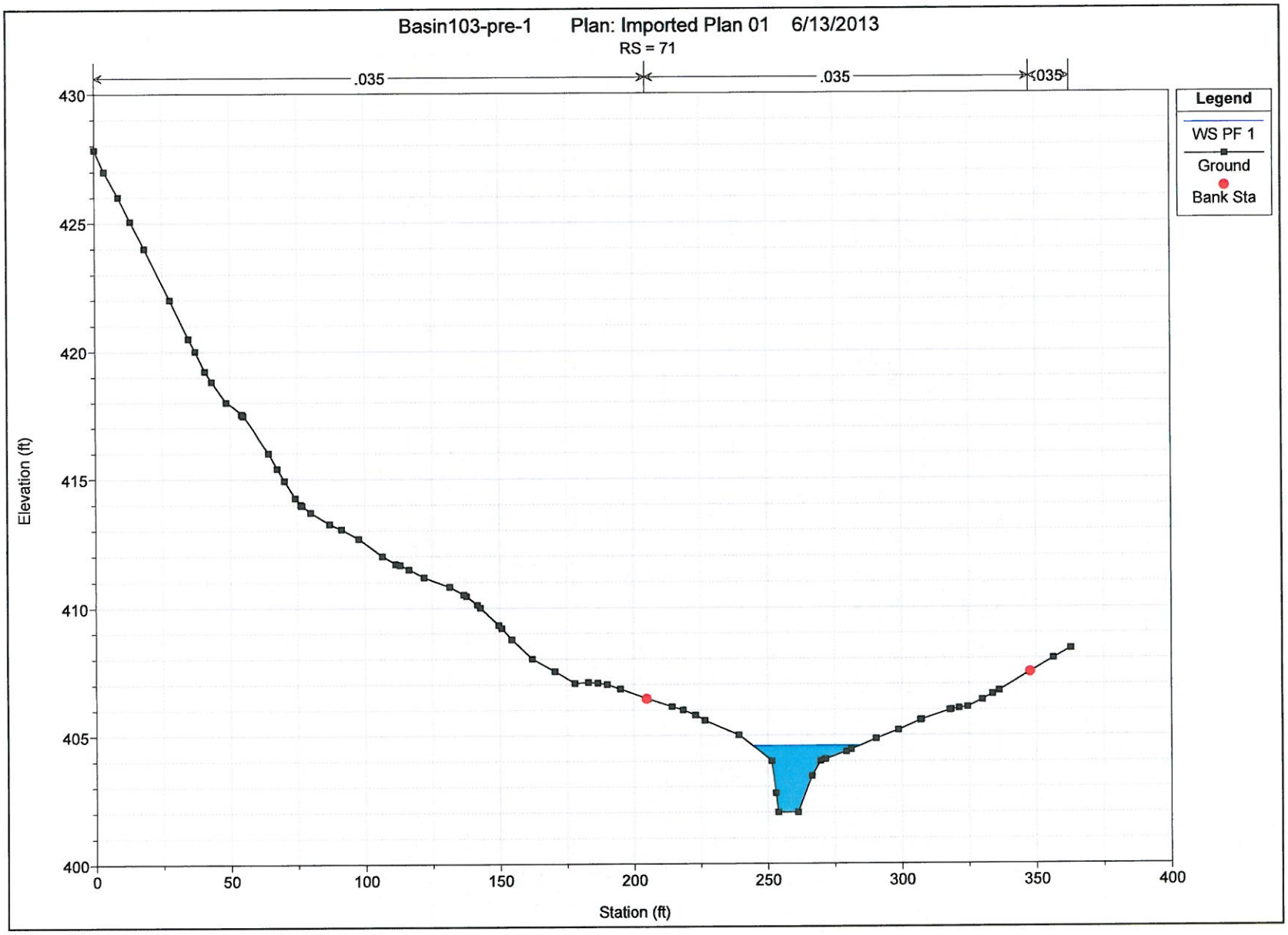
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	204.83	.035	347.78	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
204.83	347.78	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	405.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.		0.035	
W.S. Elev (ft)	404.60	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	404.60	Flow Area (sq ft)		42.40	
E.G. Slope (ft/ft)	0.018357	Area (sq ft)		42.40	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	40.29	Top Width (ft)		40.29	
Vel Total (ft/s)	5.86	Avg. Vel. (ft/s)		5.86	
Max Chl Dpth (ft)	2.60	Hydr. Depth (ft)		1.05	
Conv. Total (cfs)	1832.6	Conv. (cfs)		1832.6	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		41.27	
Min Ch El (ft)	402.00	Shear (lb/sq ft)		1.18	
Alpha	1.00	Stream Power (lb/ft s)	362.70	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.41	
C & E Loss (ft)		Cum SA (acres)		2.96	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 71
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
430
425
420
415
410
405
400
0
50
100
150
200
250
300
350
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 70

INPUT
Description: 16
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	420.5	2.29	420	8.11	418.69	11.24	418	14.06	417.3
16.95	416.6	18.99	416.15	19.64	416	25.6	414.64	28.11	414
34.17	412.81	37.82	412	42.78	410.93	43.49	410.77	44.19	410.64
45.38	410.47	47.02	410.17	49.13	410	57.13	409.64	61.9	409.25
67.79	408.87	71.29	408.48	72.93	408.33	74.84	408	80.92	407.3
81.86	407.22	84.2	406.99	86.72	406.76	88.08	406.74	89	406.68
90.04	406.65	91.43	406.64	93.35	406.65	102.93	406.73	105.52	406.72
107.49	406.73	109.9	406.7	112.48	406.66	125.1	406.42	127.68	406.36
128.25	406.34	128.71	406.32	135.1	406	143.44	405.65	145.39	405.6
155.63	405.19	158.51	405.1	162.54	405.08	169.02	404.92	181.39	404.69
184.32	404.71	186.51	404.73	190.25	404.73	194.49	404.76	195.56	404.77
196.13	404.77	196.7	404.76	198.23	404.74	208.27	404.59	223.59	404.55
225.39	404.52	236.18	404.23	239.44	404.13	244.24	404	251.29	403.25
256.58	402.38	258.96	402	260.12	401.84	263.75	401.38	271.06	401.45
271.11	401.51	272.68	402	277.32	402.51	277.5	402.52	277.9	402.54
279.09	402.62	283.61	403.03	285.65	403.11	288.76	403.18	291.25	403.38
291.96	403.44	293.25	403.54	293.54	403.56	306.05	403.66	306.84	403.7
309.46	403.73	312.54	403.81	317.27	404	317.97	404.04	319.23	404.11
334.25	404.98	336.05	405.06	341.02	405.29	342.24	405.34	343.67	405.45
345.04	405.54	345.77	405.58						

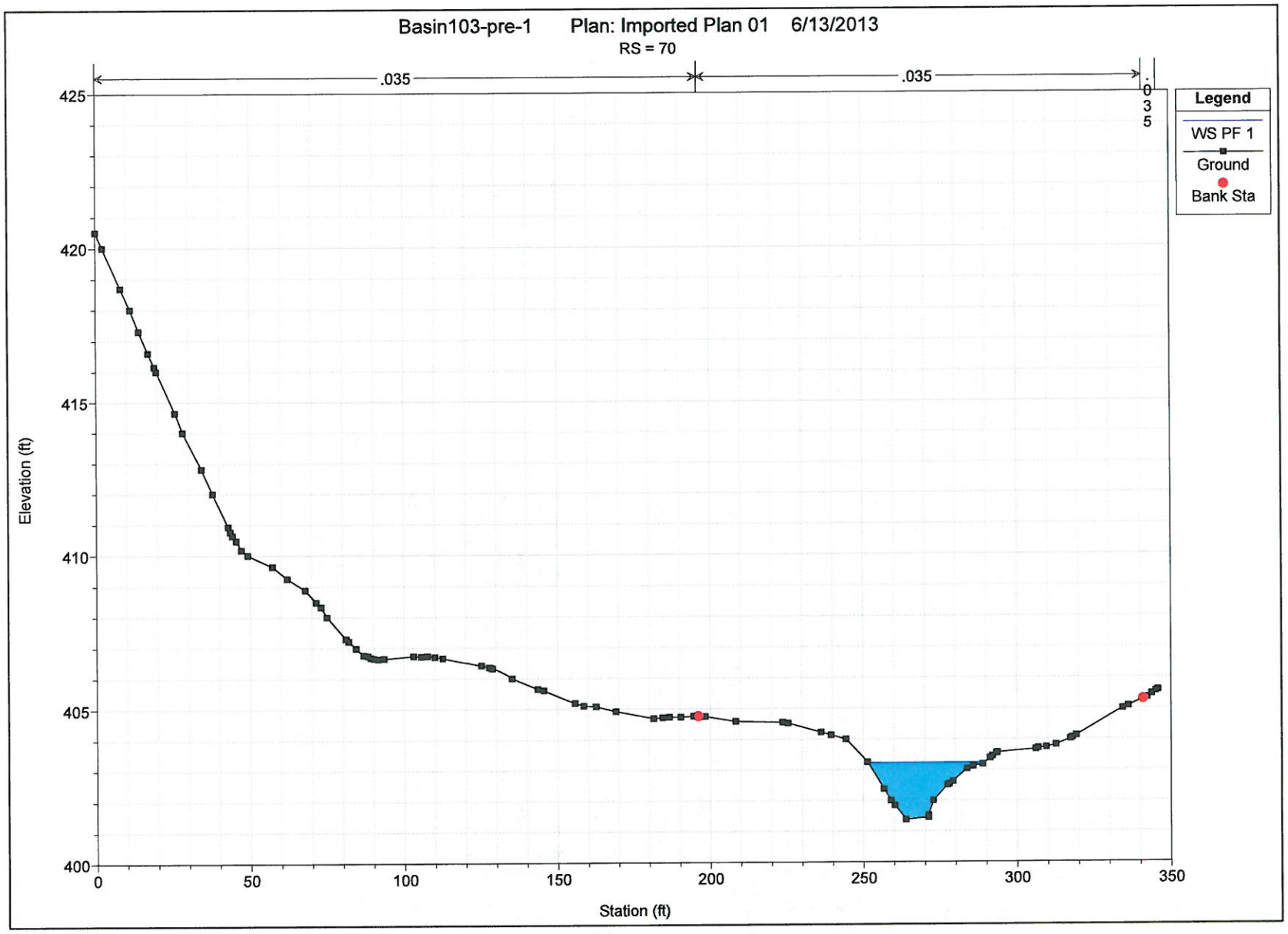
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	196.13	.035	341.02	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
196.13	341.02	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	403.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.		0.035	
W.S. Elev (ft)	403.24	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	403.39	Flow Area (sq ft)		36.09	
E.G. Slope (ft/ft)	0.028494	Area (sq ft)		36.09	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	38.07	Top Width (ft)		38.07	
Vel Total (ft/s)	6.88	Avg. Vel. (ft/s)		6.88	
Max Chl Dpth (ft)	1.86	Hydr. Depth (ft)		0.95	
Conv. Total (cfs)	1471.0	Conv. (cfs)		1471.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		38.37	
Min Ch El (ft)	401.38	Shear (lb/sq ft)		1.67	
Alpha	1.00	Stream Power (lb/ft s)	345.77	0.00	0.00
Frctn Loss (ft)	1.13	Cum Volume (acre-ft)		1.37	
C & E Loss (ft)	0.02	Cum SA (acres)		2.92	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 70
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
425
420
415
410
405
400
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 69

INPUT
Description: 17
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	416	8.11	414.48	9.74	414.17	10.66	414	11.69	413.79
20.71	412	21.34	411.86	29.82	410	37.11	408.53	40.1	408
54.16	406.03	54.42	406	61.3	405.34	64.58	405.07	78.56	404.08
79.15	404.04	79.65	404	91.53	403.57	94.84	403.48	98.12	403.49
103.36	403.63	115.94	404	119.08	404.03	120.05	404	123.72	403.85
136.2	403.17	139.26	403.03	141.12	403	142.75	402.99	145.91	402.9
147.87	402.88	150.01	402.87	152.21	402.88	154.24	402.9	192.39	403.06
198.43	402.91	218.52	402.87	219.03	402.85	219.99	402.81	221.94	402.76
225.01	402.76	227.97	402.73	231.94	402.67	258.87	402.18	260.55	402.14
263.5	402.05	264.92	402	280.45	400.41	284.66	400	296.87	400
297.54	400.18	298.21	400.38	306.14	402	309.77	402.19	315.86	402.53
317.98	402.7	333.1	403.62	342.09	404	373.66	405.96	374.36	406
374.99	406.05								

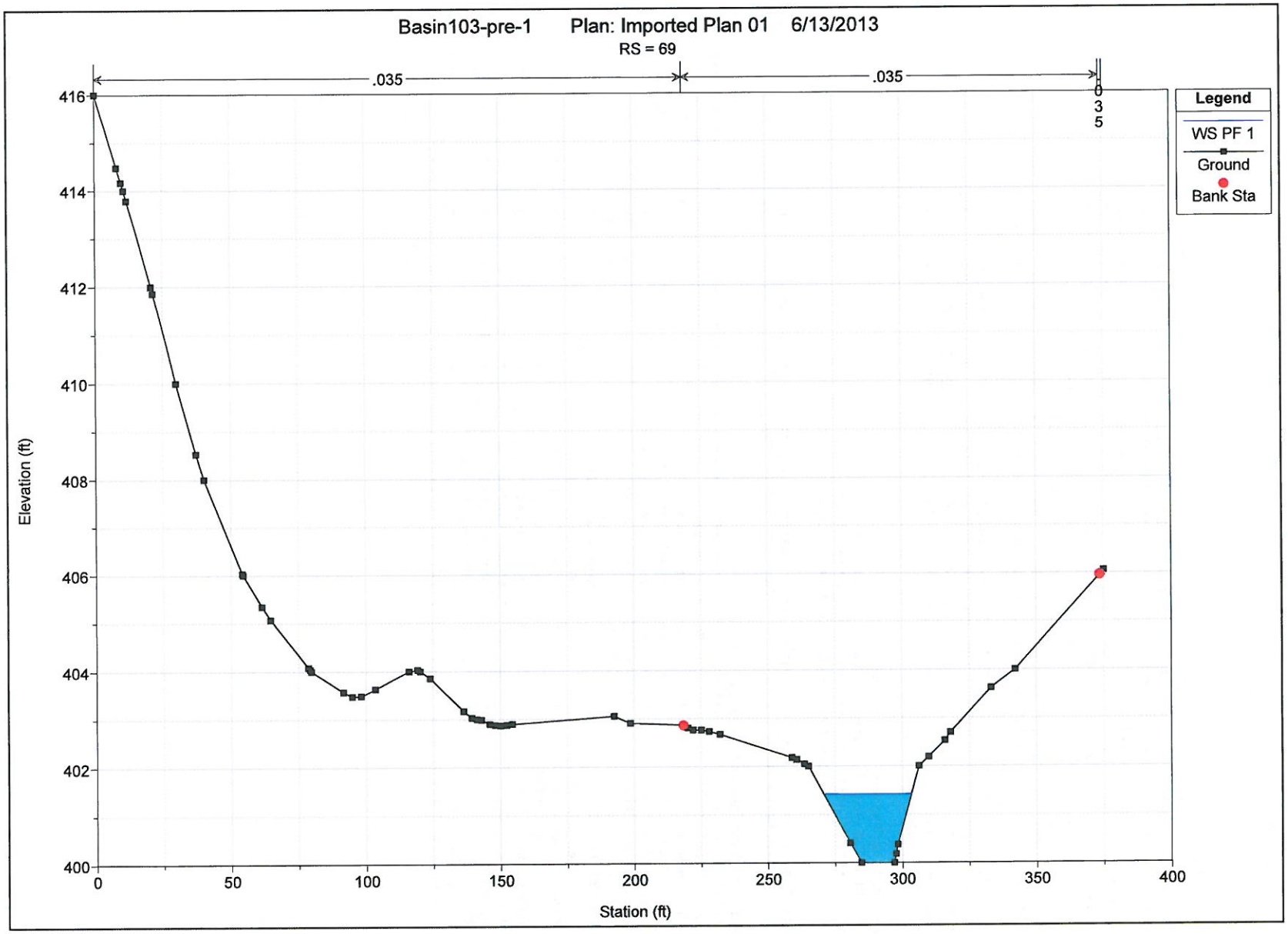
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	218.52	.035	373.66	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.52	373.66	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	402.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.94	Wt. n-Val.		0.035	
W.S. Elev (ft)	401.43	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	401.69	Flow Area (sq ft)		31.94	
E.G. Slope (ft/ft)	0.035060	Area (sq ft)		31.94	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	32.81	Top Width (ft)		32.81	
Vel Total (ft/s)	7.77	Avg. Vel. (ft/s)		7.77	
Max Chl Dpth (ft)	1.43	Hydr. Depth (ft)		0.97	
Conv. Total (cfs)	1326.1	Conv. (cfs)		1326.1	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		33.04	
Min Ch El (ft)	400.00	Shear (lb/sq ft)		2.12	
Alpha	1.00	Stream Power (lb/ft s)	374.99	0.00	0.00
Frctn Loss (ft)	1.58	Cum Volume (acre-ft)		1.33	
C & E Loss (ft)	0.02	Cum SA (acres)		2.88	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 69
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
416
414
412
410
408
406
404
402
400
0
50
100
150
200
250
300
350
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 68

INPUT
Description: 18
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	414.75	.33	414.67	3.15	414	12.06	412	18.4	410.55
20.51	410	23.14	409.26	27.81	408	31.55	407.15	36.1	406
44.63	404.03	44.79	404	52.43	403.46	56.84	403.16	59.03	403.02
60.48	402.93	76.45	402	94.89	401.55	100.11	401.44	102.95	401.4
105.13	401.38	107.49	401.38	109.95	401.36	113.55	401.29	116.58	401.27
117.79	401.26	118.92	401.26	120.45	401.28	122.39	401.33	127.91	401.48
148.8	402	149.68	402.02	151.88	402.02	159.17	402	161.68	401.95
161.98	401.95	172.3	401.76	180.88	401.64	182.78	401.6	190.53	401.48
194.53	401.38	195.55	401.34	196.7	401.28	201.54	401.16	203.15	401.1
204.01	401.06	205.75	400.96	207.54	400.85	213.13	400.57	214.12	400.5
221.01	400	224.46	399.22	227.96	398.41	228.47	398.3	229.12	398.17
229.66	398.07	229.77	398.05	229.87	398.05	229.93	398.04	230.3	398
259.23	398	262.09	398.3	263.86	398.52	266.33	398.73	267.69	398.71
268.6	398.59	269.28	398.52	269.82	398.61	273.01	398.55	273.2	398.56
273.36	398.57	273.62	398.6	274.3	398.62	275.52	398.88	277.51	399.19
279.8	399.47	280.12	399.53	280.35	399.58	282.08	400	289.55	400.64
289.85	400.69	290.26	400.71	290.67	400.75	291.76	400.8	295.05	401.19
295.3	401.22	295.49	401.24	295.71	401.25	295.9	401.26	306.13	401.75
309.42	401.95	309.86	402	312.45	402.25	315.14	402.38	315.38	402.4
340.89	404	344.82	404.39						

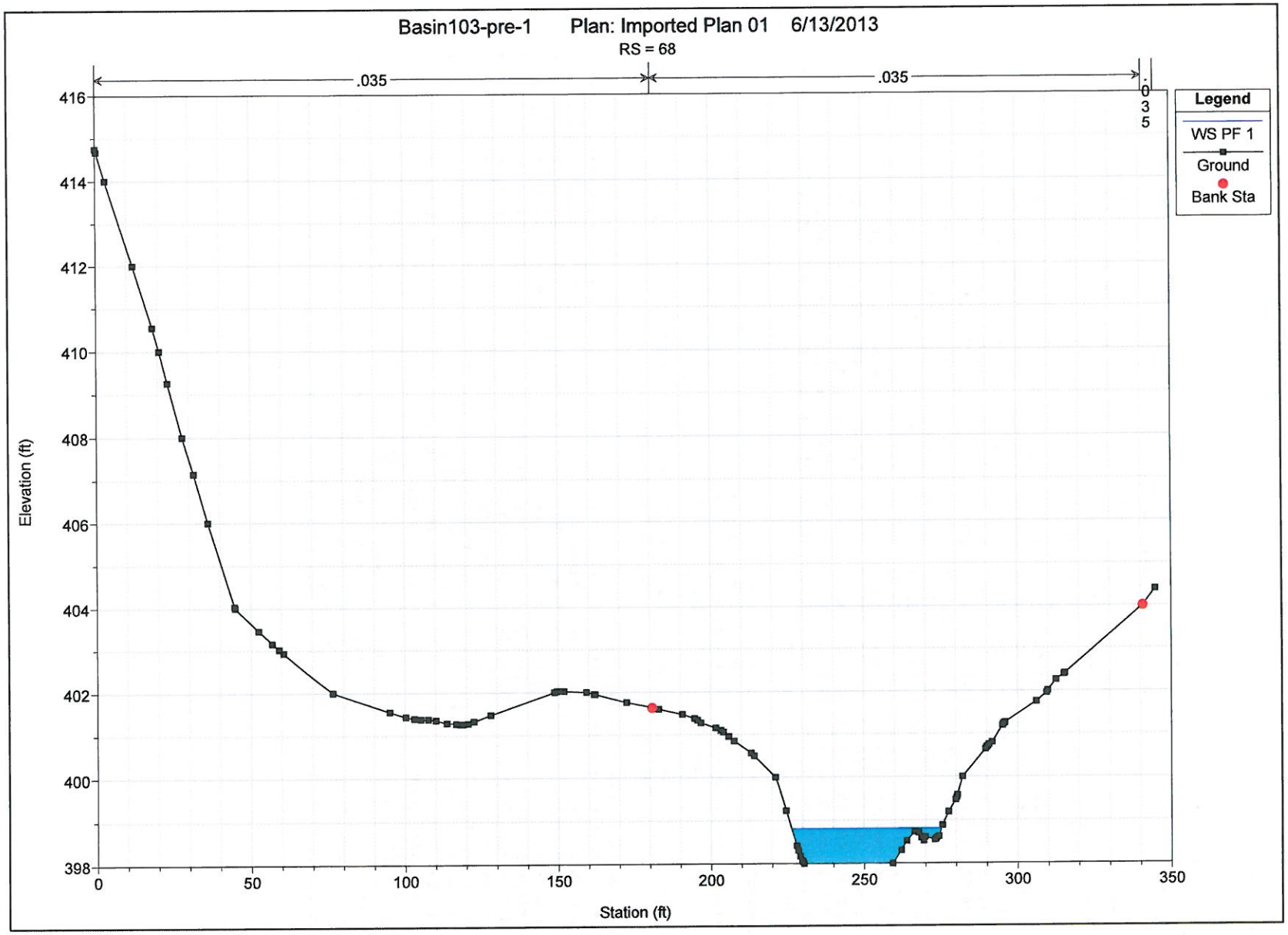
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	180.88	.035	340.89	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
180.88	340.89	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	399.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.07	Wt. n-Val.		0.035	
W.S. Elev (ft)	398.81	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	399.13	Flow Area (sq ft)		29.85	
E.G. Slope (ft/ft)	0.074534	Area (sq ft)		29.85	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	48.94	Top Width (ft)		48.94	
Vel Total (ft/s)	8.32	Avg. Vel. (ft/s)		8.32	
Max Chl Dpth (ft)	0.81	Hydr. Depth (ft)		0.61	
Conv. Total (cfs)	909.5	Conv. (cfs)		909.5	
Length Wtd. (ft)		Wetted Per. (ft)		49.10	
Min Ch El (ft)	398.00	Shear (lb/sq ft)		2.83	
Alpha	1.00	Stream Power (lb/ft s)	344.82	0.00	0.00
Frctn Loss (ft)	2.47	Cum Volume (acre-ft)		1.29	
C & E Loss (ft)	0.01	Cum SA (acres)		2.83	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 68
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
416
414
412
410
408
406
404
402
400
398
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 67

INPUT
Description: 19
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	416.27	1.22	416	4.15	415.12	7.61	414	11.5	412.86
14.18	412	18.63	410.76	21.7	410	23.6	409.59	30.88	408
34.03	407.28	39.78	406	45.9	404.35	47.34	404	52.79	402.48
54.83	402	60.03	401.16	62.48	401.05	64.13	400.86	65.06	400.72
68.51	400.73	71.98	400.84	72.13	400.84	92.02	399.85	92.28	399.85
100.9	399.49	105.21	399.38	108.52	399.39	116.71	399.47	119.89	399.44
122.94	399.46	124.25	399.45	125.39	399.45	125.65	399.43	126.31	399.39
126.59	399.37	129.58	399.35	134.6	399.06	138.06	398.98	143.96	398.56
147.44	398.42	153.97	398	160.01	397.72	160.73	397.7	163.76	397.58
166.23	397.52	168.73	397.48	171.42	397.43	175.25	397.37	177.5	397.37
179.38	397.38	180.77	397.38	181.56	397.4	183.04	397.38	189.21	397.26
190.71	397.2	202.79	398	225.18	398	235.67	399.19	242.69	400
269.3	402	273.69	402.26	292.78	403.36				

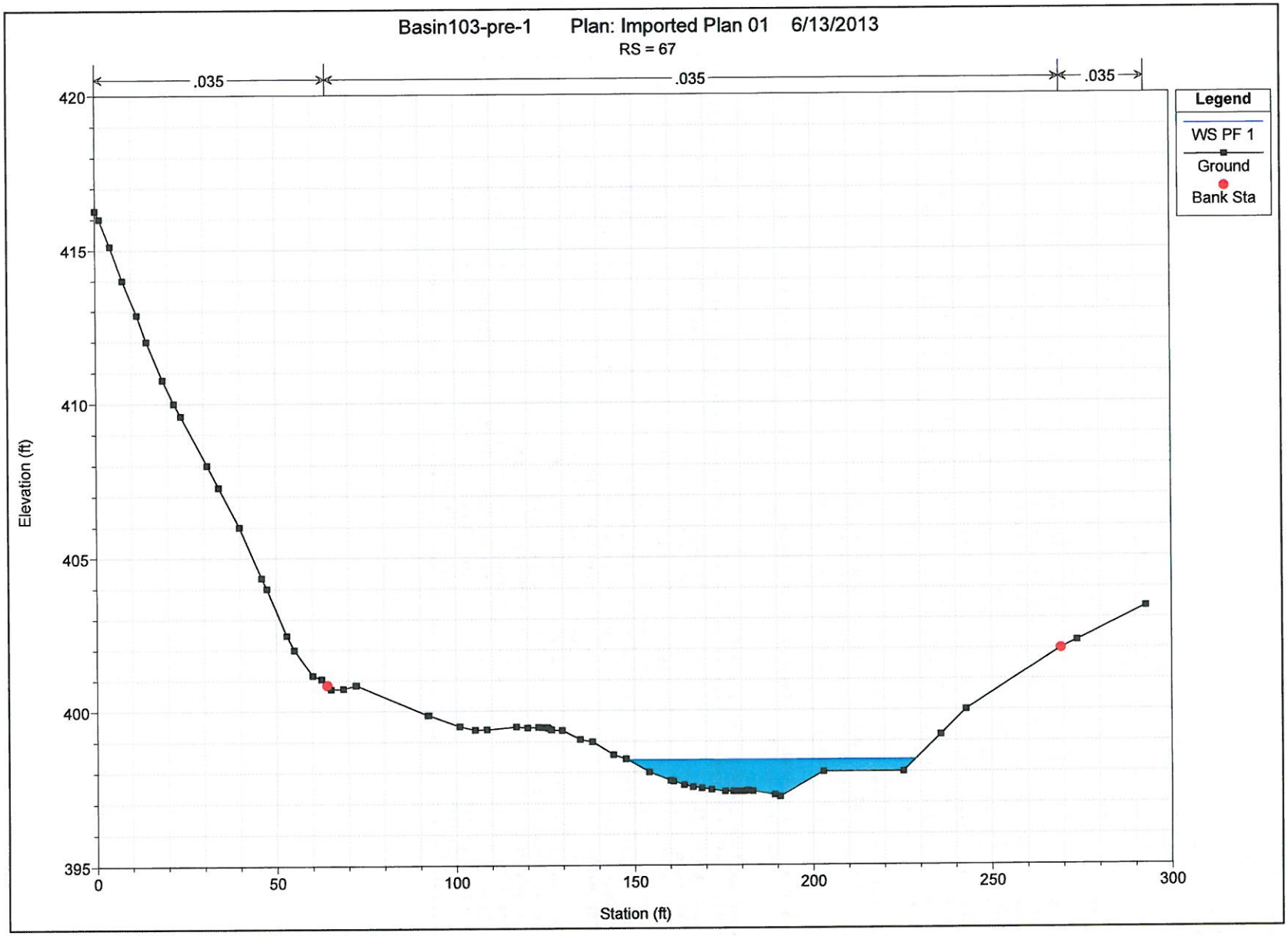
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	64.13	.035	269.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
64.13	269.3	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	398.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.035	
W.S. Elev (ft)	398.39	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	398.39	Flow Area (sq ft)		53.08	
E.G. Slope (ft/ft)	0.021274	Area (sq ft)		53.08	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	80.76	Top Width (ft)		80.76	
Vel Total (ft/s)	4.68	Avg. Vel. (ft/s)		4.68	
Max Chl Dpth (ft)	1.19	Hydr. Depth (ft)		0.66	
Conv. Total (cfs)	1702.4	Conv. (cfs)		1702.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		80.84	
Min Ch El (ft)	397.20	Shear (lb/sq ft)		0.87	
Alpha	1.00	Stream Power (lb/ft s)	292.78	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.25	
C & E Loss (ft)		Cum SA (acres)		2.76	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 67
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
420
415
410
405
400
395
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 66

INPUT
Description: 20
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	415.22	.98	414.94	4.18	414	9.22	412.45	10.62	412
15.19	410.66	17.67	410	21.08	409.04	22.03	408.8	25.1	408
32.4	406	35.35	405.2	39.73	404	42.53	403.22	46.99	402
50.82	400.96	55.1	400	57.5	399.65	59.06	399.38	62.24	398.85
67.57	398	76.43	397.6	82.13	397.37	85.8	397.28	93.11	397.19
97.4	397.1	100.21	396.89	103.62	396.77	107.59	396.55	110.41	396.45
112.27	396.4	115.13	396.23	119.95	395.92	121.57	395.8	122.91	395.71
125.08	395.62	133.29	395.35	135.87	395.28	136.35	395.27	136.71	395.27
136.82	395.26	137.09	395.25	137.31	395.25	138.04	395.23	139.64	395.21
142.13	395.2	148.74	395.25	150.79	395.25	151.76	395.22	152.35	395.19
153.35	395.16	160.5	395.35	160.67	395.38	164.8	395.75	167.86	396
175.57	396.57	198.1	398	199.75	398.06	211.85	398.43	218.81	398.54
225.04	398.56	226.98	398.67	227.62	398.69	248.76	399.71		

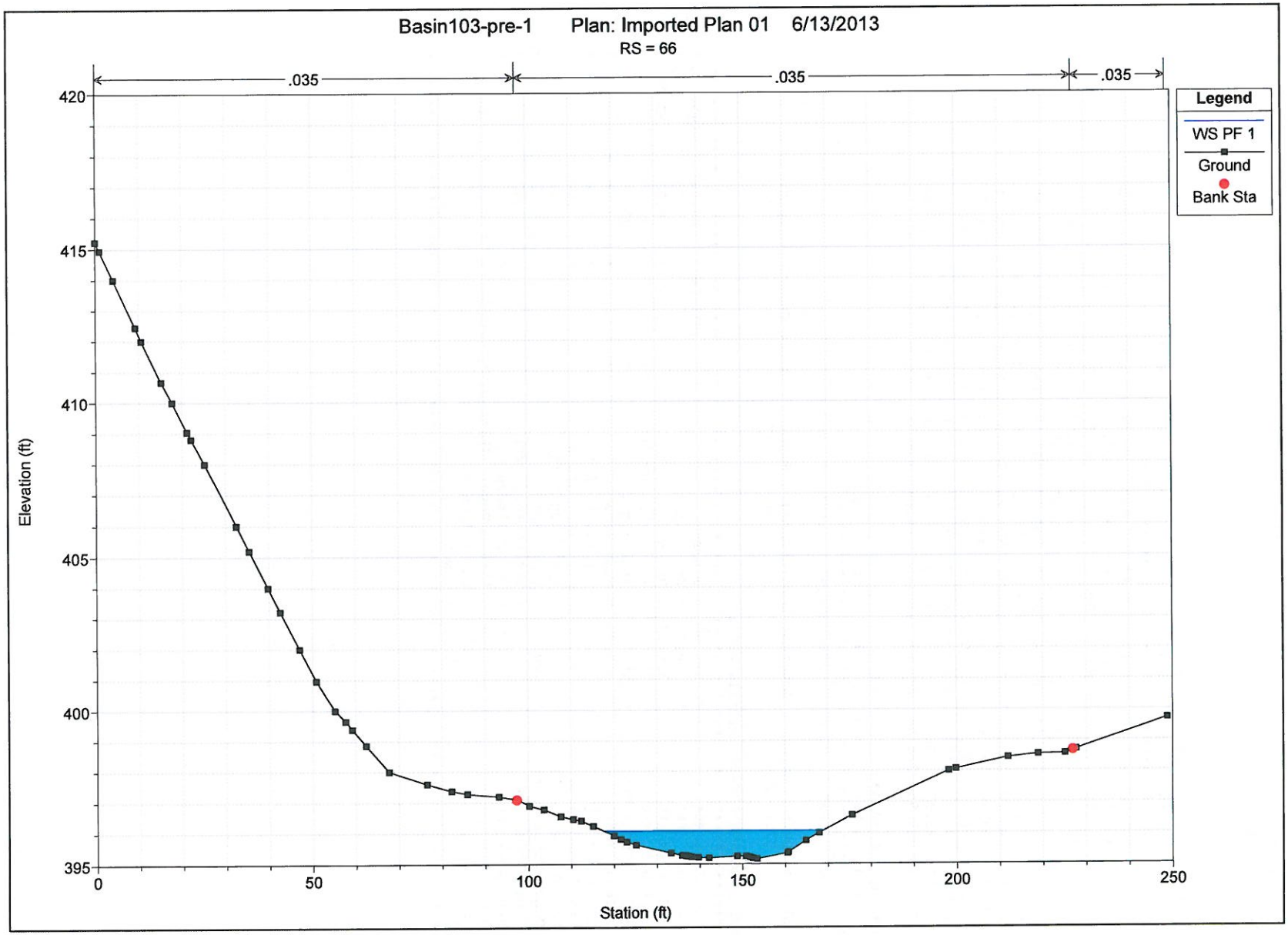
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	97.4	.035	226.98	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
97.4	226.98	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	397.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.		0.035	
W.S. Elev (ft)	396.08	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	396.37	Flow Area (sq ft)		32.26	
E.G. Slope (ft/ft)	0.061179	Area (sq ft)		32.26	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	51.34	Top Width (ft)		51.34	
Vel Total (ft/s)	7.70	Avg. Vel. (ft/s)		7.70	
Max Chl Dpth (ft)	0.92	Hydr. Depth (ft)		0.63	
Conv. Total (cfs)	1003.9	Conv. (cfs)		1003.9	
Length Wtd. (ft)		Wetted Per. (ft)		51.40	
Min Ch El (ft)	395.16	Shear (lb/sq ft)		2.40	
Alpha	1.00	Stream Power (lb/ft s)	248.76	0.00	0.00
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)		1.20	
C & E Loss (ft)	0.06	Cum SA (acres)		2.68	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 66
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
420
415
410
405
400
395
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 65

INPUT
Description: 21
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	410.42	.91	410.19	1.22	410.09	1.58	410	4.23	409.18
8.73	408	10.36	407.59	13.13	406.94	14.38	406.58	17.21	405.89
17.34	405.86	17.5	405.81	19.77	405.08	21.38	404.48	23.35	404
31.03	402.34	32.5	402	38.62	400.6	41.54	400	44.03	399.73
53.94	398.73	58.44	398	80.49	396.47	87.71	396	95.29	395.33
99.26	395.01	102.57	394.77	103.69	394.71	104.75	394.68	115.77	394.23
125.66	394.07	130.57	394	144.62	394	146.03	394.14	146.57	394.15
146.87	394.16	147.26	394.19	150.43	394.39	160.37	395.09	172.18	396
173.64	396.01	214.68	397.29	236.16	397.88	241.18	398		

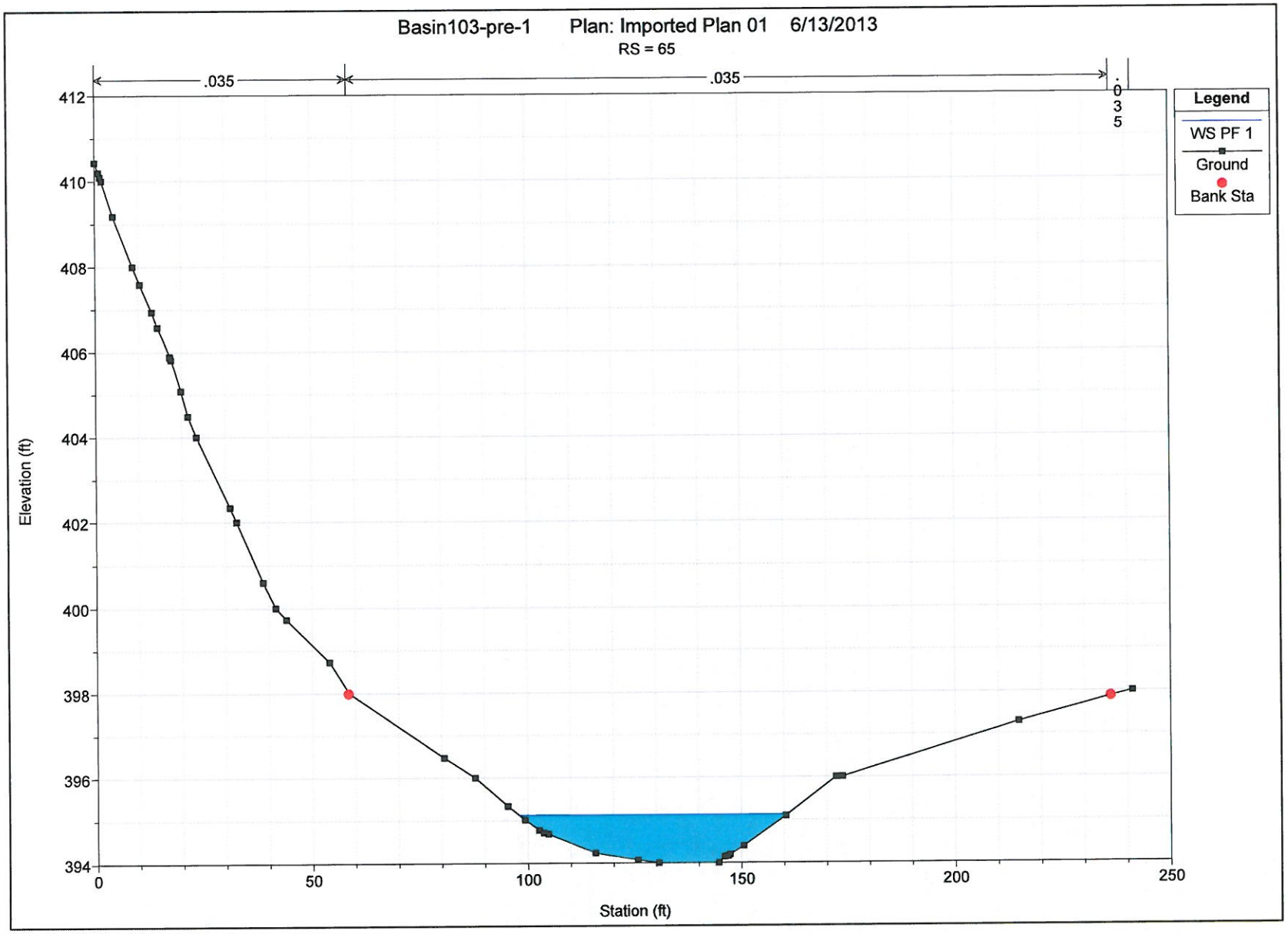
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	58.44	.035	236.16	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
58.44	236.16	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	395.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.035	
W.S. Elev (ft)	395.13	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	395.13	Flow Area (sq ft)		49.13	
E.G. Slope (ft/ft)	0.019769	Area (sq ft)		49.13	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	63.01	Top Width (ft)		63.01	
Vel Total (ft/s)	5.05	Avg. Vel. (ft/s)		5.05	
Max Chl Dpth (ft)	1.13	Hydr. Depth (ft)		0.78	
Conv. Total (cfs)	1766.0	Conv. (cfs)		1766.0	
Length Wtd. (ft)		Wetted Per. (ft)		63.07	
Min Ch El (ft)	394.00	Shear (lb/sq ft)		0.96	
Alpha	1.00	Stream Power (lb/ft s)	241.18	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.15	
C & E Loss (ft)		Cum SA (acres)		2.61	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 65
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
412
410
408
406
404
402
400
398
396
394
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 64

INPUT
Description: 22
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	412.65	1.74	412.21	2.37	412.04	2.59	412	3.46	411.69
4.78	411.23	5.88	410.78	7.98	410	12.11	408.71	13.39	408.28
13.49	408.24	14.3	408	21.62	406.03	21.73	406	28.65	404.19
29.4	404	32.13	403.28	37.1	402	39.55	401.64	46.45	400
48.24	399.72	52.53	399.11	58.02	398	65.13	396.68	69.18	396
75.27	395.42	93.06	394	94.68	393.92	94.99	393.9	95.33	393.89
101.48	394	103.34	394	109.1	394.01	112.08	394.01	115.78	394
115.9	394	118.93	393.85	121.09	394	141.58	394	158.51	395.09
163.72	395.44	171.24	396	172.52	396.01	179	396.05	183.29	396.06
189.43	396.06	196.23	396.08	196.63	396.08				

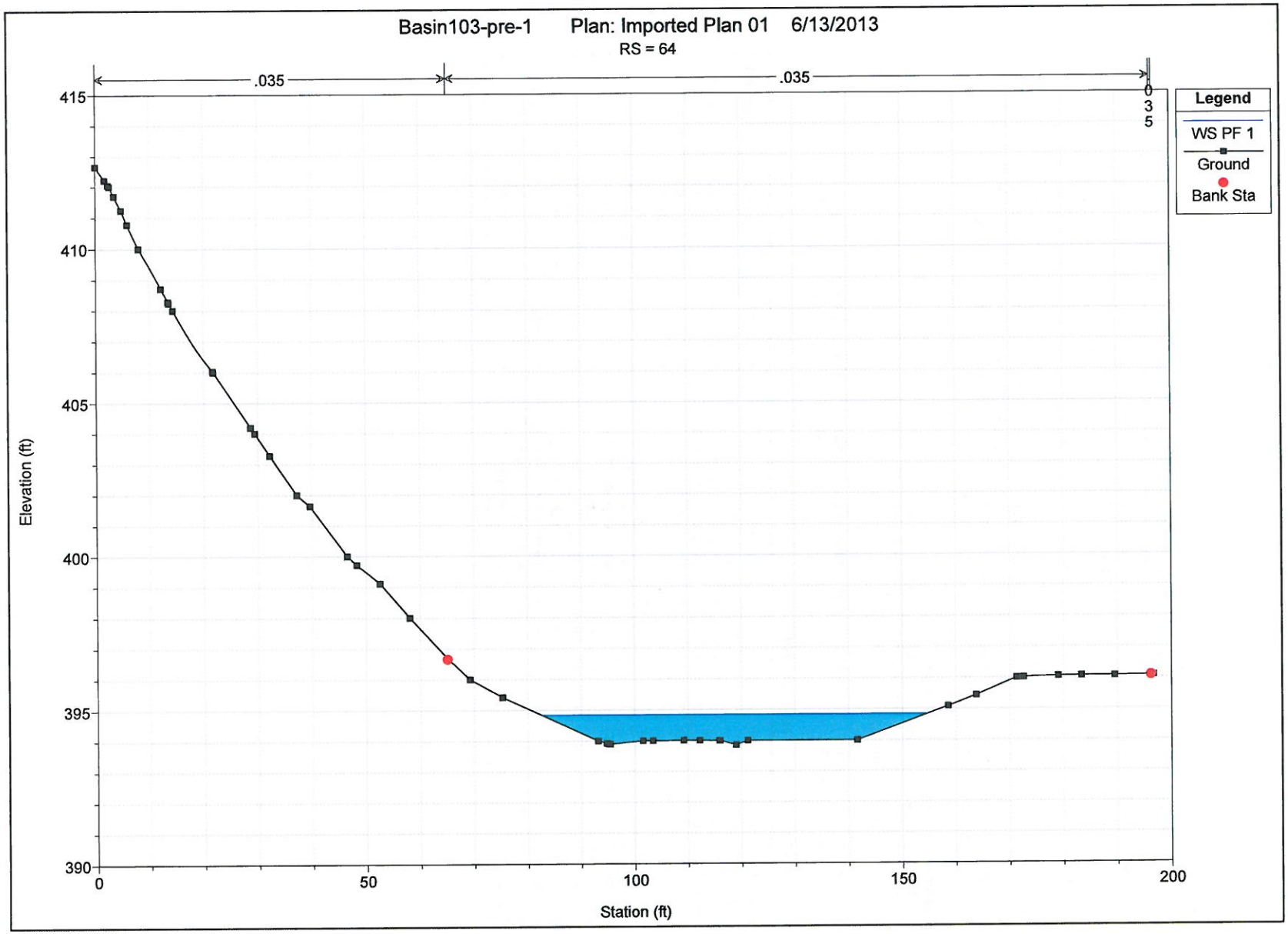
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	65.13	.035	196.23	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
65.13	196.23	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	395.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.035	
W.S. Elev (ft)	394.84	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	394.84	Flow Area (sq ft)		51.57	
E.G. Slope (ft/ft)	0.020154	Area (sq ft)		51.57	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	72.14	Top Width (ft)		72.14	
Vel Total (ft/s)	4.82	Avg. Vel. (ft/s)		4.82	
Max Chl Dpth (ft)	0.99	Hydr. Depth (ft)		0.71	
Conv. Total (cfs)	1749.0	Conv. (cfs)		1749.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		72.22	
Min Ch El (ft)	393.85	Shear (lb/sq ft)		0.90	
Alpha	1.00	Stream Power (lb/ft s)	196.63	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.09	
C & E Loss (ft)		Cum SA (acres)		2.54	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 64
.035
.035
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
415
410
405
400
395
390
0
50
100
150
200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 63

INPUT
Description: 23
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	408.28	3.65	407.69	11.06	406.22	11.85	406.06	11.98	406.03
12.16	406	24.62	404.23	26.21	404	26.27	403.99	35.68	402.57
38.71	402	42.22	401.44	43.72	401.18	51.1	400	57.99	398.77
60.41	398	62.69	397.15	63.1	397.02	65.32	396.41	65.81	396.27
66.28	396.15	66.89	396	68.63	395.49	74.63	394	94.89	392.96
97	392.86	97.8	392.82	102.24	392.62	111.57	392	115.04	392
115.41	392.02	121.72	392.3	123.82	392.4	127.2	392.58	137.38	393.15
149.25	393.64	156.89	394	158.1	394.06	161.54	394.21	169.62	394.27
170.21	394.27								

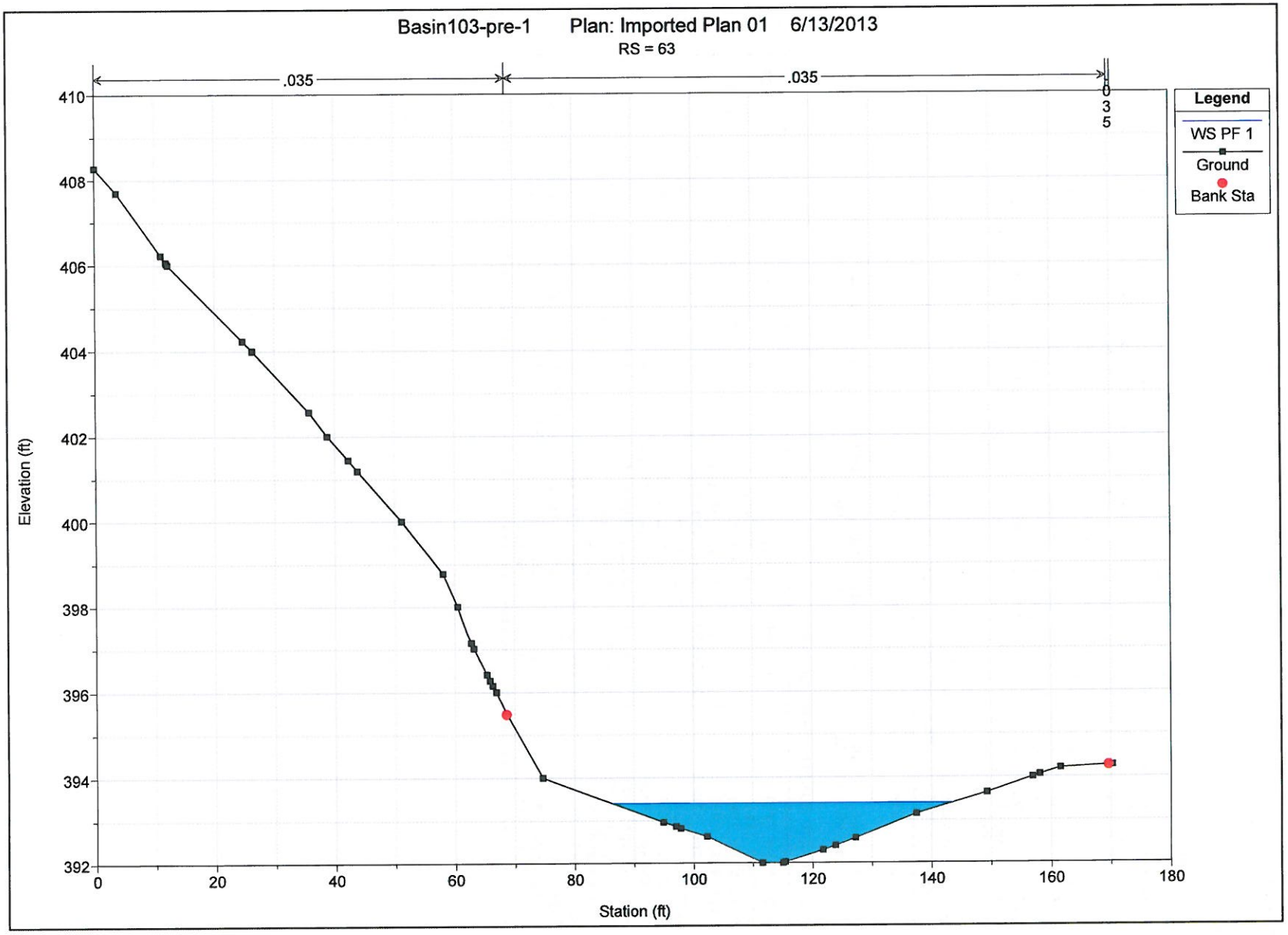
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	68.63	.035	169.62	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
68.63	169.62	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	393.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.		0.035	
W.S. Elev (ft)	393.41	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	393.53	Flow Area (sq ft)		41.61	
E.G. Slope (ft/ft)	0.030393	Area (sq ft)		41.61	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	57.40	Top Width (ft)		57.40	
Vel Total (ft/s)	5.97	Avg. Vel. (ft/s)		5.97	
Max Chl Dpth (ft)	1.41	Hydr. Depth (ft)		0.72	
Conv. Total (cfs)	1424.3	Conv. (cfs)		1424.3	
Length Wtd. (ft)		Wetted Per. (ft)		57.48	
Min Ch El (ft)	392.00	Shear (lb/sq ft)		1.37	
Alpha	1.00	Stream Power (lb/ft s)	170.21	0.00	0.00
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)		1.04	
C & E Loss (ft)	0.02	Cum SA (acres)		2.46	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 63
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
410
408
406
404
402
400
398
396
394
392
0
20
40
60
80
100
120
140
160
180

CROSS SECTION
REACH: Reach-1 RS: 62

INPUT
Description: 24
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	403.86	15.83	402.26	18.99	402	21.11	401.76	30.32	400.78
37.44	400	42.26	399.62	43.49	399.5	46.01	399.28	53.38	398.66
58.52	398.09	59.29	398	71.22	396.48	74.21	396.12	74.49	396.08
75.33	396	90.14	394.35	93.39	394	98.02	393.38	104.36	392
124.15	392	124.86	392.06	130.08	392.42	144.16	393.1	146.03	393.1
147.25	393.11	148.49	393.13	149.54	393.15	150.81	393.17	156.06	393.28
164.01	393.42	170.13	393.51	191.84	393.7	195.44	393.78	196.02	393.77
198.29	393.81	200.14	393.83	200.57	393.83	204.42	393.96	214.54	393.96
219.39	393.97	224.1	394	224.54	394	229.37	394.11	274.38	394.35
279.56	394.39	281.45	394.39	308.93	396	309.17	396.02		

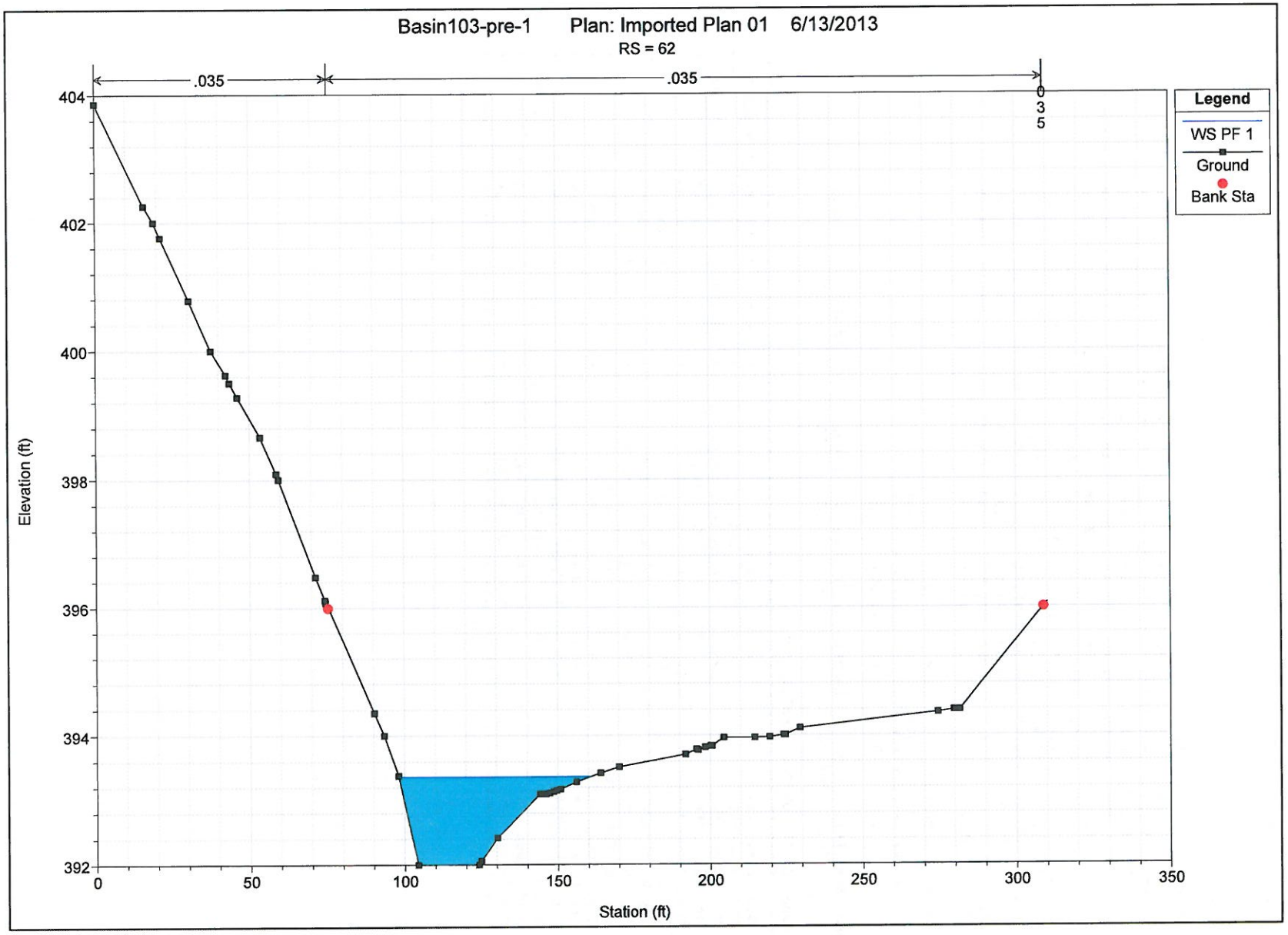
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	75.33	.035	308.93	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
75.33	308.93	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	393.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.035	
W.S. Elev (ft)	393.36	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	393.36	Flow Area (sq ft)		49.05	
E.G. Slope (ft/ft)	0.019781	Area (sq ft)		49.05	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	62.67	Top Width (ft)		62.67	
Vel Total (ft/s)	5.06	Avg. Vel. (ft/s)		5.06	
Max Chl Dpth (ft)	1.36	Hydr. Depth (ft)		0.78	
Conv. Total (cfs)	1765.4	Conv. (cfs)		1765.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		62.85	
Min Ch El (ft)	392.00	Shear (lb/sq ft)		0.96	
Alpha	1.00	Stream Power (lb/ft s)	309.17	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.99	
C & E Loss (ft)		Cum SA (acres)		2.39	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 62
.035
.035
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
404
402
400
398
396
394
392
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 61

INPUT
Description: 25
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	404.76	3.36	404	10.93	402.52	13.52	402	16.82	401.51
26.49	400	36.28	398.62	40.87	398	55.11	396	63.12	394.65
67.14	394	68.86	393.75	81.36	392	84.34	391.77	86.51	391.61
87.83	391.53	89.21	391.47	91.34	391.43	98.25	391.36	101.33	391.31
102.78	391.32	104.94	391.27	105.95	391.23	106.28	391.18	106.73	390.9
117.26	390.88	121.82	391.14	123.89	391.25	127.46	391.4	128.37	391.42
145.22	392	145.33	392	146.19	392.04	147.69	392.08	150.22	392.11
153.89	392.13	162.06	392.15	165.99	392.15	176.75	392.05	189.51	391.97
194.12	391.99	194.47	392	201.18	392.16	207.38	392.34	216.39	392.64
220.61	392.77	223.09	392.87						

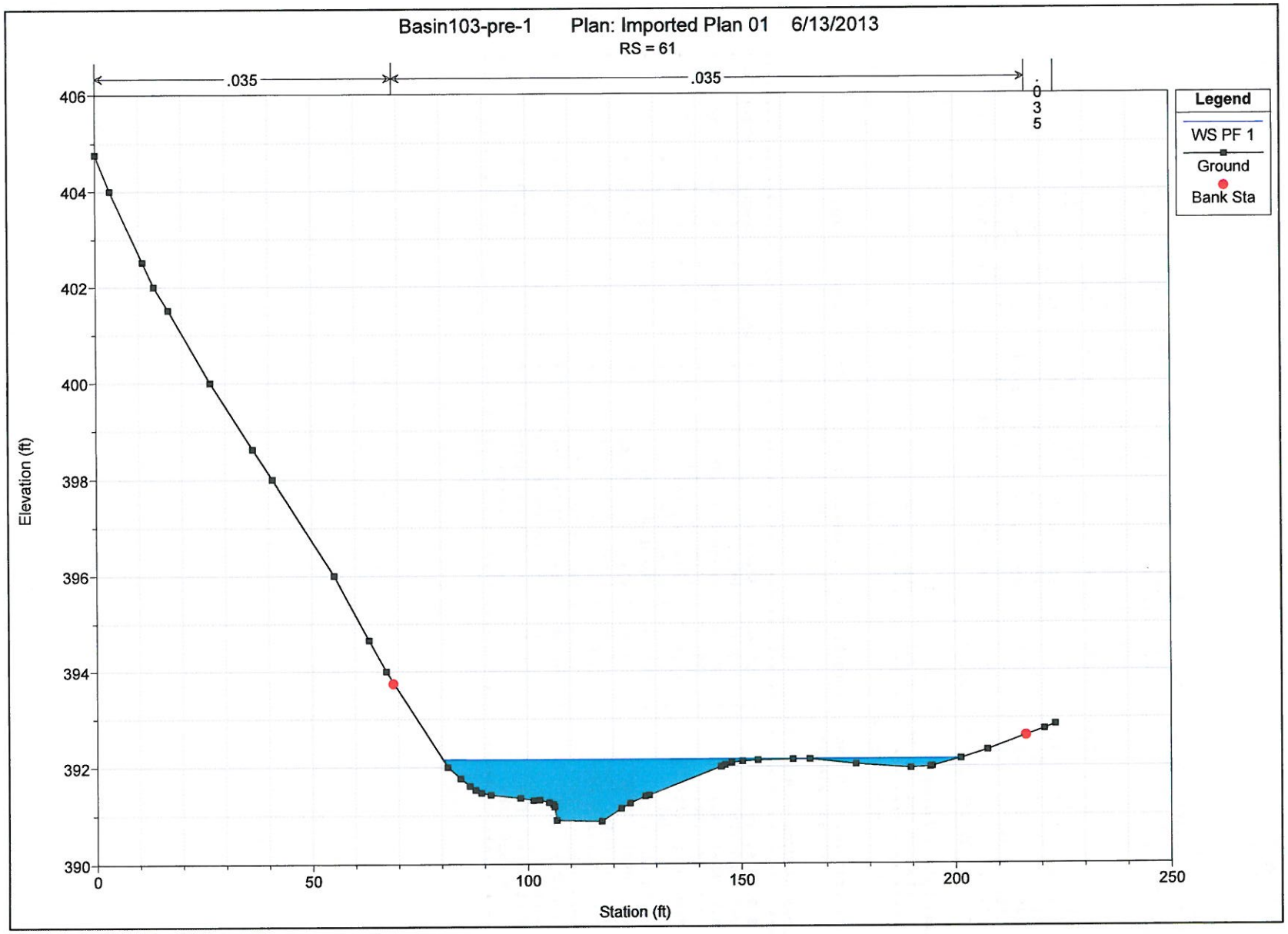
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	68.86	.035	216.39	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
68.86	216.39	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	392.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.035	
W.S. Elev (ft)	392.16	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	392.22	Flow Area (sq ft)		54.78	
E.G. Slope (ft/ft)	0.032873	Area (sq ft)		54.78	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	121.08	Top Width (ft)		121.08	
Vel Total (ft/s)	4.53	Avg. Vel. (ft/s)		4.53	
Max Chl Dpth (ft)	1.28	Hydr. Depth (ft)		0.45	
Conv. Total (cfs)	1369.5	Conv. (cfs)		1369.5	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		121.22	
Min Ch El (ft)	390.88	Shear (lb/sq ft)		0.93	
Alpha	1.00	Stream Power (lb/ft s)	223.09	0.00	0.00
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)		0.93	
C & E Loss (ft)	0.02	Cum SA (acres)		2.29	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 61
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
406
404
402
400
398
396
394
392
390
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 60

INPUT
Description: 26
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	404.13	.49	404	6.8	402.21	7.55	402	11.17	400.95
14.53	400	25.34	398.13	26.08	398	26.32	397.96	34.86	396.47
41.72	395.15	48.08	394	55.48	392.63	59.31	392	65.33	391.02
72.04	390	75.03	389.89	78.48	389.79	80.95	389.77	82.03	389.75
82.76	389.72	84.18	389.67	92.11	389.5	94.33	389.47	97.55	389.45
100.65	389.45	102.43	389.47	104.29	389.55	115.29	389.92	118.24	390
120.51	390.08	128.57	390.31	129.37	390.31	140.62	390.59	143.92	390.61
164.37	390.44	178.43	390.57	179.91	390.58	182.15	390.6	184.82	390.61
186.55	390.63	190.27	390.66	190.63	390.66	195.34	390.63	196.12	390.63
199.74	390.64	201.56	390.64	202.28	390.63	203.48	390.63	225.04	391.43
229.11	391.42	232.55	391.43	234.62	391.42	256.19	391.08	258.11	391.08
260	391.1	262.75	391.15	263.3	391.15	263.9	391.14	266.93	390.98
267.68	390.96	268.35	390.95	269.74	390.95	270.79	390.97	273.67	391.03
275.83	391.08	311.84	392	318.65	392.6	339.99	394	345.34	394.53

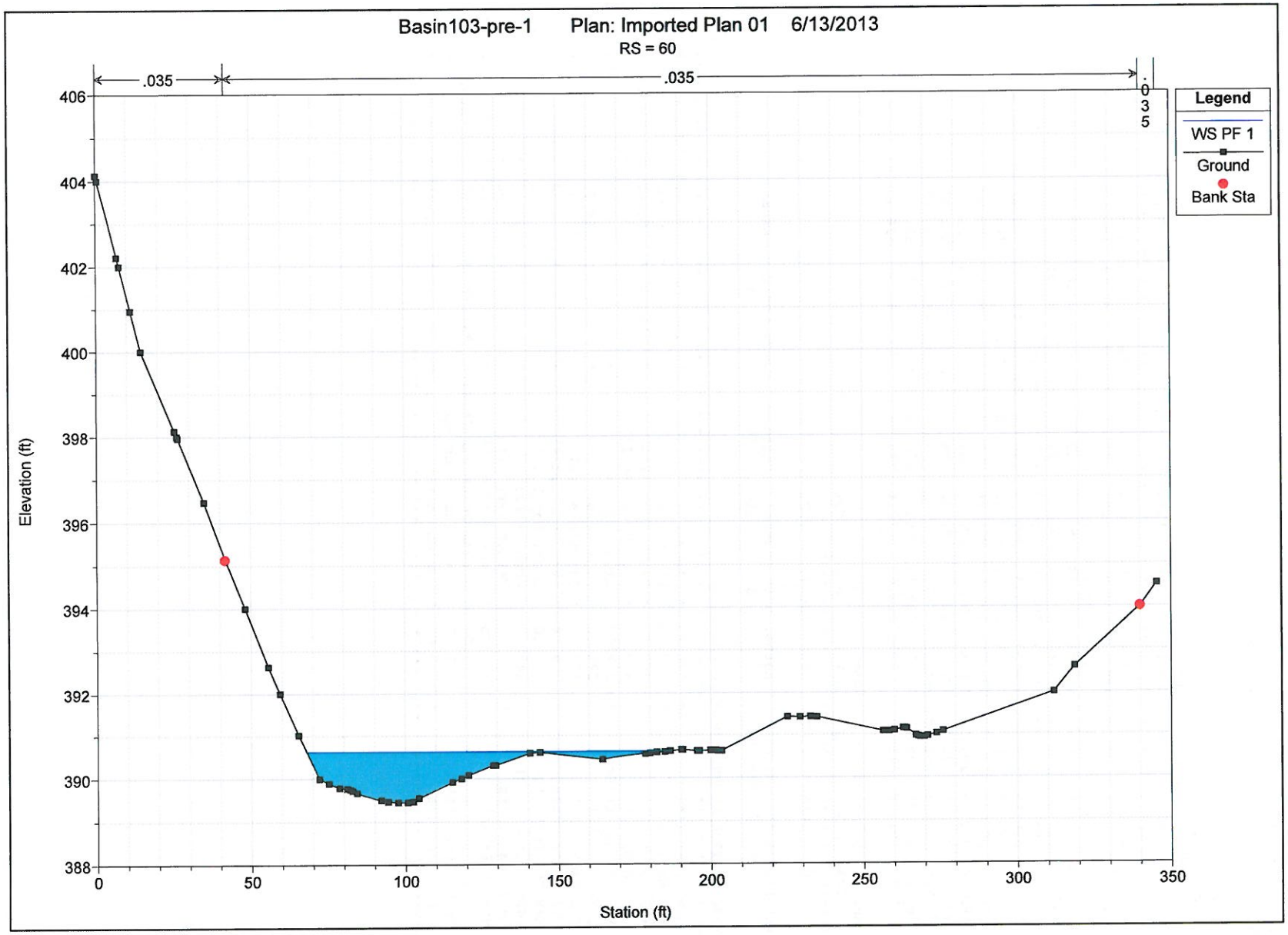
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	41.72	.035	339.99	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
41.72	339.99	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	390.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.035	
W.S. Elev (ft)	390.63	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	390.69	Flow Area (sq ft)		57.24	
E.G. Slope (ft/ft)	0.029217	Area (sq ft)		57.24	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	123.76	Top Width (ft)		123.76	
Vel Total (ft/s)	4.34	Avg. Vel. (ft/s)		4.34	
Max Chl Dpth (ft)	1.18	Hydr. Depth (ft)		0.46	
Conv. Total (cfs)	1452.7	Conv. (cfs)		1452.7	
Length Wtd. (ft)		Wetted Per. (ft)		123.84	
Min Ch El (ft)	389.45	Shear (lb/sq ft)		0.84	
Alpha	1.00	Stream Power (lb/ft s)	345.34	0.00	0.00
Frctn Loss (ft)	1.55	Cum Volume (acre-ft)		0.86	
C & E Loss (ft)	0.01	Cum SA (acres)		2.15	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 60
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
406
404
402
400
398
396
394
392
390
388
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 59

INPUT
Description: 27
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	400.3	1.2	400	3.48	399.39	9.35	398	11.1	397.54
17.35	396.15	17.73	396.06	18.01	396	28.09	394.55	30.79	394
37.04	392.59	39.71	392	42.75	391.27	44.72	390.84	48.78	390
50.11	389.94	55.28	389.72	59.48	389.51	61	389.47	68.14	389.08
74.57	388.75	75.42	388.7	76.33	388.65	79.84	388.51	82.03	388.43
82.5	388.42	82.82	388.41	83.39	388.41	83.64	388.4	83.8	388.39
84.13	388.38	85.95	388.34	86.46	388.34	87.19	388.33	87.9	388.33
88.31	388.34	88.53	388.34	88.74	388.35	90.1	388.4	91.26	388.44
92.39	388.47	95.97	388.98	96.3	389.09	97.41	389.21	99.54	389.42
100.82	389.55	103.36	389.75	108.06	390	108.15	390	110.87	390.04
113.83	390.05	119.5	390.02	121.75	390	126.34	389.97	126.52	389.96
132.64	389.89	133.47	389.87	136.6	389.83	172.16	389.99	174.75	389.99
193.01	389.91	195.18	389.91	205.45	389.93	208.55	389.93	214.6	389.85
217.1	389.84	219.43	389.82	222.58	389.8	233.31	389.79	238.52	389.76
242.68	389.76	246.58	389.81	254.93	389.96	255.86	390	259.99	390.14
300.4	391.6	304.3	391.85	307	392				

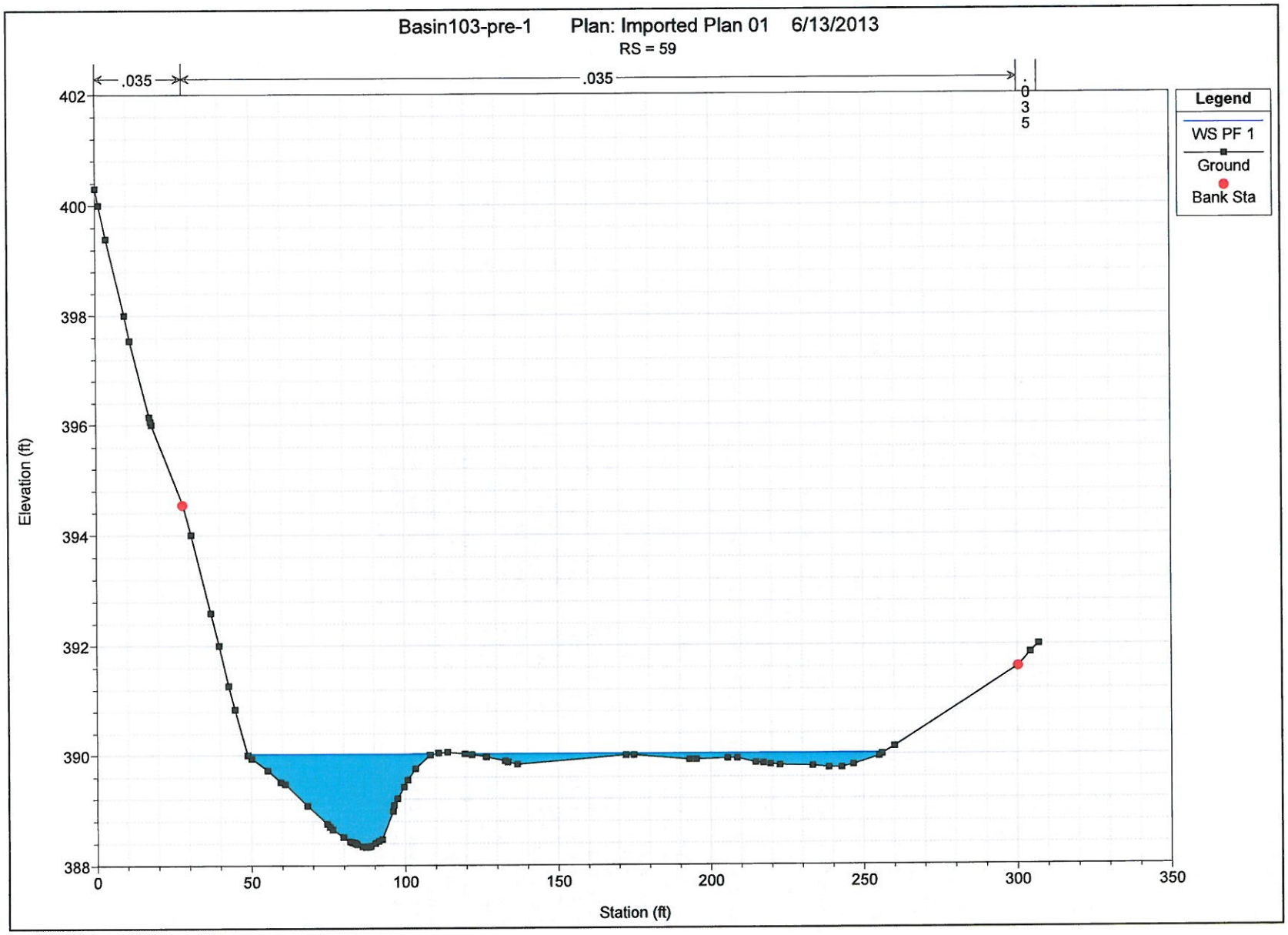
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	28.09	.035	300.4	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
28.09	300.4	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	390.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.035	
W.S. Elev (ft)	390.03	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	390.03	Flow Area (sq ft)		71.98	
E.G. Slope (ft/ft)	0.025709	Area (sq ft)		71.98	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	199.37	Top Width (ft)		199.37	
Vel Total (ft/s)	3.45	Avg. Vel. (ft/s)		3.45	
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)		0.36	
Conv. Total (cfs)	1548.6	Conv. (cfs)		1548.6	
Length Wtd. (ft)		Wetted Per. (ft)		199.51	
Min Ch El (ft)	388.33	Shear (lb/sq ft)		0.58	
Alpha	1.00	Stream Power (lb/ft s)	307.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.79	
C & E Loss (ft)		Cum SA (acres)		1.96	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 59
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
402
400
398
396
394
392
390
388
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 58

INPUT
Description: 28
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	394.52	4.18	394	4.46	393.97	4.6	393.95	9.76	393.29
14.39	392.84	15.19	392.74	20.06	392	25.12	391.31	32.79	390
42.38	389.21	48.32	388.67	51.3	388.42	56.09	388	78.16	388
93.52	388.84	95.76	388.94	98.32	389.03	99.11	389.06	99.6	389.08
103.64	389.36	104.57	389.36	105.09	389.35	105.16	389.35	105.42	389.34
105.65	389.35	107.08	389.35	108.44	389.36	204.61	389.32	206.68	389.29
259.75	389.66	270.51	389.85	277.47	390	289.03	390.62	294.29	390.82

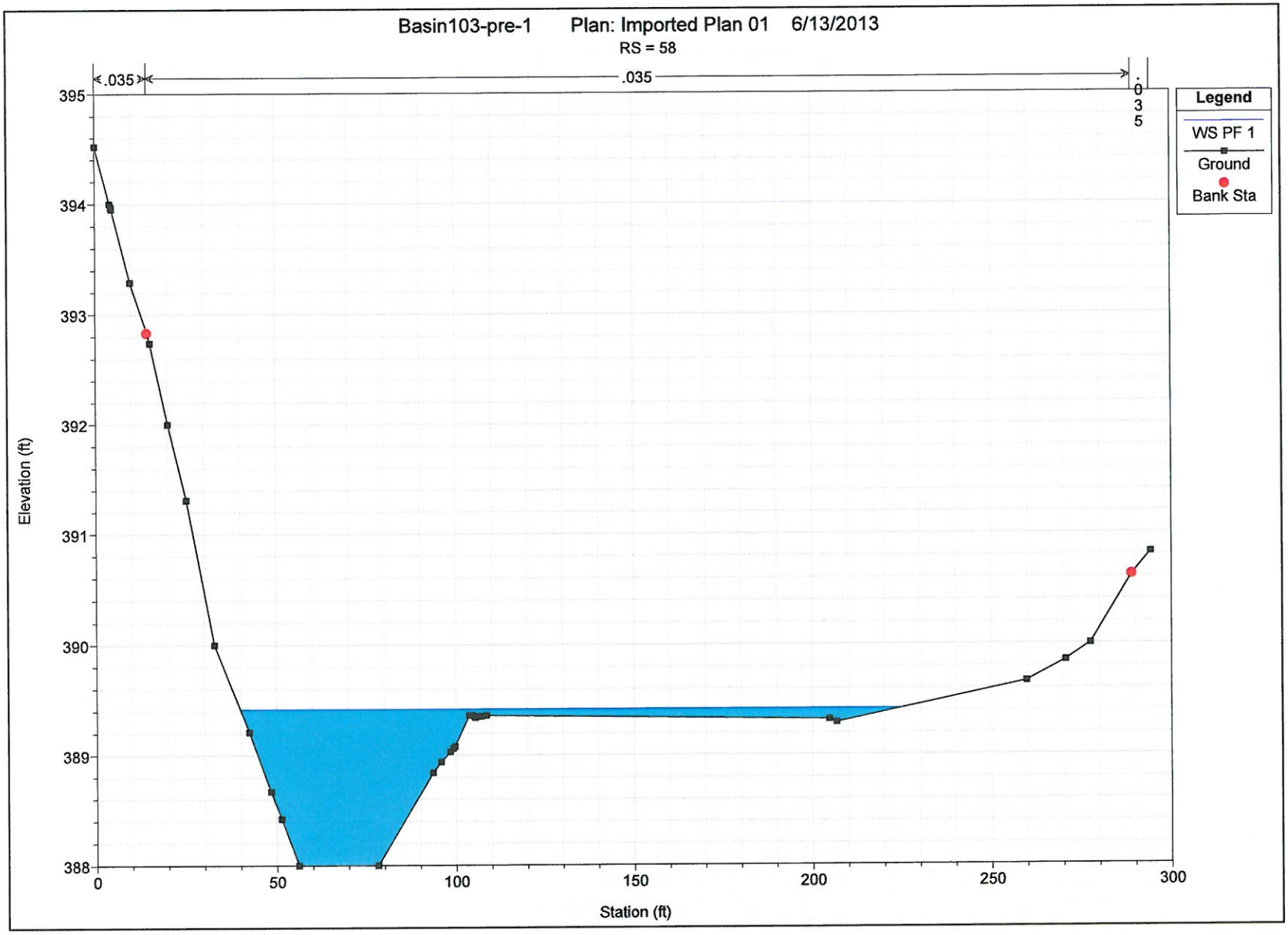
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	14.39	.035	289.03	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
14.39	289.03	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	389.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.035	
W.S. Elev (ft)	389.42	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	389.42	Flow Area (sq ft)		70.69	
E.G. Slope (ft/ft)	0.024710	Area (sq ft)		70.69	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	185.01	Top Width (ft)		185.01	
Vel Total (ft/s)	3.51	Avg. Vel. (ft/s)		3.51	
Max Chl Dpth (ft)	1.42	Hydr. Depth (ft)		0.38	
Conv. Total (cfs)	1579.6	Conv. (cfs)		1579.6	
Length Wtd. (ft)		Wetted Per. (ft)		185.11	
Min Ch El (ft)	388.00	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)	294.29	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.71	
C & E Loss (ft)		Cum SA (acres)		1.74	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 58
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
395
394
393
392
391
390
389
388
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 57

INPUT
Description: 29
Station Elevation Data num= 103

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	396.17	.43	396.1	1	396	1.96	395.8	11.1	394
20.42	392.19	21.47	392	27.88	390.79	32.16	390	38.71	389.67
44.91	389.38	59.18	388.74	64.27	388.52	65.15	388.48	65.71	388.47
66.65	388.44	67.04	388.43	67.29	388.42	67.77	388.4	70.68	388.3
71.46	388.29	72.14	388.28	72.51	388.27	72.7	388.28	72.88	388.28
73.97	388.3	75.51	388.32	77.4	388.57	77.55	388.63	78.03	388.67
78.85	388.73	79.3	388.77	80.07	388.81	81.3	388.81	83.14	388.86
84.51	388.83	88.2	389.05	89.63	388.98	103.53	389.7	106.42	389.67
109.33	389.62	109.41	389.62	112.08	389.56	112.41	389.55	113.61	389.52
119.55	389.52	123.04	389.51	145.54	389.3	184.47	388.54	188.65	388.53
210.52	389.66	258.29	388.04	260.54	388.04	263.99	388	267.36	387.98
272.03	387.98	276.13	387.99	278.09	388	281.05	388.05	286.75	388.16
290.91	388.31	292.84	388.44	293.77	388.5	294.91	388.47	296.67	388.39
298.62	388.35	300.15	388.37	301.14	388.43	301.83	388.46	302.69	388.43
304.41	388.39	321.26	388.32	326.37	388.35	326.79	388.36	331.51	388.42
332.39	388.43	336.61	388.52	340.4	388.61	344.16	388.67	348.61	388.65
358.89	388.54	361.99	388.58	373.68	388.53	375.2	388.53	375.51	388.54
376.64	388.58	397.1	388.98	400.3	389.13	403.22	389.1	404.3	389.1
407.67	389.27	408.37	389.29	416.96	389.68	417.27	389.69	418.24	389.72
422.43	389.98	422.69	390	442.13	391.16	447.59	391.41	451.05	391.8
452.93	392	460	393.44	463.1	394				

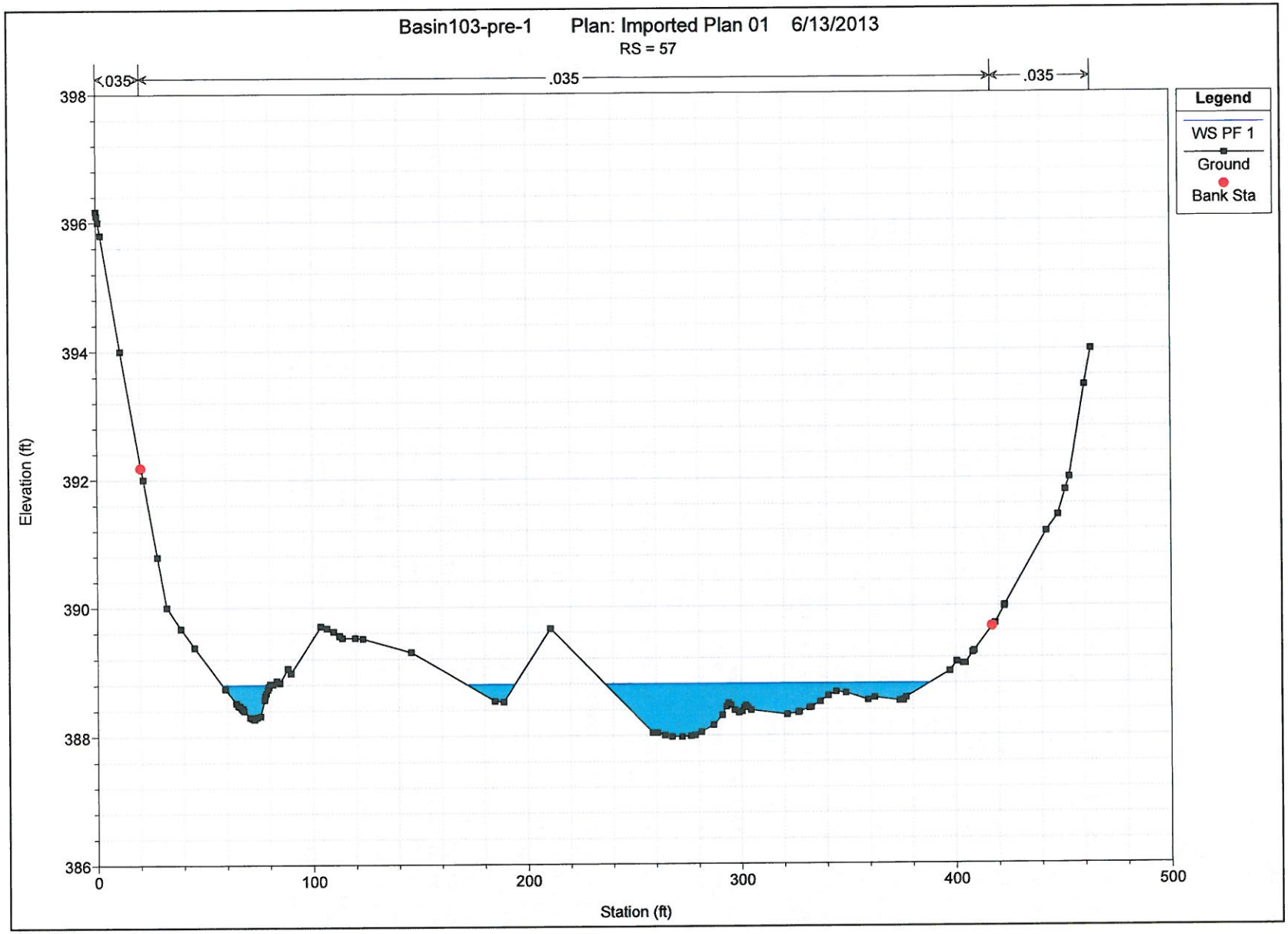
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	20.42	.035	416.96	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
20.42	416.96	103.95	50	421.91	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	388.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.035	
W.S. Elev (ft)	388.80	Reach Len. (ft)	103.95	50.00	421.91
Crit W.S. (ft)	388.80	Flow Area (sq ft)		72.31	
E.G. Slope (ft/ft)	0.024907	Area (sq ft)		72.31	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	197.00	Top Width (ft)		197.00	
Vel Total (ft/s)	3.43	Avg. Vel. (ft/s)		3.43	
Max Chl Dpth (ft)	0.82	Hydr. Depth (ft)		0.37	
Conv. Total (cfs)	1573.3	Conv. (cfs)		1573.3	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		197.09	
Min Ch El (ft)	387.98	Shear (lb/sq ft)		0.57	
Alpha	1.00	Stream Power (lb/ft s)	463.10	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.62	
C & E Loss (ft)		Cum SA (acres)		1.52	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 57
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
398
396
394
392
390
388
386
0
100
200
300
400
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 56

INPUT
Description: 30
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	401.38	6.21	400	6.44	399.95	7.21	399.76	12.01	398.54
13.98	398	14.78	397.76	21.16	396	24.2	395.43	32.48	394
42.18	392.53	45.77	392	52.7	391.12	60.23	390	69.86	389.16
75.83	388.58	80.48	388.14	81.86	388	110.45	388	117.28	388.31
119.55	388.42	122.32	388.48	126.78	388.49	132.17	388.45	138.15	388.3
144.86	388.07	146.56	388	202.6	388	202.9	388.01	207.26	388.13
212.91	388.22	218.76	388.27	224.22	388.21	229.47	388.08	231.54	388
234.17	387.91	235.25	387.89	240.54	387.68	243.11	387.63	248.6	387.39
252.05	387.23	253.99	387.16	261.13	387.01	267.6	386.91	272.04	386.8
274.87	386.7	276.42	386.64	277.33	386.61	278.25	386.59	282.14	386.59
284.79	386.61	286.08	386.64	286.95	386.68	287.66	386.71	291.03	386.69
310.43	387.1	310.95	387.1	311.58	387.08	312.49	387.08	312.92	387.09
313.4	387.09	313.67	387.08	314.33	387.08	315.2	387.09	316.04	387.09
317.81	387.11	318.93	387.12	364.6	386.73	365.8	386.77	394.26	387.42
397.05	387.5	399.1	387.55	400.58	387.57	401.65	387.58	404.03	387.58
413.08	387.84	413.71	387.84	417.07	387.93	417.23	387.93	419.86	388
428.87	388.33	430.83	388.46	436.66	388.7				

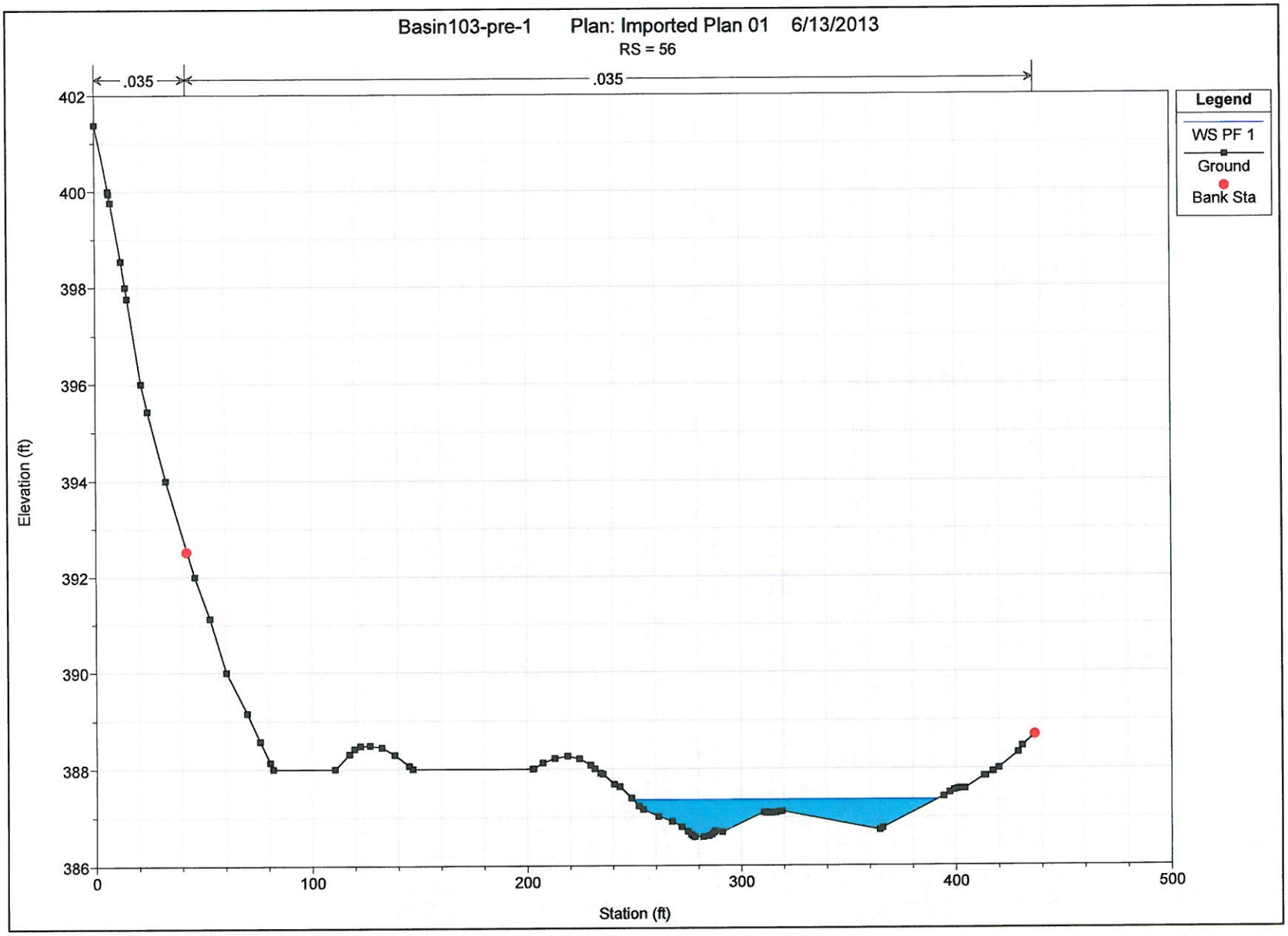
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	42.18	.035	436.66	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
42.18	436.66	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	387.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.035	
W.S. Elev (ft)	387.36	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	387.39	Flow Area (sq ft)		60.35	
E.G. Slope (ft/ft)	0.029515	Area (sq ft)		60.35	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	142.44	Top Width (ft)		142.44	
Vel Total (ft/s)	4.11	Avg. Vel. (ft/s)		4.11	
Max Chl Dpth (ft)	0.77	Hydr. Depth (ft)		0.42	
Conv. Total (cfs)	1445.3	Conv. (cfs)		1445.3	
Length Wtd. (ft)		Wetted Per. (ft)		142.47	
Min Ch El (ft)	386.59	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)	436.66	0.00	0.00
Frctn Loss (ft)	1.35	Cum Volume (acre-ft)		0.55	
C & E Loss (ft)	0.01	Cum SA (acres)		1.33	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 56
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
402
400
398
396
394
392
390
388
386
0
100
200
300
400
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 55

INPUT
Description: 31
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	404.14	.56	404	2.33	403.58	6.05	402.67	8.76	402
9.98	401.73	17.35	400	20.29	399.27	25.59	398	32.18	396.45
34.16	396	36.1	395.66	44.98	394	49.41	393.31	58.43	392
65.47	390.93	72.31	390	90.18	388.94	95.86	388.59	104.12	388
110.86	388	117.67	387.38	140.11	387.36	142.39	387.55	149.34	388
152.02	388.34	152.53	388.39	153.54	388.41	155.65	388.4	159.36	388.35
169.46	388.12	212.78	386.96	224.57	386.6	229.47	386.47	233.17	386.4
235.27	386.38	237.02	386.38	239	386.35	241.02	386.31	249.64	386.02
251.04	386.01	255.54	386.02	264.56	386	266.27	385.96	268.92	385.86
268.96	385.79	274.36	385.62	280.46	385.57	283.92	385.56	288.06	385.59
295.39	385.66	297.44	385.7	298.75	385.74	299.66	385.79	302.28	386
302.9	386.08	304.26	386.14	307.5	386.18	313.19	386.2	318.83	386.19
321.93	386.19	324.25	386.15	339.68	385.78	344.19	385.68	345.81	385.65
346.9	385.65	349.8	385.66	351.84	385.66	353.64	385.63	354.57	385.58
354.73	385.54	354.94	385.52	355.83	385.54	357.83	385.58	360.95	385.63
364.38	385.66	367.28	385.68	384.32	385.76	390.86	385.78	394.78	385.78
402.16	385.74	406.24	385.74	411.22	385.8	417.86	385.95	419.79	386
430.01	386.37	444.8	386.82						

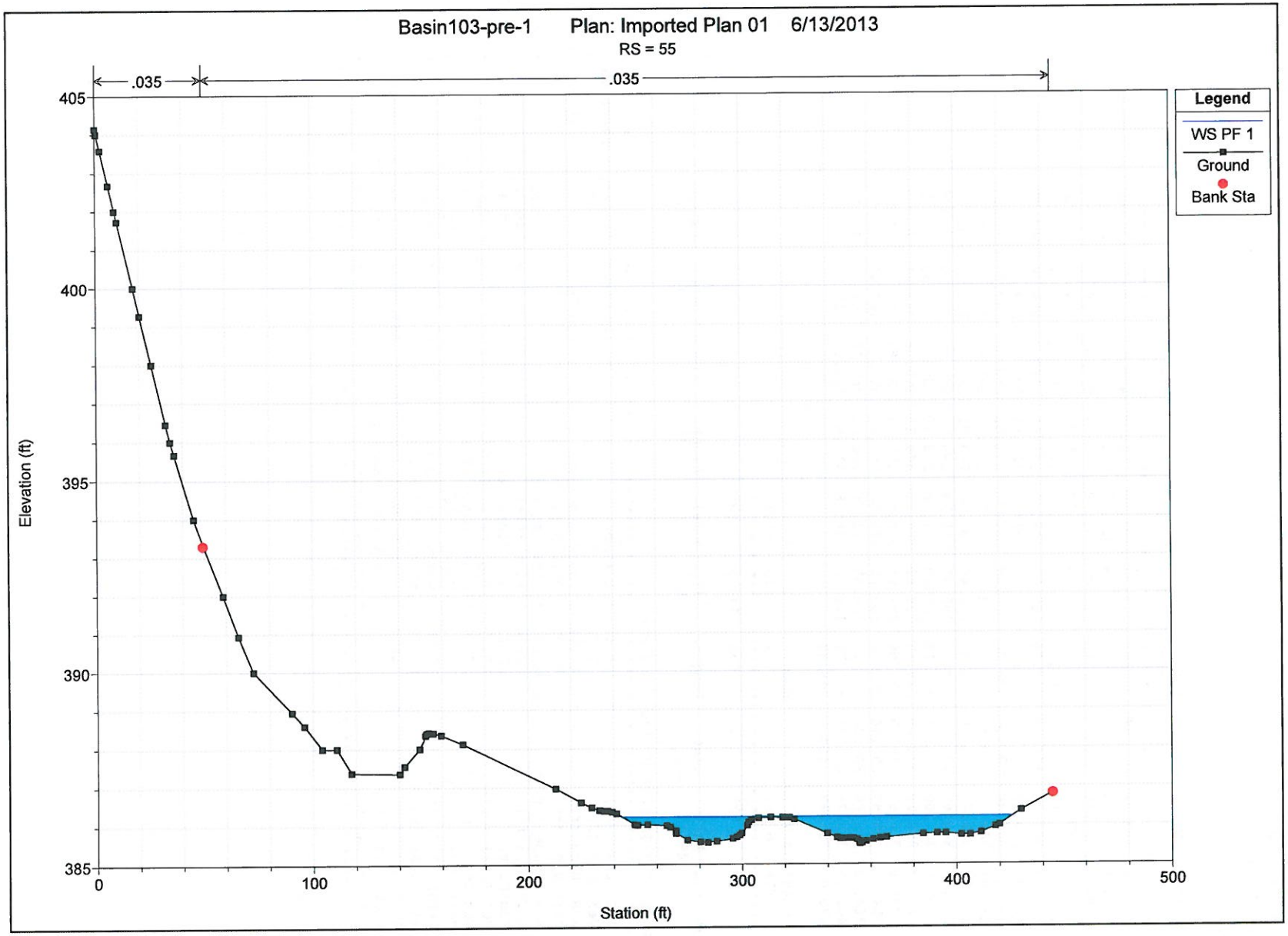
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	49.41	.035	444.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
49.41	444.8	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.035	
W.S. Elev (ft)	386.22	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	386.22	Flow Area (sq ft)		69.59	
E.G. Slope (ft/ft)	0.025552	Area (sq ft)		69.59	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	182.43	Top Width (ft)		182.43	
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)		3.57	
Max Chl Dpth (ft)	0.70	Hydr. Depth (ft)		0.38	
Conv. Total (cfs)	1553.3	Conv. (cfs)		1553.3	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		182.51	
Min Ch El (ft)	385.52	Shear (lb/sq ft)		0.61	
Alpha	1.00	Stream Power (lb/ft s)	444.80	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.47	
C & E Loss (ft)		Cum SA (acres)		1.14	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 55
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
405
400
395
390
385
0
100
200
300
400
500
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 54

INPUT
Description: 32
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	402.46	2.03	402	9.61	400.38	11.23	400	16.66	398.99
21.53	398	28.87	396.75	32.96	396	36.5	395.61	49.87	394
64.29	392.38	68.72	392	77.34	391.49	80.07	391.36	104.1	390
111.14	389.48	132.07	388	135.64	387.73	140.26	387.39	141.73	387.3
151.97	386.73	170.06	386.03	170.33	386.02	170.81	386	191.74	386
192.15	386.03	195.46	386.17	207.7	386.53	208.34	386.55	209.32	386.57
210.65	386.58	216.32	386.46	234.84	386.11	239.97	386	248.71	385.7
256.17	385.42	262	385.17	265.4	385.03	266.28	384.99	267.43	384.93
267.87	384.91	268.96	384.93	269.83	384.92	270.62	384.9	272.06	384.84
273.15	384.83	274.51	384.83	275.25	384.84	275.81	384.85	276.18	384.85
276.41	384.86	276.58	384.87	277.06	384.91	277.35	384.92	277.88	384.94
278.95	384.96	280.66	384.96	320.11	385.19	325.34	385.19	351.62	384.77
363.23	384.51	366.01	384.46	374.16	384.4	383.7	384.29	388.48	384.25
394.34	384.28	395.9	384.28	400.55	384.27	402.32	384.27	403.08	384.28
404.1	384.3	405.74	384.34	410.18	384.36	412.34	384.41	415.79	384.44
418.58	384.51	425.82	384.61	429.83	384.65	433.56	384.65	436.5	384.62
438.01	384.6	438.54	384.58	438.79	384.57	439.25	384.55	439.58	384.56
449.38	384.36	460.83	384.1	463.6	384	465.81	383.97	477.33	383.75
478.75	383.75	483.81	383.83	491.69	383.97	492.46	383.98	492.9	384
492.96	384.01	493.03	384.02	496.54	384.43	509.67	386		

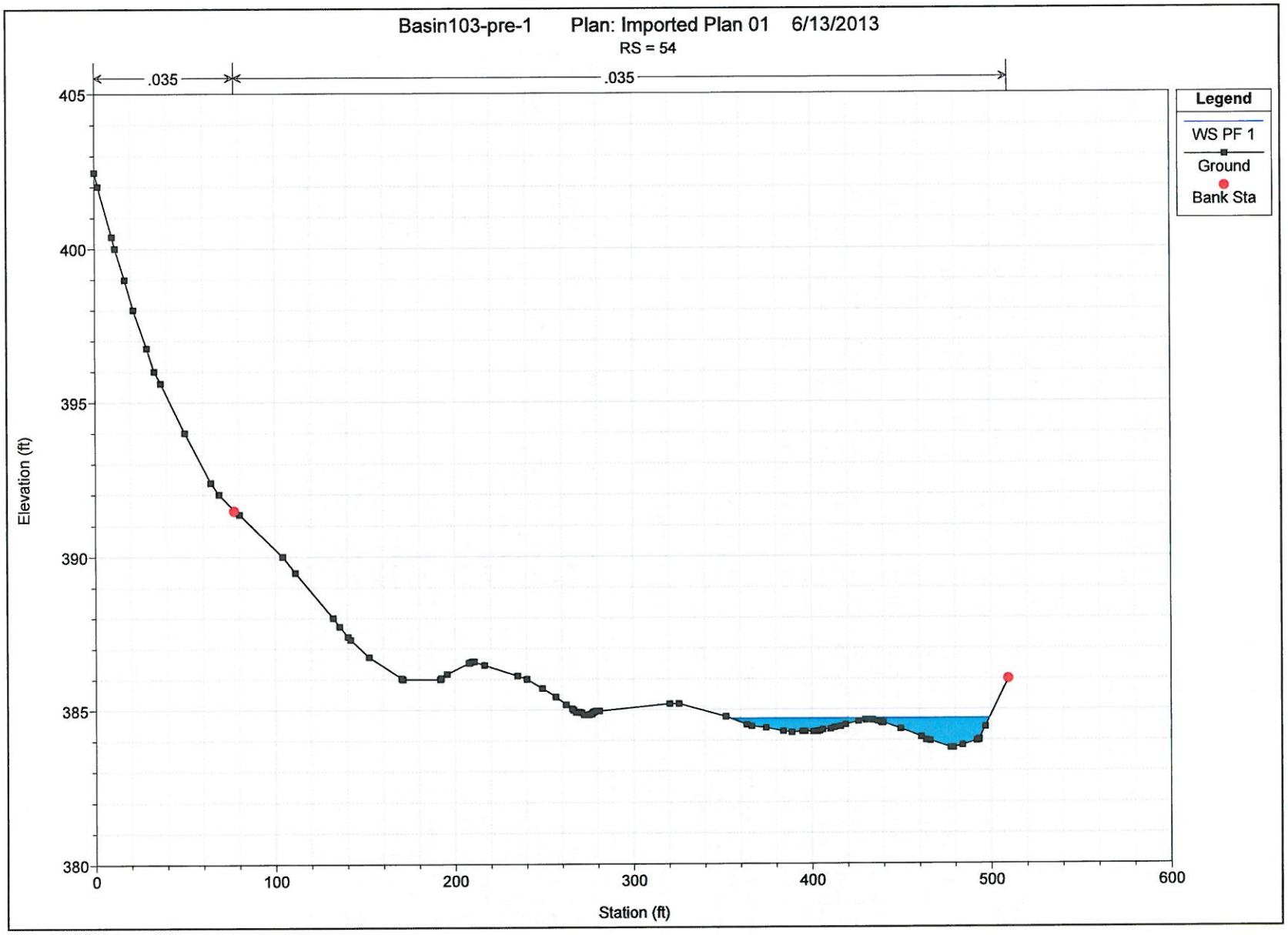
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	77.34	.035	509.67	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
77.34	509.67	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	384.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.035	
W.S. Elev (ft)	384.71	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	384.76	Flow Area (sq ft)		58.90	
E.G. Slope (ft/ft)	0.032584	Area (sq ft)		58.90	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	144.33	Top Width (ft)		144.33	
Vel Total (ft/s)	4.22	Avg. Vel. (ft/s)		4.22	
Max Chl Dpth (ft)	0.96	Hydr. Depth (ft)		0.41	
Conv. Total (cfs)	1375.6	Conv. (cfs)		1375.6	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		144.39	
Min Ch El (ft)	383.75	Shear (lb/sq ft)		0.83	
Alpha	1.00	Stream Power (lb/ft s)	509.67	0.00	0.00
Frctn Loss (ft)	1.44	Cum Volume (acre-ft)		0.40	
C & E Loss (ft)	0.01	Cum SA (acres)		0.95	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 54
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
405
400
395
390
385
380
0
100
200
300
400
500
600
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 53

INPUT
Description: 33
Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	400.83	4.6	400	16.99	398.47	20	398	25.61	397.26
36.75	396	40.26	395.79	41.05	395.74	42.74	395.62	57.61	394.72
62.67	394.36	63.61	394.29	68.75	394	81.5	393.1	84.93	392.81
98.06	392	102.91	391.6	103.12	391.58	106.71	391.33	108.16	391.2
116.62	390.54	122.4	390	133.76	389.02	144.43	388	156.37	387.42
183.65	386	185.41	385.9	187.53	385.71	188.67	385.68	190.97	385.64
193.58	385.61	195.75	385.58	196.88	385.56	202.34	385.5	211.14	385.55
211.93	385.56	213.82	385.56	228.4	385.07	243.65	385.5	268.98	384.78
293.64	384.21	294.96	384.2	316.72	384.25	321.67	384.22	326.53	384.17
332.38	384.09	337.04	384	342.83	383.93	343.54	383.92	344.12	383.92
344.82	383.93	346.96	383.94	351.74	383.97	357.7	383.97	360.61	383.91
369.16	383.77	376.7	383.58	385.17	383.31	388.32	383.27	400.97	383.14
403.43	383.11	406.1	383.11	410.57	383.13	417.69	383.18	441.72	382.9
444.91	382.82	447.24	382.82	457.8	382.5	459.07	382.49	464.08	382.33
464.54	382.32	470.09	382.15	470.24	382.15	470.31	382.14	471.4	382.13
473.54	382.12	476.59	382.04	477.2	382.07	482.44	382.14	483.95	382.23
490.88	382.5	495.62	382.73	502.1	383.13	505.16	383.31	515.85	384

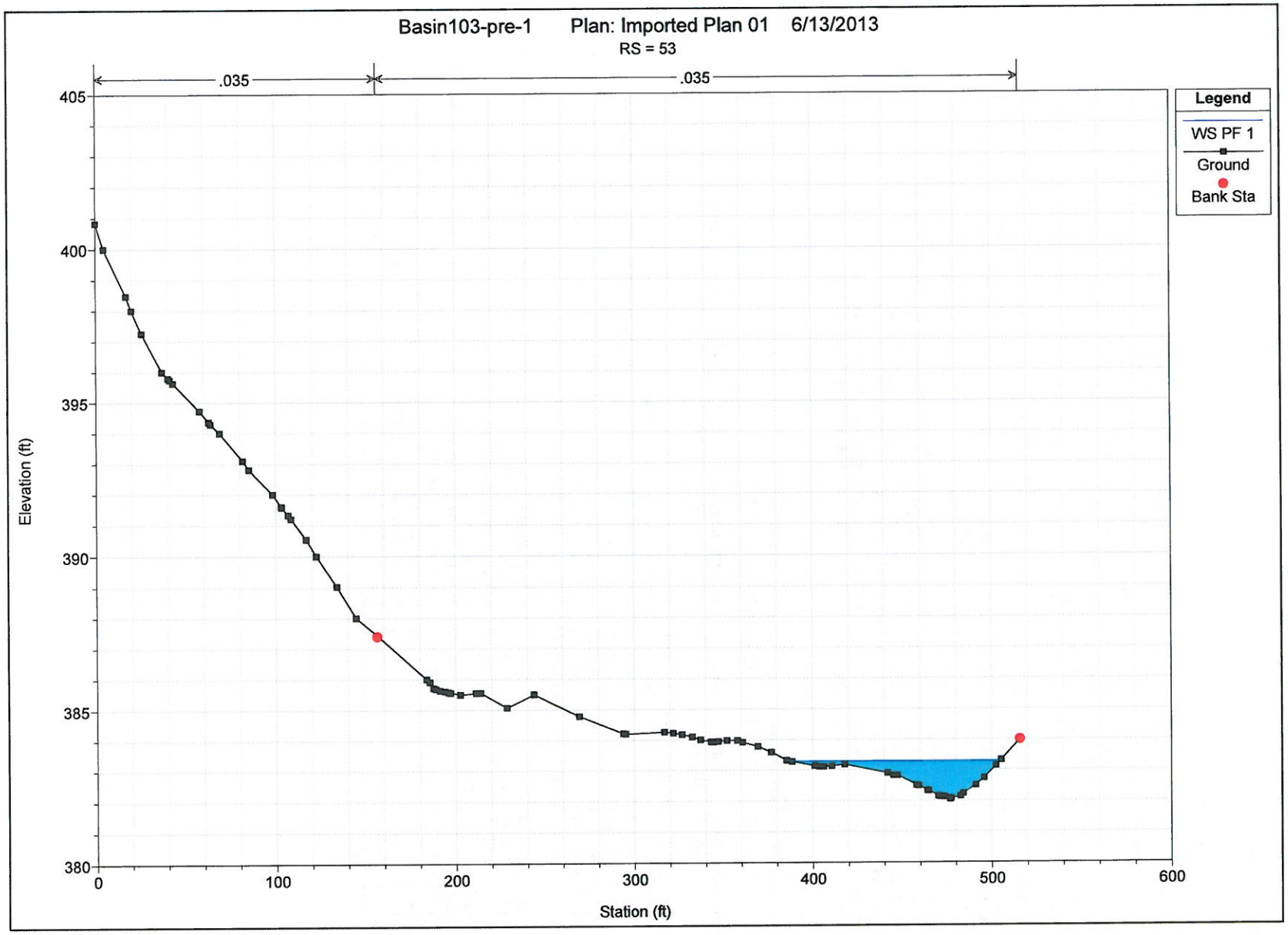
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	156.37	.035	515.85	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
156.37	515.85	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	383.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.035	
W.S. Elev (ft)	383.29	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	383.30	Flow Area (sq ft)		59.04	
E.G. Slope (ft/ft)	0.024746	Area (sq ft)		59.04	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	118.08	Top Width (ft)		118.08	
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)		4.21	
Max Chl Dpth (ft)	1.25	Hydr. Depth (ft)		0.50	
Conv. Total (cfs)	1578.4	Conv. (cfs)		1578.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		118.13	
Min Ch El (ft)	382.04	Shear (lb/sq ft)		0.77	
Alpha	1.00	Stream Power (lb/ft s)	515.85	0.00	0.00
Frctn Loss (ft)	1.41	Cum Volume (acre-ft)		0.33	
C & E Loss (ft)	0.00	Cum SA (acres)		0.80	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 53
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
405
400
395
390
385
380
0
100
200
300
400
500
600
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 52

INPUT
Description: 34
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	398.21	1.18	398	10.16	396.65	13.83	396	27.29	394.57
28.55	394.44	28.77	394.42	28.99	394.41	30.56	394.31	32.96	394
41.11	393.32	46.71	393.12	48.25	393.04	52.85	392.93	54.69	392.83
58.97	392.74	67.92	392.22	68.35	392.2	72.49	392	74.79	391.91
75.65	391.85	84.94	391.47	85.8	391.39	89.2	391.28	89.83	391.23
90.26	391.21	98.66	391	99.1	390.99	104.03	390.93	104.65	390.91
108.9	390.8	113.22	390.52	113.65	390.48	118.48	390	130.12	388.93
130.6	388.91	132.22	388.79	136.66	388.54	148.63	388	150.52	387.94
150.84	387.92	152.41	387.83	170.24	386.97	171.14	386.89	172.58	386.78
174.86	386.65	178.12	386.43	184.96	386	191.83	385.84	213.74	384.66
220.13	384.36	225.19	384	253.18	384	253.48	384.01	254.66	384.04
256.72	384.06	260.51	384.06	266.64	384.02	277.71	383.9	284	383.82
290.7	383.71	294.28	383.66	297.84	383.62	300.83	383.57	302.82	383.53
412.83	381.04	414.83	381.01	415.3	381.03	416.17	381.03	418.21	380.97
419.71	380.92	420.6	380.9	421.32	380.88	444.16	380.13	454.64	380
483.03	379.83	485.57	379.8	487.35	379.76	488.79	379.7	490.39	379.66
492.73	379.63	560.9	379.22	585.46	379.52	595.87	379.58	599.82	379.61
602.66	379.66	602.95	379.67	618.4	380	623.29	380.91	628.43	382

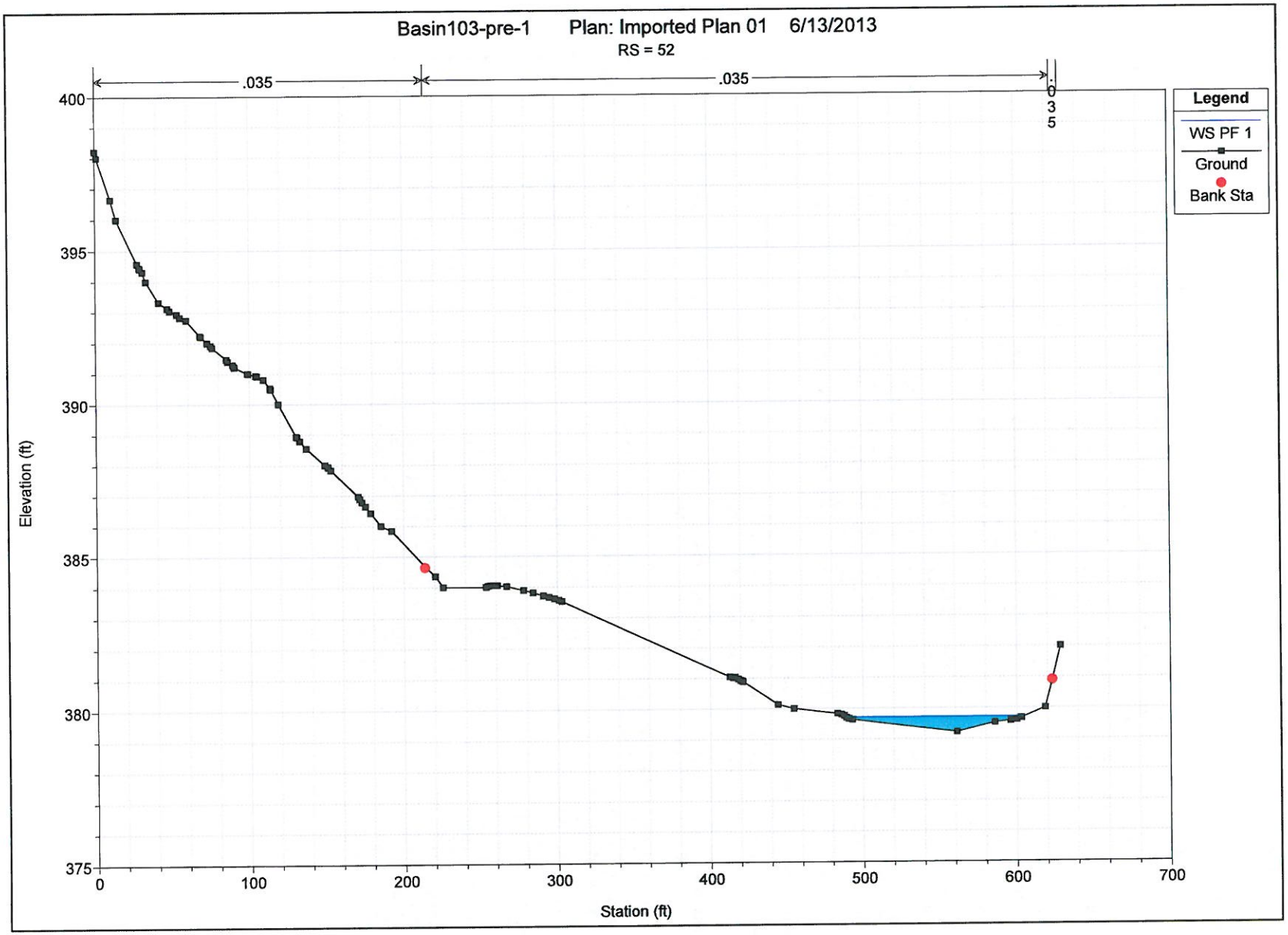
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	213.74	.035	623.29	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
213.74	623.29	59.3	50	316.33	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	380.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.		0.035	
W.S. Elev (ft)	379.71	Reach Len. (ft)	59.30	50.00	316.33
Crit W.S. (ft)	379.98	Flow Area (sq ft)		30.68	
E.G. Slope (ft/ft)	0.215164	Area (sq ft)		30.68	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	116.47	Top Width (ft)		116.47	
Vel Total (ft/s)	8.09	Avg. Vel. (ft/s)		8.09	
Max Chl Dpth (ft)	0.49	Hydr. Depth (ft)		0.26	
Conv. Total (cfs)	535.3	Conv. (cfs)		535.3	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		116.47	
Min Ch El (ft)	379.22	Shear (lb/sq ft)		3.54	
Alpha	1.00	Stream Power (lb/ft s)	628.43	0.00	0.00
Frctn Loss (ft)	2.76	Cum Volume (acre-ft)		0.28	
C & E Loss (ft)	0.07	Cum SA (acres)		0.67	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 52
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
400
395
390
385
380
375
0
100
200
300
400
500
600
700
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 51

INPUT
Description: 35
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	402.41	2.47	402	12.18	400.19	13.02	400.03	13.2	400
28.62	398.09	29.71	398	39.93	397.1	43.5	396.85	53.31	396.55
57.61	396.35	58.44	396.3	64.03	396	64.16	395.99	64.28	395.99
72.32	395.53	77.68	395.18	93.81	394.48	102.97	394.1	105.03	394
108.4	393.66	110.28	393.58	112.36	393.46	117.85	393.07	131.28	392
136.03	391.65	157.35	390	182.02	388	205.07	386	217.46	385.02
231.73	384	241.4	383.89	316.98	382.71	318.41	382.7	320.03	382.7
322.11	382.69	324.24	382.7	326.95	382.7	327.46	382.69	328.11	382.61
328.79	382.57	329.94	382.54	340.71	382.43	346.07	382.36	367.98	382
372.02	381.92	382.18	381.59	384.2	381.55	387.34	381.5	389.18	381.46
393.93	381.31	399.29	381.13	422.88	380.27	430.61	380	456.57	379.76
463.1	379.69	468.57	379.62	478.78	379.37	500.82	379.12	573.29	378.61
578.8	378.68	579.48	378.69	581.13	378.7	582.01	378.7	582.65	378.71
582.72	378.71	584.77	378.76	587.96	378.83	589.14	378.85	589.48	378.86
589.77	378.86	596	379.06	597.97	379.11	604.8	379.31	613.75	379.54
633.16	379.96	635.41	380	639.96	380.34	646.2	381.31	646.72	381.38
651.03	382	655.95	382.43	669.7	384	680.36	385.63	684.47	386
694.94	387.14	698.69	387.49	699.78	387.62	700	387.64		

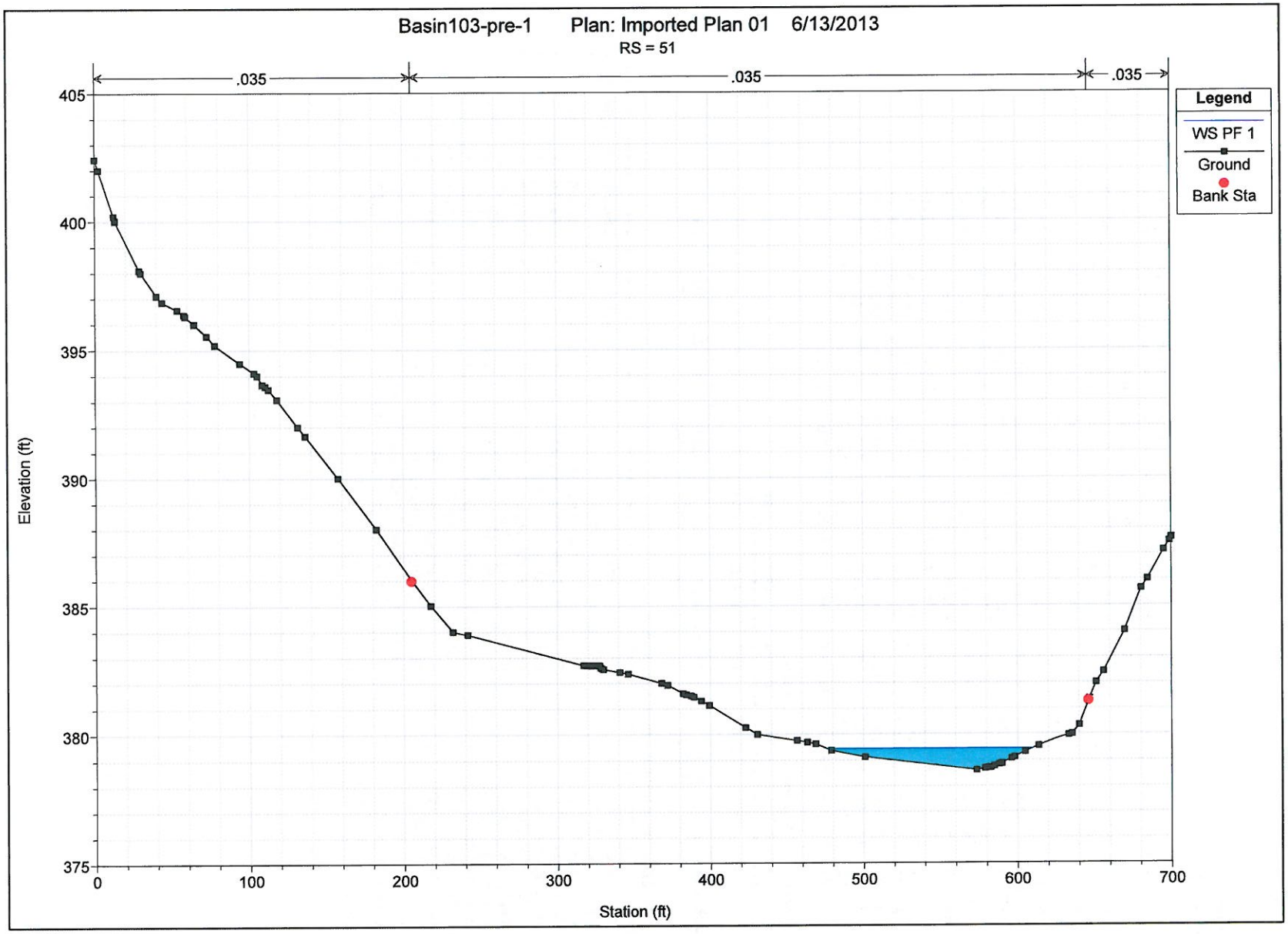
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	205.07	.035	646.2	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.07	646.2	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	379.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.035	
W.S. Elev (ft)	379.44	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	379.44	Flow Area (sq ft)		63.10	
E.G. Slope (ft/ft)	0.023374	Area (sq ft)		63.10	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	133.68	Top Width (ft)		133.68	
Vel Total (ft/s)	3.93	Avg. Vel. (ft/s)		3.93	
Max Chl Dpth (ft)	0.83	Hydr. Depth (ft)		0.47	
Conv. Total (cfs)	1624.1	Conv. (cfs)		1624.1	
Length Wtd. (ft)		Wetted Per. (ft)		133.70	
Min Ch El (ft)	378.61	Shear (lb/sq ft)		0.69	
Alpha	1.00	Stream Power (lb/ft s)	700.00	0.00	0.00
Frctn Loss (ft)	2.64	Cum Volume (acre-ft)		0.23	
C & E Loss (ft)	0.23	Cum SA (acres)		0.52	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 51
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
405
400
395
390
385
380
375
0
100
200
300
400
500
600
700
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 50

INPUT
Description: 36
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
186.35	387.41	201.57	386	202.18	385.95	228.72	384	237.04	383.47
239.8	383.4	248.74	382.93	251.39	382.9	256.96	382.63	258.28	382.57
260.98	382.46	284.03	382.82	314.06	382.07	317.25	382.02	320.37	382
321.53	381.99	326.45	381.97	337.85	381.96	342.21	381.97	345.02	381.96
351.4	381.77	354.59	381.66	364.55	381.34	397.68	380.37	404.31	380.14
409.38	380	415.31	379.9	427.82	379.72	429.03	379.7	456.51	379.07
464.32	379.13	505.34	378.65	537.03	378.39	557.51	378.18	560.35	378.18
564.83	378.16	572.09	378.21	585.75	378.1	588.99	378.08	592.05	378.09
593.99	378.09	596.42	378.06	612.58	378.01	614.33	378.04	618.95	378.11
624.09	378.4	659.94	380	661.41	380.15	678.56	382	683.92	382.77
692.71	384	700	384.6						

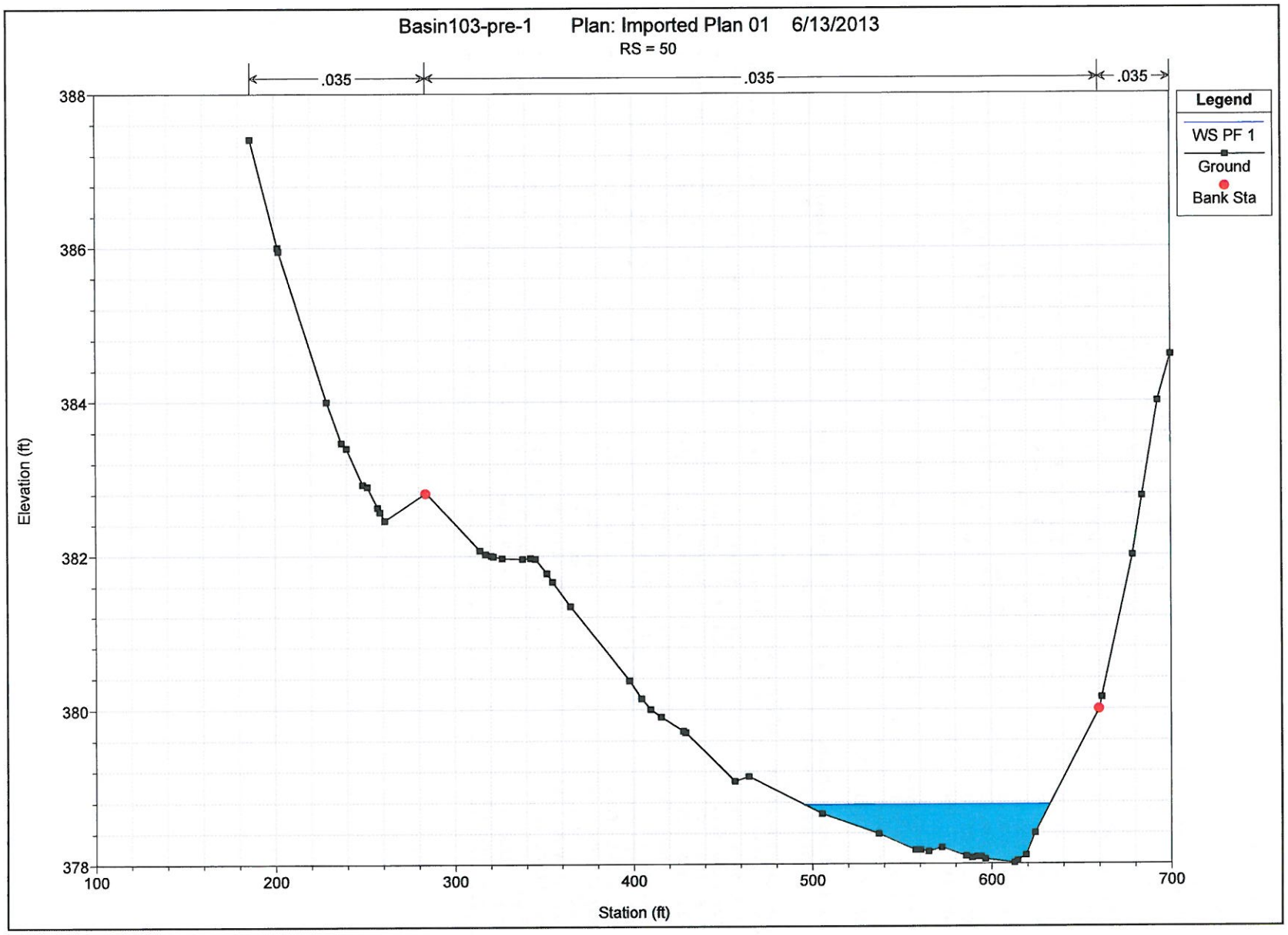
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
186.35	.035	284.03	.035	659.94	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
284.03	659.94	39.68	50	75.79	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	379.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.035	
W.S. Elev (ft)	378.77	Reach Len. (ft)	39.68	50.00	75.79
Crit W.S. (ft)	378.77	Flow Area (sq ft)		63.66	
E.G. Slope (ft/ft)	0.023574	Area (sq ft)		63.66	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	137.53	Top Width (ft)		137.53	
Vel Total (ft/s)	3.90	Avg. Vel. (ft/s)		3.90	
Max Chl Dpth (ft)	0.76	Hydr. Depth (ft)		0.46	
Conv. Total (cfs)	1617.2	Conv. (cfs)		1617.2	
Length Wtd. (ft)		Wetted Per. (ft)		137.55	
Min Ch El (ft)	378.01	Shear (lb/sq ft)		0.68	
Alpha	1.00	Stream Power (lb/ft s)	700.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.15	
C & E Loss (ft)		Cum SA (acres)		0.37	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 50
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
388
386
384
382
380
378
100
200
300
400
500
600
700
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 49

INPUT
Description: 37
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
194.8	387.18	207.14	386	208.28	385.92	209.35	385.84	232.66	384
237.94	383.57	241.53	383.36	248.52	382.89	256.82	382.41	263.21	382
263.59	381.89	288.67	381.31	295.48	381.46	296.32	381.44	296.44	381.38
297.62	381.37	303.46	381.39	314.57	382	314.91	382	356.21	381.03
356.53	381.02	356.86	381.02	357.17	381.01	357.83	381.01	357.95	381
358.42	381	360.33	380.95	360.6	380.94	360.98	380.93	362.32	380.9
363.86	380.87	368.97	380.78	409.51	380	474.39	378.44	484.57	378.21
486.97	378.16	487.83	378.14	488.79	378.12	496.98	378	497.95	377.99
516.52	377.94	530.62	377.93	537.42	377.91	540.82	377.88	551.22	377.71
556.09	377.69	565.11	377.59	570.19	377.55	596.8	377.41	599.65	377.38
605.18	377.29	607.68	377.26	609.59	377.27	610.84	377.28	620.16	377.37
620.38	377.42	622.02	377.46	624.51	377.48	628.22	377.49	640.22	377.48
642.9	377.5	653.89	377.77	656.84	377.83	658.49	377.87	660.3	377.93
662.29	378	681.36	379.87	681.81	379.91	683.07	380	690.02	380.77
692.46	381.05	699.22	382	700	382.08				

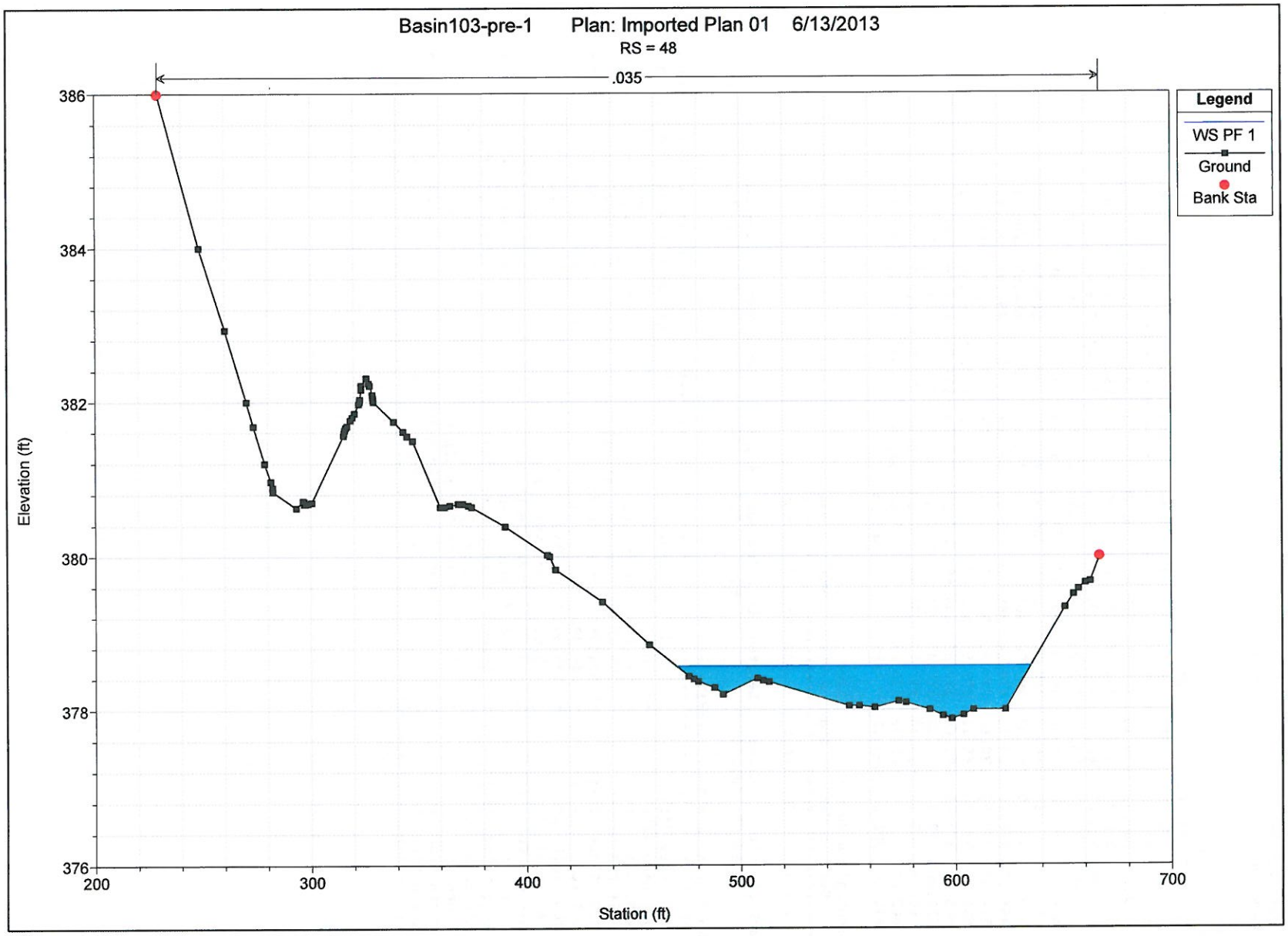
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
194.8	.035	314.57	.035	681.36	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
314.57	681.36	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	378.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.035	
W.S. Elev (ft)	378.06	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	378.06	Flow Area (sq ft)		68.53	
E.G. Slope (ft/ft)	0.024498	Area (sq ft)		68.53	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	170.20	Top Width (ft)		170.20	
Vel Total (ft/s)	3.62	Avg. Vel. (ft/s)		3.62	
Max Chl Dpth (ft)	0.80	Hydr. Depth (ft)		0.40	
Conv. Total (cfs)	1586.4	Conv. (cfs)		1586.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		170.22	
Min Ch El (ft)	377.26	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)	700.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.08	
C & E Loss (ft)		Cum SA (acres)		0.19	


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 48
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
386
384
382
380
378
376
200
300
400
500
600
700
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 48

INPUT
Description: 38
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
229.1	386	248.19	384	260.09	382.93	270.05	382	273.28	381.68
278.52	381.2	281.42	380.97	282.11	380.89	282.3	380.84	293.11	380.63
296.37	380.72	296.78	380.71	296.84	380.68	297.43	380.68	298.67	380.69
300.38	380.7	315.13	381.56	315.29	381.59	315.69	381.63	316.12	381.66
316.65	381.68	318.33	381.76	319.22	381.8	320.16	381.85	322.19	381.97
322.63	382	322.77	382.03	323.24	382.16	323.33	382.21	325.67	382.31
326.75	382.24	327.19	382.21	328.39	382.09	328.67	382.05	328.83	382.02
328.89	382	338.37	381.74	342.7	381.61	344.58	381.55	347.23	381.49
359.94	380.64	362.02	380.64	364.43	380.66	368.23	380.68	370.34	380.68
373.05	380.66	374.5	380.64	390.07	380.39	409.83	380.02	410.76	380
413.5	379.83	435.33	379.41	457.29	378.85	475.73	378.44	478.01	378.4
479.99	378.37	487.6	378.29	491.62	378.2	507.67	378.41	510.23	378.38
513.1	378.36	550.4	378.05	555.08	378.05	562.26	378.03	573.37	378.11
576.73	378.09	587.87	378	593.97	377.92	598.13	377.88	603.52	377.93
608.02	378	622.88	378	650.74	379.33	654.67	379.5	656.89	379.57
660.08	379.65	662.4	379.67	666.81	380				

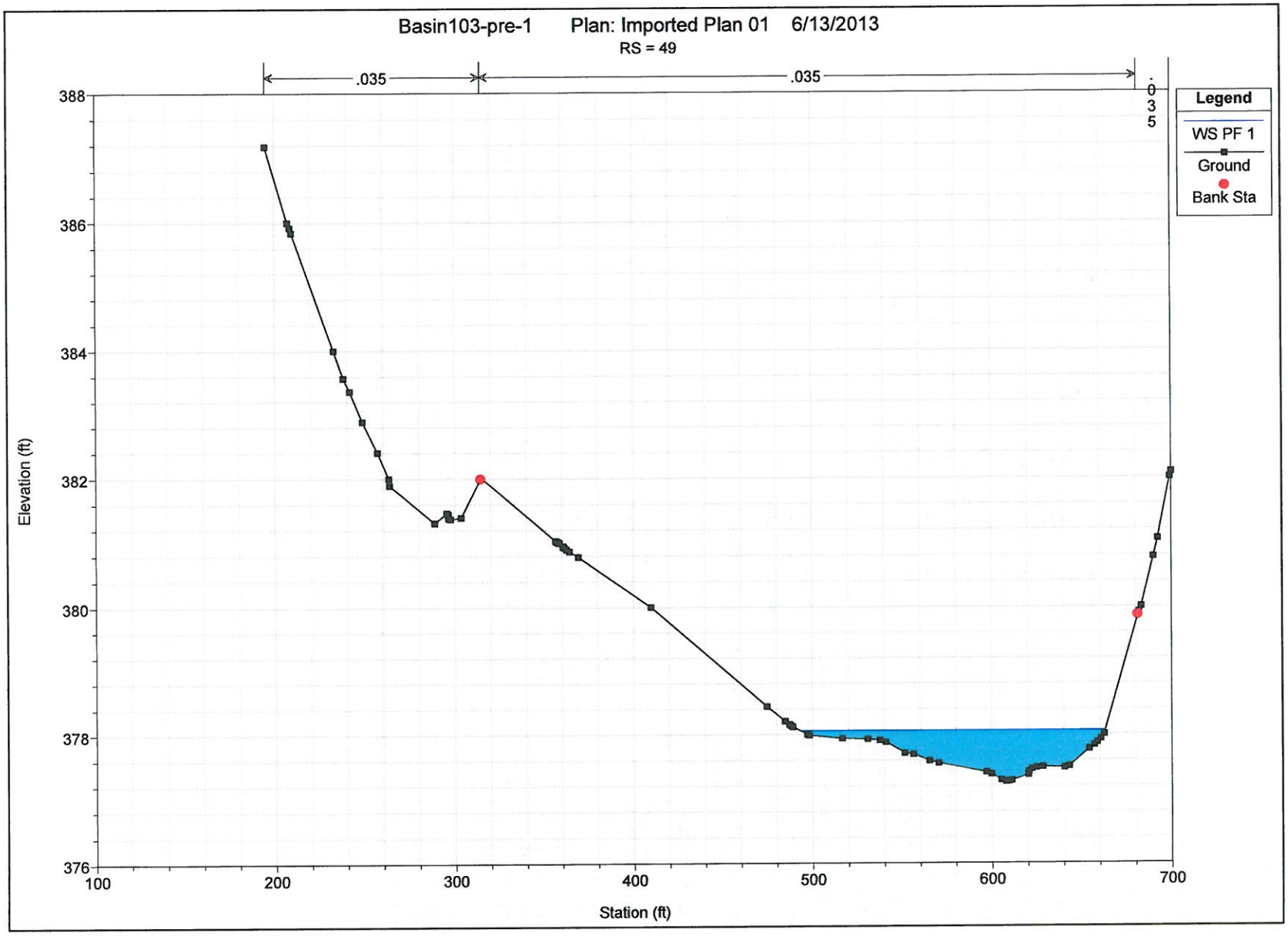
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
229.1	.035	229.1	.035	666.81	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
229.1	666.81	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	378.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.035	
W.S. Elev (ft)	378.57	Reach Len. (ft)			
Crit W.S. (ft)	378.57	Flow Area (sq ft)		67.46	
E.G. Slope (ft/ft)	0.024802	Area (sq ft)		67.46	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	165.11	Top Width (ft)		165.11	
Vel Total (ft/s)	3.68	Avg. Vel. (ft/s)		3.68	
Max Chl Dpth (ft)	0.69	Hydr. Depth (ft)		0.41	
Conv. Total (cfs)	1576.7	Conv. (cfs)		1576.7	
Length Wtd. (ft)		Wetted Per. (ft)		165.13	
Min Ch El (ft)	377.88	Shear (lb/sq ft)		0.63	
Alpha	1.00	Stream Power (lb/ft s)	666.81	0.00	0.00
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)			
C & E Loss (ft)	0.00	Cum SA (acres)			


Basin103-pre-1 Plan: Imported Plan 01 6/13/2013
RS = 49
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
388
386
384
382
380
378
376
100
200
300
400
500
600
700
Station (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

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

PROJECT DATA
Project Title: Basin103-1
Project File : Basin103-1.prj
Run Date and Time: 6/13/2013 3:23:44 PM

Project in English units

Project Description:
******* Autodesk, Inc. HEC-2 Input Data file ********
      ************
Minimum Data Input     *************

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

PLAN DATA

Plan Title: Imported Plan 01
Plan File : C:\Shapouri&Associates\Active Projects\Warner Ranch\Hydrology\Hecras 2012\Basin 103
Post\Basin103-1.p01

           Geometry Title: Imported Geom 01
           Geometry File : C:\Shapouri&Associates\Active Projects\Warner Ranch\Hydrology\Hecras
2012\Basin 103 Post\Basin103-1.g01

           Flow Title    : Imported Flow 01
           Flow File     : C:\Shapouri&Associates\Active Projects\Warner Ranch\Hydrology\Hecras
2012\Basin 103 Post\Basin103-1.f01

Plan Summary Information:
Number of:  Cross Sections =   46    Multiple Openings  =    0
            Culverts       =    1    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Supercritical Flow
```

FLOW DATA

Flow Data (cfs)

River	Reach	RS	PF 1
RIVER-1	Reach-1	85	248.3

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1	Critical	Critical

GEOMETRY DATA
CROSS SECTION
REACH: Reach-1 RS: 85

INPUT
Description: 1
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	447.77	2.07	446.23	2.44	446	3.37	445.44	5.65	444
9.06	442.02	12.16	440.35	12.85	440	15.48	438.6	16.65	438
18.94	436.79	20.48	436	30.17	434.47	43.89	432.14	44.72	432
44.97	431.85	45.36	431.65	47.36	430.56	47.8	430.29	48.05	430.11
48.11	430.06	48.24	430.05	48.47	430.06	48.57	430.07	49.14	430.16
50.47	430.4	54.06	431.06	56.64	431.51	58.97	432	59.9	432.62
60.86	433.35	61.44	434	61.95	434.48	62.09	434.61	64.15	436
65.56	436.82	67.26	438	69.77	439.51	70.74	440	72.82	441.15
74.74	442	76.35	442.7	79.31	444	83.77	445.98	83.83	446.01
87.95	448	88.03	448.04	90.6	449.33	91.91	449.98	92.8	450.4
96.14	452	96.4	452.13	98.01	452.76	100.32	453.66	101.31	454
106.99	456	107.81	456.29	108.62	456.59	112.85	458	117.67	459.64
120.79	460.87	123.7	462	124.66	462.42	125.2	462.64	125.99	462.93
126.51	463.09	128.38	463.62	129.83	464	132.93	464.85	136.87	465.61
140.66	465.85	148.85	465.61	150.78	465.58				

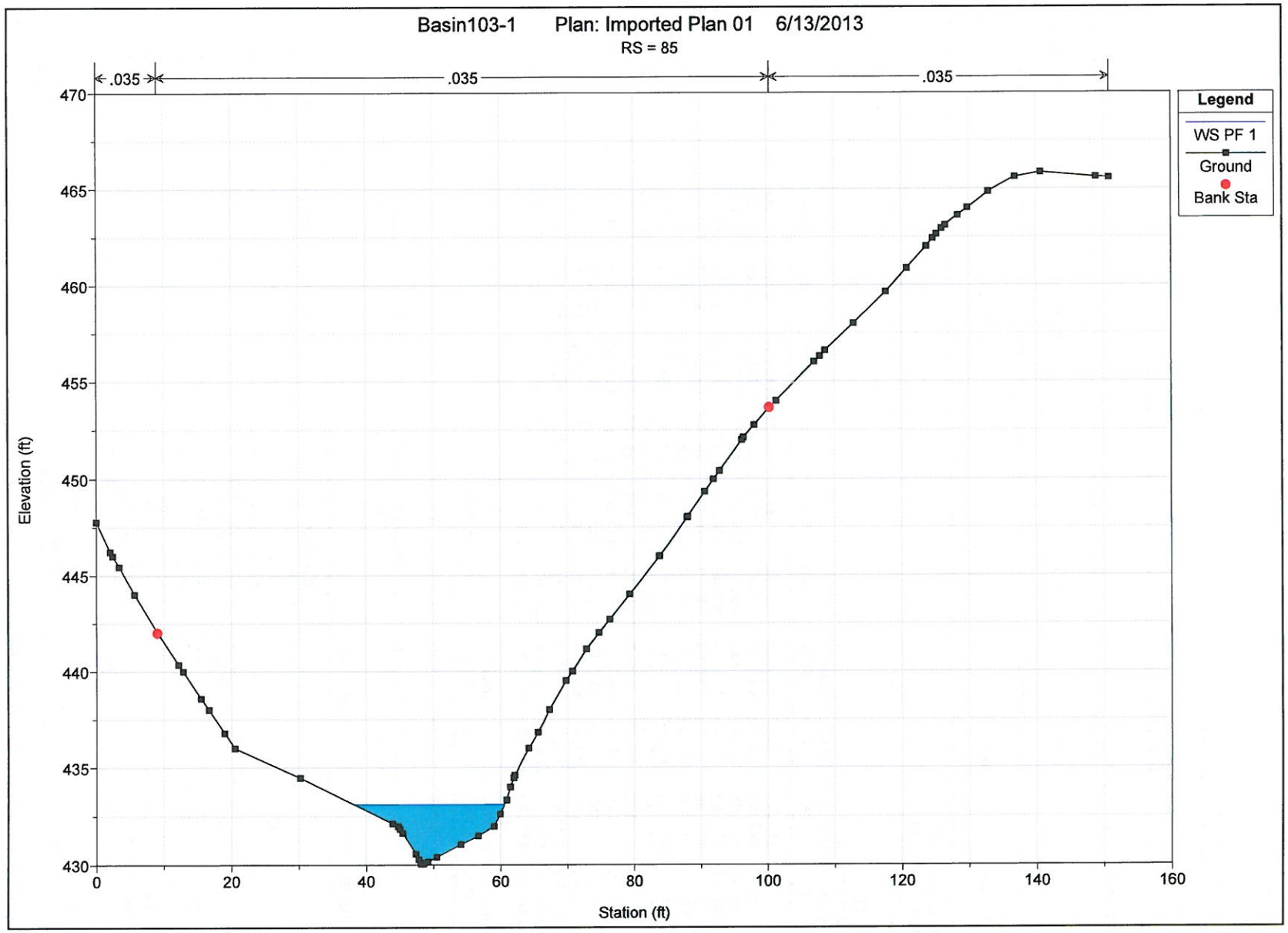
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	9.06	.035	100.32	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.06	100.32	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	433.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.035	
W.S. Elev (ft)	433.11	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	433.11	Flow Area (sq ft)		34.69	
E.G. Slope (ft/ft)	0.016899	Area (sq ft)		34.69	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	22.35	Top Width (ft)		22.35	
Vel Total (ft/s)	7.16	Avg. Vel. (ft/s)		7.16	
Max Chl Dpth (ft)	3.06	Hydr. Depth (ft)		1.55	
Conv. Total (cfs)	1910.1	Conv. (cfs)		1910.1	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		23.49	
Min Ch El (ft)	430.05	Shear (lb/sq ft)		1.56	
Alpha	1.00	Stream Power (lb/ft s)	150.78	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		2.70	0.00
C & E Loss (ft)		Cum SA (acres)		3.34	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 85
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
470
465
460
455
450
445
440
435
430
0
20
40
60
80
100
120
140
160
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 84

INPUT
Description: 2
Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	446.94	1.58	446	3.35	444.88	4.84	444	6.28	443.14
8.07	442	10.51	440.44	11.2	440	14.1	438.22	14.4	438
15.04	437.56	15.16	437.5	15.23	437.47	15.31	437.44	15.46	437.38
15.64	437.31	16.01	437.13	18.09	436	19.83	435.28	22.54	434
22.73	433.91	26.4	432	28.44	431.19	31.41	430	31.89	429.89
35.81	428.86	37.31	428.53	38.01	428.4	38.24	428.34	38.35	428.31
38.49	428.32	38.69	428.34	38.95	428.35	39.21	428.37	39.43	428.38
39.78	428.41	39.97	428.43	40.82	428.6	41.33	428.76	46.24	429.8
47.24	430	50.34	430.69	55.9	432	57.88	432.4	60.87	432.76
61.25	432.81	62.26	432.96	63.48	433.12	67.63	433.62	71.52	434
78.25	434.94	85.97	436	90.73	437.08	95.45	438	95.6	438.04
95.9	438.09	100.98	439.04	104.51	439.56	107.59	440	114.01	441.07
115.09	441.26	115.49	441.29	118.4	441.53	118.83	441.56	121.42	441.66
131.68	442	132.22	442.02	132.29	442.03	139.22	442.23	139.9	442.23
151.73	442.09	152.28	442.08	155.31	442	157.67	441.96		

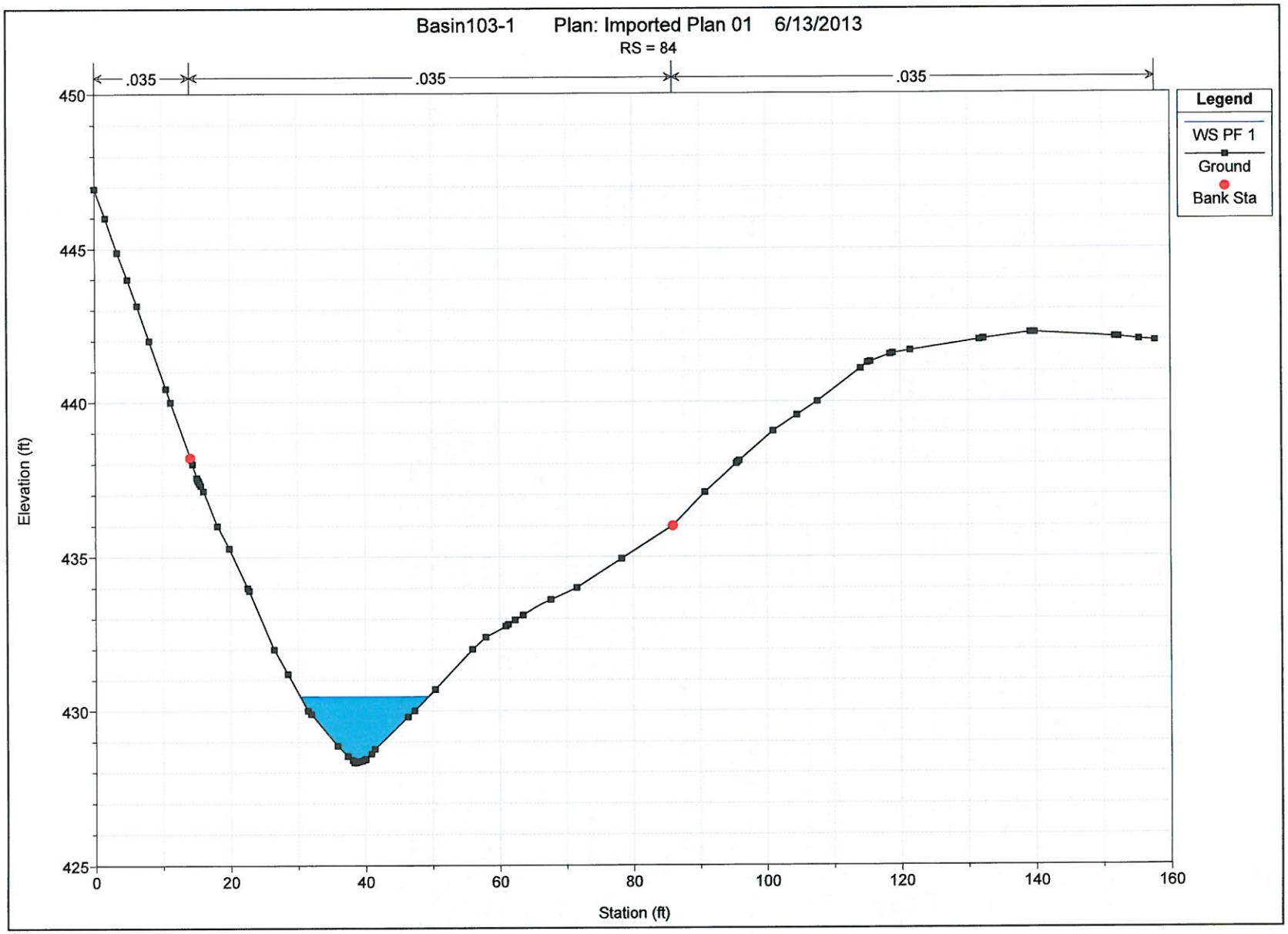
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	14.1	.035	85.97	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
14.1	85.97	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	432.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.91	Wt. n-Val.		0.035	
W.S. Elev (ft)	430.47	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	431.07	Flow Area (sq ft)		22.40	
E.G. Slope (ft/ft)	0.057049	Area (sq ft)		22.40	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	19.08	Top Width (ft)		19.08	
Vel Total (ft/s)	11.08	Avg. Vel. (ft/s)		11.08	
Max Chl Dpth (ft)	2.15	Hydr. Depth (ft)		1.17	
Conv. Total (cfs)	1039.6	Conv. (cfs)		1039.6	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		19.60	
Min Ch El (ft)	428.31	Shear (lb/sq ft)		4.07	
Alpha	1.00	Stream Power (lb/ft s)	157.67	0.00	0.00
Frctn Loss (ft)	1.42	Cum Volume (acre-ft)		2.67	0.00
C & E Loss (ft)	0.11	Cum SA (acres)		3.32	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 84
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
450
445
440
435
430
425
0
20
40
60
80
100
120
140
160
Station (ft)

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 83

INPUT
Description: 3
Station Elevation Data num= 115

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	449.62	.69	449.24	3.14	448	4.05	447.19	5.56	446
7.48	444.12	7.59	444	7.77	443.79	9.41	442	10.4	440.85
11.13	440	12.76	438.11	12.87	438	12.99	437.83	13.46	437.29
14.79	436	15.58	435.08	16.5	434	17.27	433.07	18.37	432
19.38	430.99	20.39	430	21.23	429.54	24.67	428.16	25.06	428
26.96	427.74	28.49	427.51	29.6	427.36	31.29	427.18	32.12	427.06
32.76	426.94	34.21	426.61	34.6	426.47	34.83	426.44	35.27	426.38
35.68	426.34	36.03	426.35	36.31	426.37	36.44	426.4	36.51	426.42
36.61	426.43	36.77	426.44	37.02	426.45	38.25	426.53	38.45	426.55
38.61	426.57	39.1	426.61	39.24	426.63	39.3	426.65	41.59	427.43
43.37	428	54.31	429.9	54.77	430	55.06	430.02	55.14	430.03
62.63	430.49	67.76	430.77	69.55	430.86	76.76	431.19	85.15	431.46
88.15	431.59	99.37	432	101.38	432.1	102.02	432.12	112.99	432.58
117.07	432.72	122.23	432.84	128.42	432.97	131.74	433.05	134.15	433.12
142.88	433.43	144.51	433.51	148.77	433.68	155.66	434	157.29	434.09
157.42	434.09	160.51	434.17	162.87	434.21	164.29	434.24	164.94	434.24
166.24	434.27	167.3	434.24	167.65	434.24	167.98	434.23	168.16	434.23
168.32	434.24	168.61	434.26	169.11	434.28	169.81	434.31	175.51	434.49
177.07	434.53	177.96	434.54	178.95	434.54	185.54	434.58	187.02	434.62
191.14	434.65	192.45	434.67	194.02	434.71	197.32	434.7	199.76	434.81
202.92	434.98	203.59	435	207.84	435.26	208.48	435.29	209.22	435.33
210.87	435.41	214.46	435.55	220.89	435.77	226.19	435.99	226.24	435.99
226.34	436	229.87	436.29	239.34	437.56	240.92	437.75	241.89	437.86

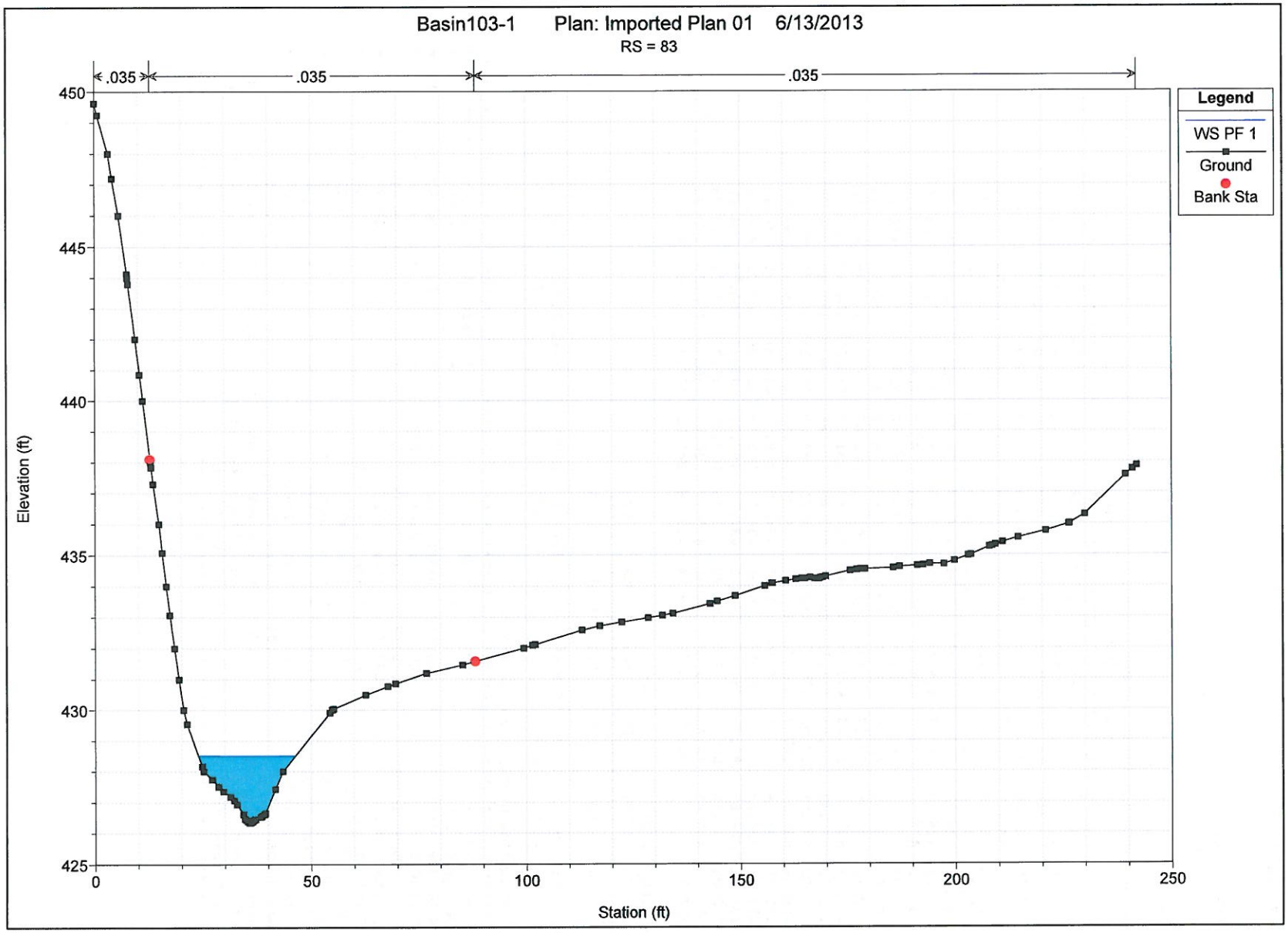
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	12.76	.035	88.15	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
12.76	88.15	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	429.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.34	Wt. n-Val.		0.035	
W.S. Elev (ft)	428.51	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	428.91	Flow Area (sq ft)		26.74	
E.G. Slope (ft/ft)	0.039213	Area (sq ft)		26.74	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	22.51	Top Width (ft)		22.51	
Vel Total (ft/s)	9.29	Avg. Vel. (ft/s)		9.29	
Max Chl Dpth (ft)	2.17	Hydr. Depth (ft)		1.19	
Conv. Total (cfs)	1253.9	Conv. (cfs)		1253.9	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		23.03	
Min Ch El (ft)	426.34	Shear (lb/sq ft)		2.84	
Alpha	1.00	Stream Power (lb/ft s)	241.89	0.00	0.00
Frctn Loss (ft)	2.34	Cum Volume (acre-ft)		2.64	0.00
C & E Loss (ft)	0.17	Cum SA (acres)		3.30	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 83
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
450
445
440
435
430
425
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 82

INPUT
Description: 4
Station Elevation Data num= 125

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	452.24	.51	452	.87	451.82	4.37	450	8.88	448.02
12.73	446.22	13.24	446	14.51	445.46	17.77	444	18.6	443.51
20.51	442	20.89	441.59	22.38	440	22.77	439.58	24.3	438
24.81	437.4	26.06	436	27.01	434.95	28.02	434	29.6	432.45
30.01	432	30.61	431.34	31.91	430	33.43	428.56	34.2	428
36.88	426.62	38.34	426	44.06	424.94	45.8	424.65	49.14	424.58
49.39	424.88	49.71	424.98	50.3	425.1	56.44	426	59.3	426.34
60.42	426.46	63.05	426.78	66.18	427.14	72.45	428	75.42	428.16
78.25	428.28	78.96	428.3	86.57	428.53	87.36	428.54	88.96	428.57
90.34	428.62	91.55	428.68	95.82	429.01	97.88	429.11	101.84	429.39
103.26	429.48	105.57	429.64	108.9	429.75	109.32	429.77	109.54	429.78
109.66	429.78	109.74	429.79	109.82	429.79	109.91	429.8	110.04	429.8
111	429.83	114.15	429.86	120.44	429.99	120.55	429.99	121.48	430
125.46	430.01	126.34	430.07	126.4	430.07	139.3	430.35	139.46	430.36
139.74	430.36	143.29	430.47	143.93	430.47	144.67	430.46	151.63	430.71
152.68	430.69	153.93	430.68	155.8	430.73	157.3	430.74	158.74	430.74
160.42	430.72	164.52	430.65	167.7	430.68	168.81	430.67	170.55	430.67
171.57	430.66	175.46	430.66	178.23	430.63	178.93	430.62	179.52	430.6
180.68	430.6	183.49	430.55	186.29	430.45	189.09	430.31	191.98	430.15
192.68	430.16	194.91	430.02	194.98	430.02	195.3	430	196.41	429.98
197.69	429.97	198.97	429.99	199.27	430	200.72	430.12	201.69	430.19
209.9	430.91	212.35	431.03	215.57	431.27	217.73	431.4	219.13	431.46
222.48	431.52	223.27	431.53	225.62	431.52	233.75	431.56	236.66	431.69
239.18	431.88	239.6	431.88	241.09	432	242.21	432.16	255.66	434
259.23	435.01	261.8	436	266.33	437.62	267.31	438	271.09	439.28

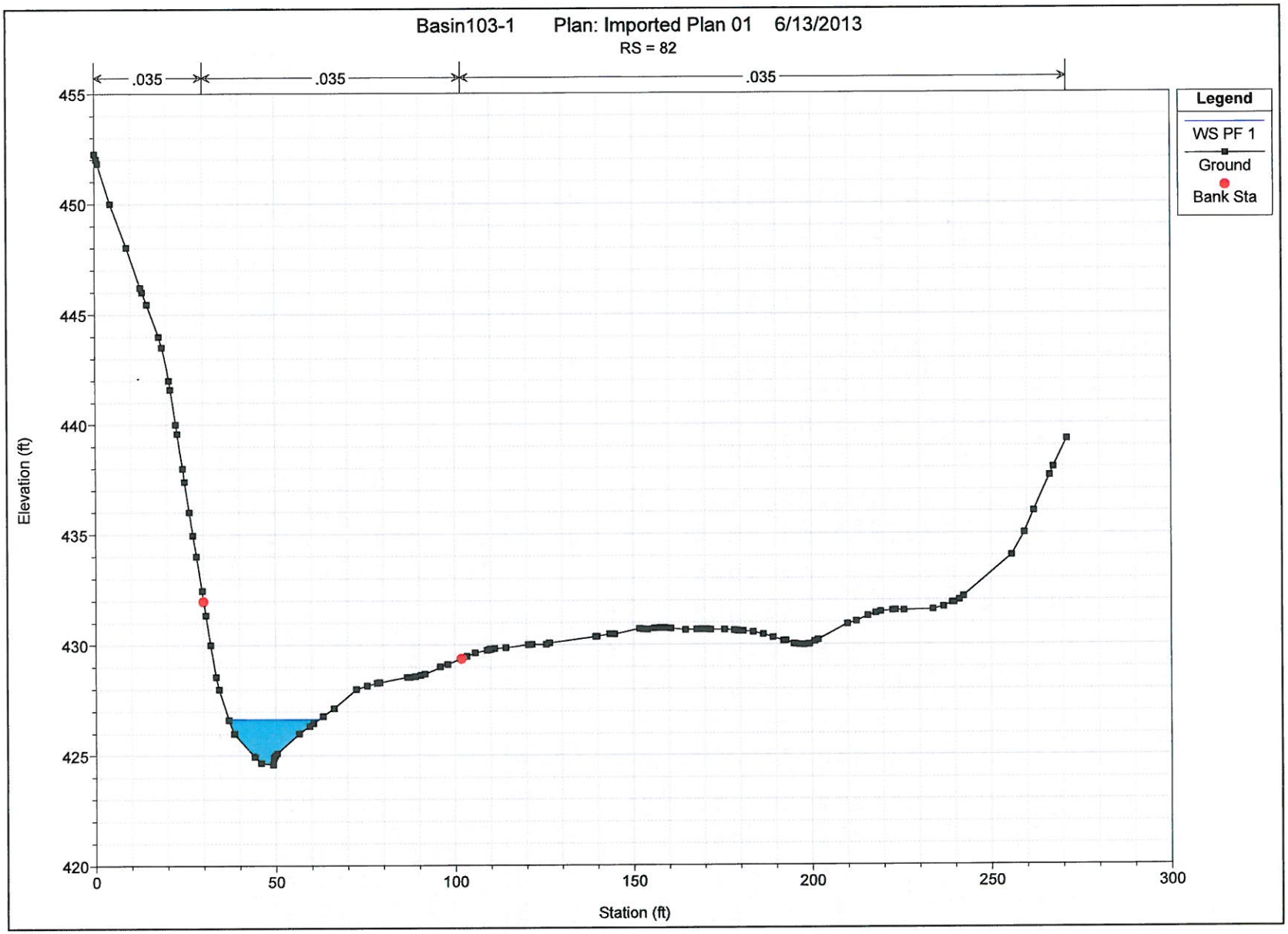
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	30.01	.035	101.84	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
30.01	101.84	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	427.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.20	Wt. n-Val.		0.035	
W.S. Elev (ft)	426.67	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	427.02	Flow Area (sq ft)		28.19	
E.G. Slope (ft/ft)	0.038323	Area (sq ft)		28.19	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	25.32	Top Width (ft)		25.32	
Vel Total (ft/s)	8.81	Avg. Vel. (ft/s)		8.81	
Max Chl Dpth (ft)	2.09	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	1268.4	Conv. (cfs)		1268.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		25.85	
Min Ch El (ft)	424.58	Shear (lb/sq ft)		2.61	
Alpha	1.00	Stream Power (lb/ft s)	271.09	0.00	0.00
Frctn Loss (ft)	1.94	Cum Volume (acre-ft)		2.61	0.00
C & E Loss (ft)	0.04	Cum SA (acres)		3.27	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 82
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
455
450
445
440
435
430
425
420
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 81

INPUT
Description: 5
Station Elevation Data num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	452.52	1.26	452	3.37	451.24	6.34	450	7.98	449.44
11.94	448	16.2	446.57	17.91	446	21.06	444.98	24.02	444
25.74	443.44	30.7	442	33.58	441.1	37.45	440	40.84	438.27
41.31	438	41.7	437.79	44.85	436	47.89	434.29	48.41	434
49.06	433.65	51.81	432	54.82	430.22	55.17	430	55.33	429.92
55.4	429.9	55.49	429.86	55.61	429.81	59.77	428	62.96	427.15
67.72	426	75.6	424.16	76.21	424	76.33	423.91	76.41	423.79
78.29	422	82.57	422	82.62	422.01	92.51	424	95.66	424.58
96.88	424.81	101	425.49	103.85	426	109.91	426.79	111.23	426.81
112.75	426.79	114.34	426.78	120.31	427.27	127.79	427.31	127.99	427.32
128.22	427.33	128.55	427.34	129.38	427.35	130.82	427.37	133.09	427.43
137.02	427.49	137.78	427.49	138.35	427.47	138.98	427.44	148.03	427.96
148.08	427.95	148.16	427.95	148.79	428	163.93	428.22	165.97	428.24
166.35	428.25	166.74	428.25	180.77	428.17	183.15	428.14	184.35	428.1
185.31	428.07	189.1	428	189.86	427.97	193.73	427.78	196.83	427.59
202.41	427.14	205.16	426.91	207.09	426.72	207.29	426.72	209.62	426.48
210.02	426.45	210.53	426.46	213.56	426.55	214.17	426.55	215.48	426.56
217.15	426.58	218.64	426.64	224.29	426.83	226.15	426.9	227.03	426.95
227.97	427.04	236.76	428	246.07	428.93	251.23	429.41	252.77	429.51
253.74	429.52	255.37	429.69	257.01	429.66	258.32	429.76	260.46	430
261.37	430.13	261.82	430.24	267.61	431.5	269.88	432	274.33	433.47

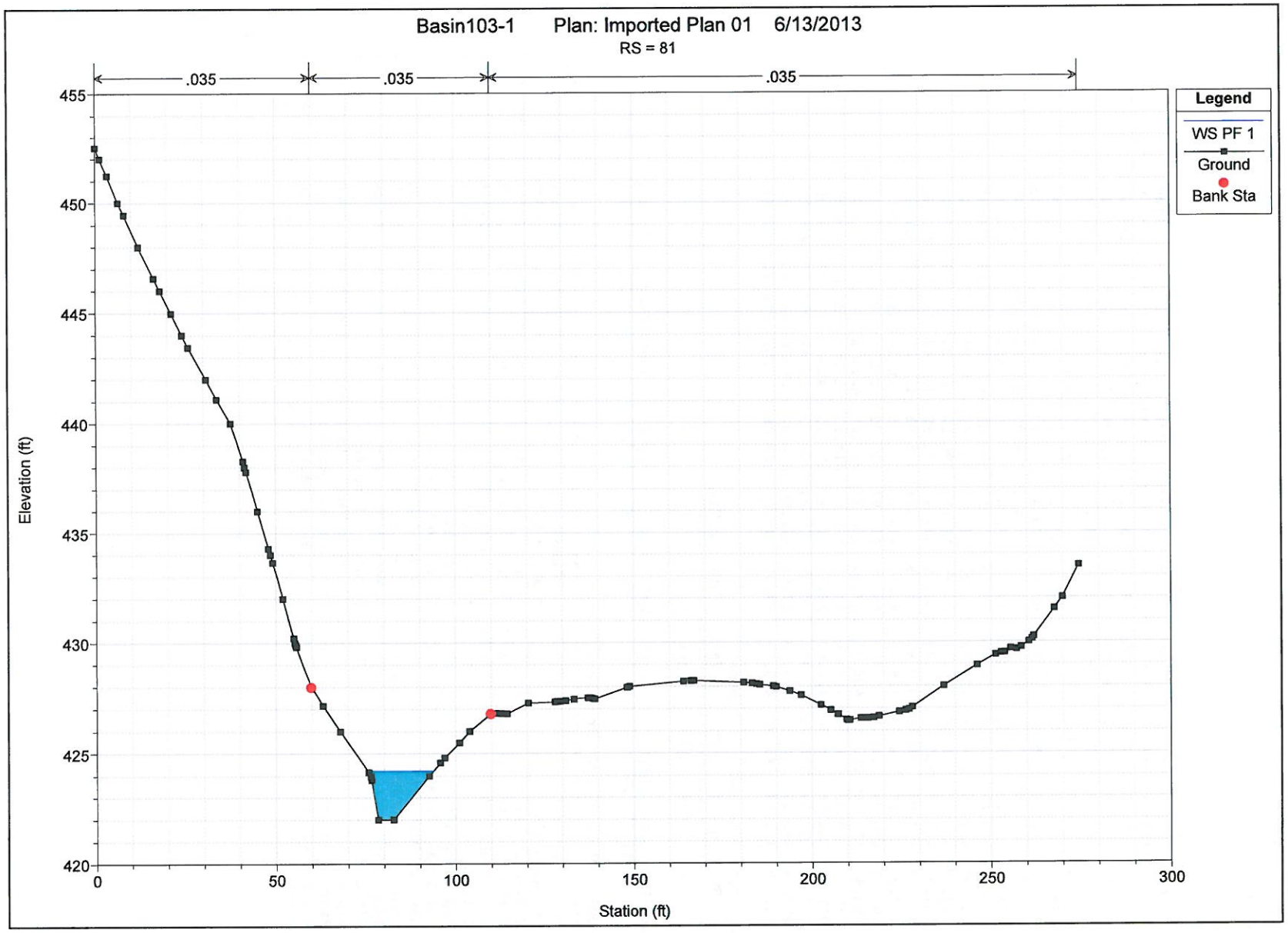
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	59.77	.035	109.91	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
59.77	109.91	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	425.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.60	Wt. n-Val.		0.035	
W.S. Elev (ft)	424.22	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	424.75	Flow Area (sq ft)		24.49	
E.G. Slope (ft/ft)	0.041991	Area (sq ft)		24.49	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	18.41	Top Width (ft)		18.41	
Vel Total (ft/s)	10.14	Avg. Vel. (ft/s)		10.14	
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)		1.33	
Conv. Total (cfs)	1211.7	Conv. (cfs)		1211.7	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		19.46	
Min Ch El (ft)	422.00	Shear (lb/sq ft)		3.30	
Alpha	1.00	Stream Power (lb/ft s)	274.33	0.00	0.00
Frctn Loss (ft)	2.00	Cum Volume (acre-ft)		2.58	0.00
C & E Loss (ft)	0.04	Cum SA (acres)		3.24	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 81
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
455
450
445
440
435
430
425
420
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 80

INPUT
Description: 6
Station Elevation Data num= 116

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	457.19	3	456	5.76	454.96	8.25	454	11.41	452.84
13.51	452	19.29	450	22.89	448.92	25.7	448	27.27	447.48
34.56	445.11	38.02	444	42.41	442.69	44.89	442	51.33	440.02
51.39	440	55.36	438.73	57.32	438	58.44	437.56	62.55	436
65.68	434.44	66.77	434	67.64	433.43	69.84	432	72.42	430.15
72.65	430	72.78	429.9	75.75	428	77.31	426.89	78.73	426
82.87	424.02	82.93	424	86.11	422	88.57	420.66	89.26	420.38
89.55	420.27	89.94	420.23	90.08	420.25	90.58	420.27	90.73	420.28
91.95	420.41	93.62	420.6	93.73	420.62	93.85	420.64	94.2	420.69
96.44	420.95	97.05	420.99	99.82	421.29	101.49	421.48	104.24	421.82
104.38	421.84	105.63	422	111.68	422.52	113.71	422.69	120.46	423.19
120.84	423.22	121.73	423.31	121.91	423.25	122.2	423.21	123.1	423.18
124.52	423.19	126.71	423.26	128.31	423.3	131.04	423.35	132.33	423.38
134.09	423.41	135.54	423.48	138.32	423.48	139.14	423.54	139.57	423.62
140.38	423.62	140.94	423.63	141.41	423.64	142.98	423.67	153.95	423.58
155.01	423.58	173.68	423.97	173.9	423.97	174.01	423.96	174.22	423.95
178.49	424.04	184.65	424.05	184.8	424.05	184.99	424.06	195.21	424
195.34	424	197.12	423.97	205.29	423.9	208.71	423.85	210.18	423.79
210.94	423.73	212.01	423.68	212.84	423.62	213	423.57	215.25	423.53
232.21	423.88	234.87	423.85	235.14	423.85	235.23	423.86	235.46	423.85
237.98	423.97	238.05	423.97	241.2	424	242.89	424	247.93	423.99
254.98	424	255.37	424	259.72	424.06	260.16	424.09	269.31	424.44
271.15	424.62	273.51	424.92	277.01	425.15	280.61	426	280.96	426.12
281.61	426.35								

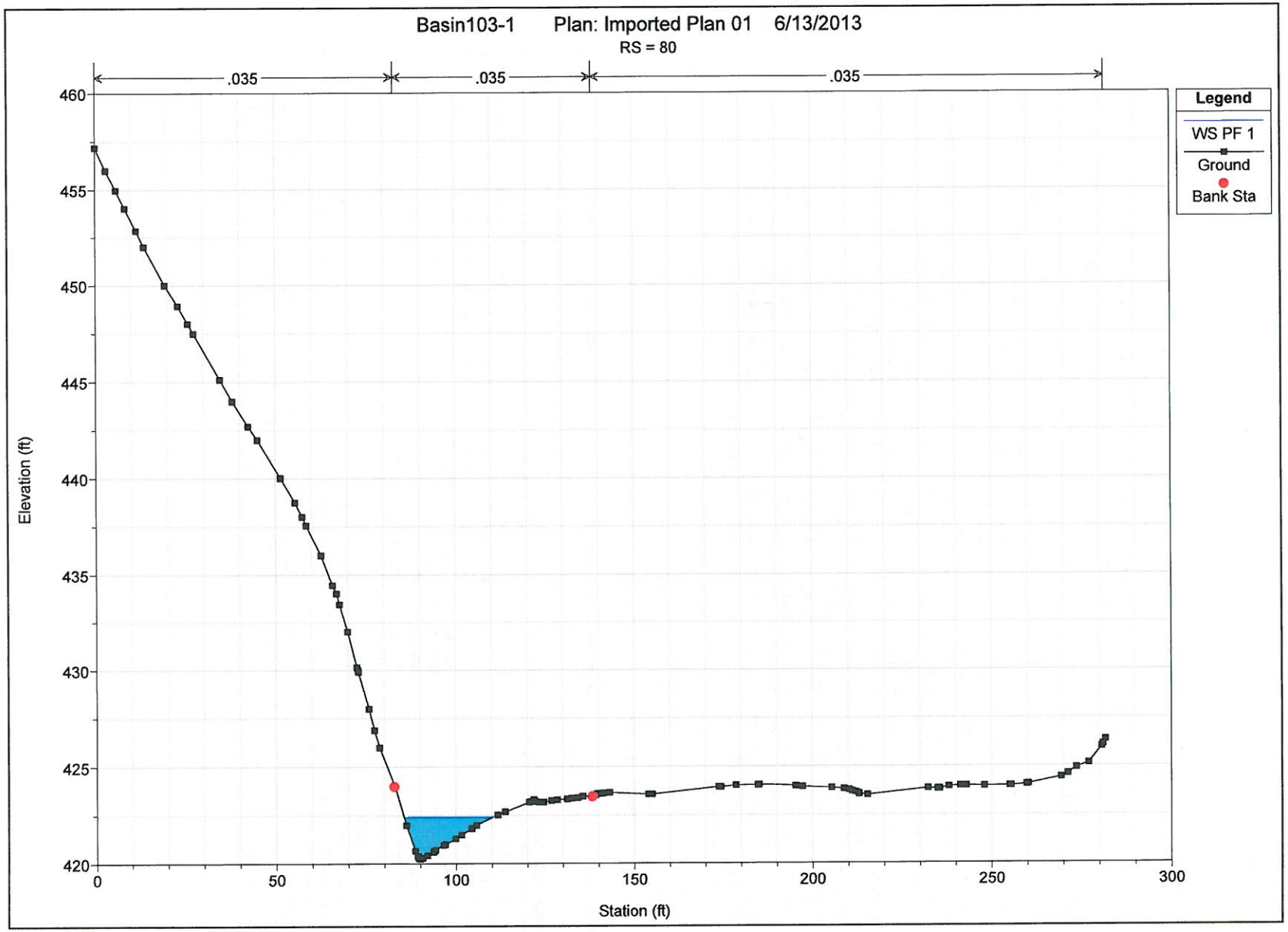
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	82.87	.035	138.32	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.87	138.32	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	423.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.24	Wt. n-Val.		0.035	
W.S. Elev (ft)	422.42	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	422.81	Flow Area (sq ft)		27.77	
E.G. Slope (ft/ft)	0.040225	Area (sq ft)		27.77	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	25.14	Top Width (ft)		25.14	
Vel Total (ft/s)	8.94	Avg. Vel. (ft/s)		8.94	
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)		1.10	
Conv. Total (cfs)	1238.0	Conv. (cfs)		1238.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		25.80	
Min Ch El (ft)	420.23	Shear (lb/sq ft)		2.70	
Alpha	1.00	Stream Power (lb/ft s)	281.61	0.00	0.00
Frctn Loss (ft)	2.05	Cum Volume (acre-ft)		2.55	0.00
C & E Loss (ft)	0.11	Cum SA (acres)		3.22	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 80
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
460
455
450
445
440
435
430
425
420
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 79

INPUT
Description: 7
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	454.65	.59	454.41	1.71	454	2.64	453.64	6.96	452
11.27	450.19	11.67	450	11.81	449.93	15.95	448	21.39	446.2
21.92	446	22.76	445.75	29.24	444	32.57	443.03	36.43	442
39.22	441.18	42.95	440	46.26	438.98	49.26	438	52.84	436.9
55.73	436	64.56	434.23	64.68	434.21	66.04	434	76.5	432.25
77.68	432	79.57	431.33	83.76	430	86.69	429.06	89.87	428
90.6	427.72	93.97	426.44	94.9	426	95.26	425.79	95.33	425.78
100.71	424	101.4	423.77	101.59	423.7	101.96	423.58	103.42	423.14
104.81	422.68	105.89	422.37	106.95	422	107.73	421.71	108.93	421.31
109.55	421.15	109.94	421.05	110.27	420.93	110.57	420.78	111.79	420
114.68	419.79	123.43	419.69	126.56	420	130.55	420.17	131.16	420.17
131.43	420.18	132.93	420.23	134.3	420.29	135.9	420.32	144.62	420.74
145.77	420.79	146.91	420.81	148.18	420.81	149.66	420.79	151.01	420.75
151.83	420.74	152.3	420.74	157.96	420.89	158.38	420.89	159.12	420.91
160.36	420.95	163.85	421.02	165.42	421.06	167.11	421.09	168.97	421.14
172.31	421.1	174.38	421.17	176.37	421.26	176.73	421.26	176.98	421.27
177.38	421.28								

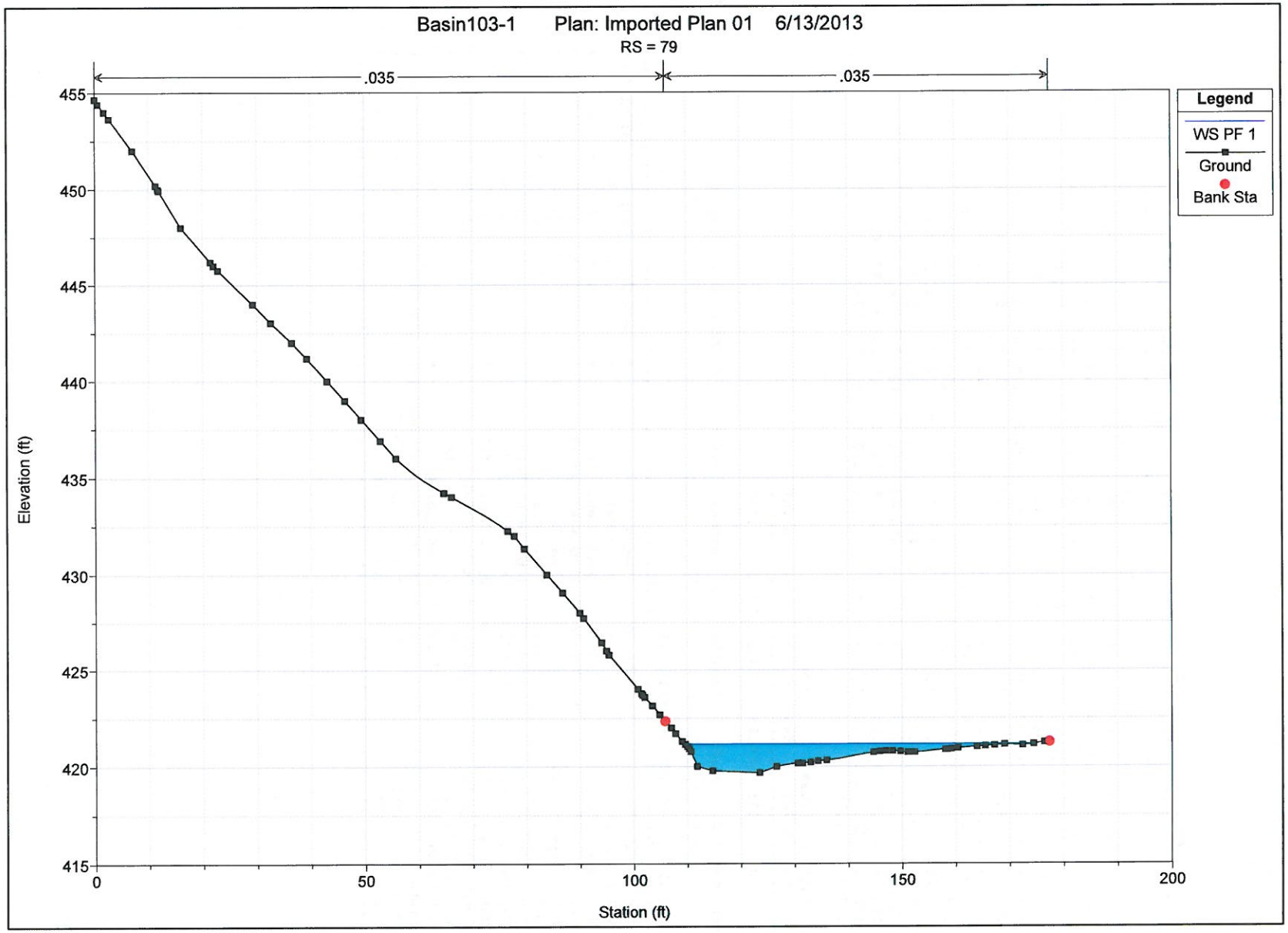
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	105.89	.035	177.38	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
105.89	177.38	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	421.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.		0.035	
W.S. Elev (ft)	421.17	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	421.28	Flow Area (sq ft)		43.47	
E.G. Slope (ft/ft)	0.031149	Area (sq ft)		43.47	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	64.97	Top Width (ft)		64.97	
Vel Total (ft/s)	5.71	Avg. Vel. (ft/s)		5.71	
Max Chl Dpth (ft)	1.48	Hydr. Depth (ft)		0.67	
Conv. Total (cfs)	1406.9	Conv. (cfs)		1406.9	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		65.32	
Min Ch El (ft)	419.69	Shear (lb/sq ft)		1.29	
Alpha	1.00	Stream Power (lb/ft s)	177.38	0.00	0.00
Frctn Loss (ft)	1.76	Cum Volume (acre-ft)		2.51	0.00
C & E Loss (ft)	0.22	Cum SA (acres)		3.17	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 79
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
455
450
445
440
435
430
425
420
415
0
50
100
150
200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 78

INPUT
Description: 8
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	451	.4	450.88	3.03	450	5.98	449.12	9.67	448
11.93	447.32	14.79	446.42	15.91	446	17.38	445.5	21.74	444
27.6	442	30.68	440.97	33.5	440	36.48	439.23	41.07	438
47.18	436.83	51.19	436	57.04	434.91	61.36	434	64.61	433.45
73.59	432	82.89	430.09	83.37	430	83.77	429.91	86.8	429.21
91.95	428	96.08	427.23	102.89	426	111.5	424.68	116.06	424
124.03	422	128.51	420	134.34	419.69	134.45	419.68	136.71	419.58
147.77	418.72	150.18	418.57	156.9	418	160.92	417.46	167.16	416.58
172.65	416.99	172.7	417.03	174.42	417.75	174.94	417.95	175.14	418
175.47	418.02	176.26	418.06	177.09	418.1	177.78	418.11	178.48	418.11
179.62	418.14	192.06	418.28	192.47	418.29	194.46	418.33	195.08	418.36
195.87	418.35	196.76	418.33	197.6	418.33	207.76	418.49	208.36	418.47
218.42	418.41	223.86	418.43	231.1	418.53	232.72	418.56	233.92	418.61
234.73	418.62	238.13	418.65	238.57	418.66	238.76	418.67		

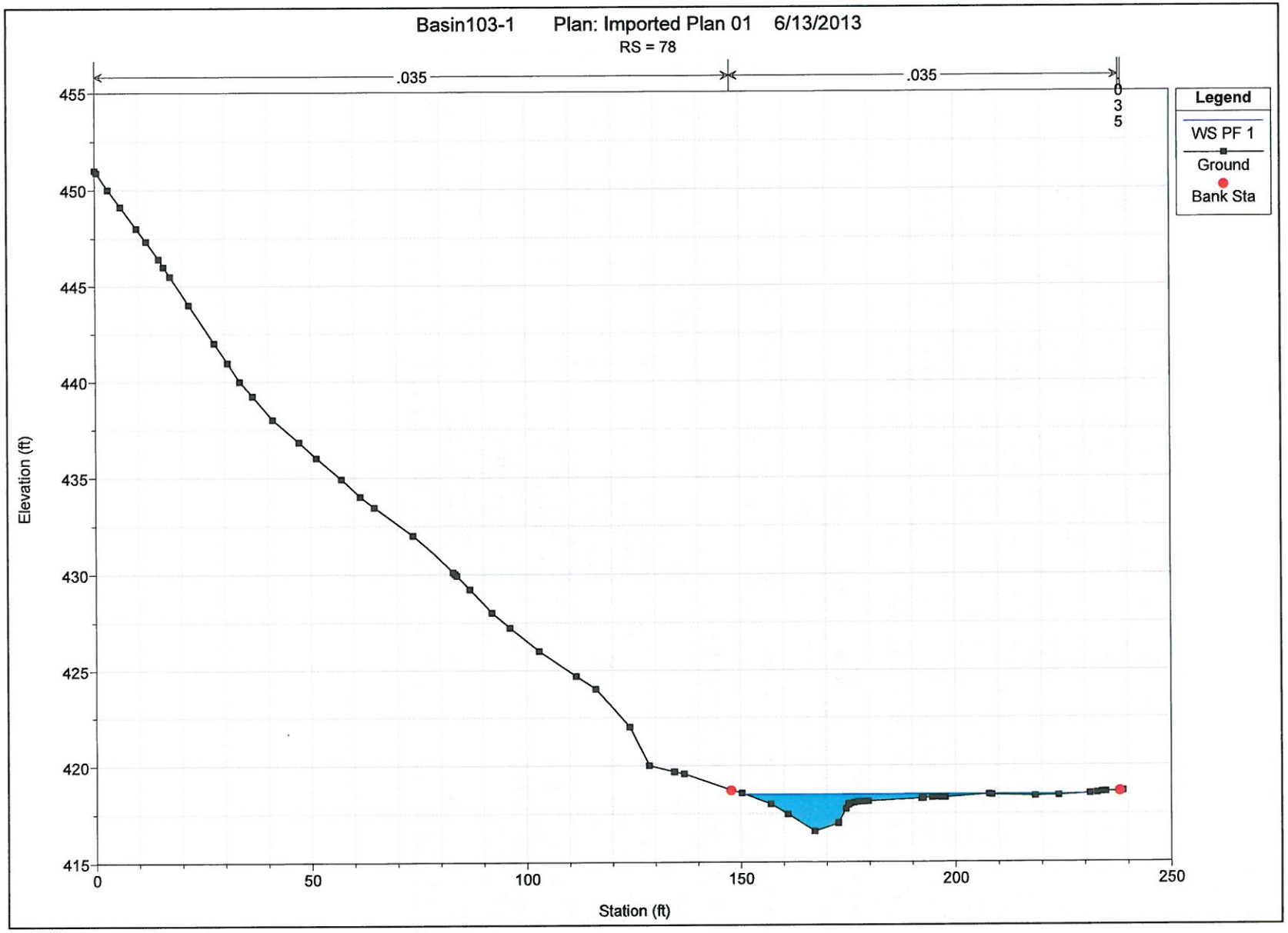
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	147.77	.035	238.13	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
147.77	238.13	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	419.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.		0.035	
W.S. Elev (ft)	418.51	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	418.75	Flow Area (sq ft)		35.31	
E.G. Slope (ft/ft)	0.080922	Area (sq ft)		35.31	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	79.10	Top Width (ft)		79.10	
Vel Total (ft/s)	7.03	Avg. Vel. (ft/s)		7.03	
Max Chl Dpth (ft)	1.93	Hydr. Depth (ft)		0.45	
Conv. Total (cfs)	872.9	Conv. (cfs)		872.9	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		79.45	
Min Ch El (ft)	416.58	Shear (lb/sq ft)		2.25	
Alpha	1.00	Stream Power (lb/ft s)	238.76	0.00	0.00
Frctn Loss (ft)	2.37	Cum Volume (acre-ft)		2.46	0.00
C & E Loss (ft)	0.03	Cum SA (acres)		3.08	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 78
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
455
450
445
440
435
430
425
420
415
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 77

INPUT
Description: 9
Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	446.32	1.07	446.05	1.27	446.01	9.97	444.09	10.39	444
19.1	442	21.24	441.45	26.41	440	31.02	438.88	34.96	438
45.89	436	54.16	434.51	57.16	434	59.34	433.55	66.79	432
68.57	431.61	76.19	430	83.77	428.85	89.03	428	92.43	427.5
103.67	426	118.78	424.43	123.04	424	140.38	422	150.36	420
161.34	418.44	164.84	418	168.92	417.66	175.5	417.18	180.39	416.93
183.68	416.81	185.6	416.78	186.8	416.79	198.33	416.07	199.02	416
199.86	415.8	200	415.8	203.04	415.04	203.53	414.89	203.72	414.81
203.99	414.44	206.29	414.34	207.18	414.4	207.44	414.42	207.65	414.45
209.11	414.64	209.64	414.7	211.58	414.86	212.48	414.88	213.32	414.94
215.03	415.02	218.08	415.2	218.19	415.21	222.3	415.56	226.06	416
230.41	416.17	246.54	417.05	249.4	417.1	253.67	417.23	273.51	417.76
277.63	417.83	282.4	418	286.93	418.27	289.42	418.44	314.92	419.77
315.98	419.83	318.62	420	320.02	420.18	326.51	420.62	342.87	422
347.01	422.54	348.8	422.71	352.26	424	355.9	425.37		

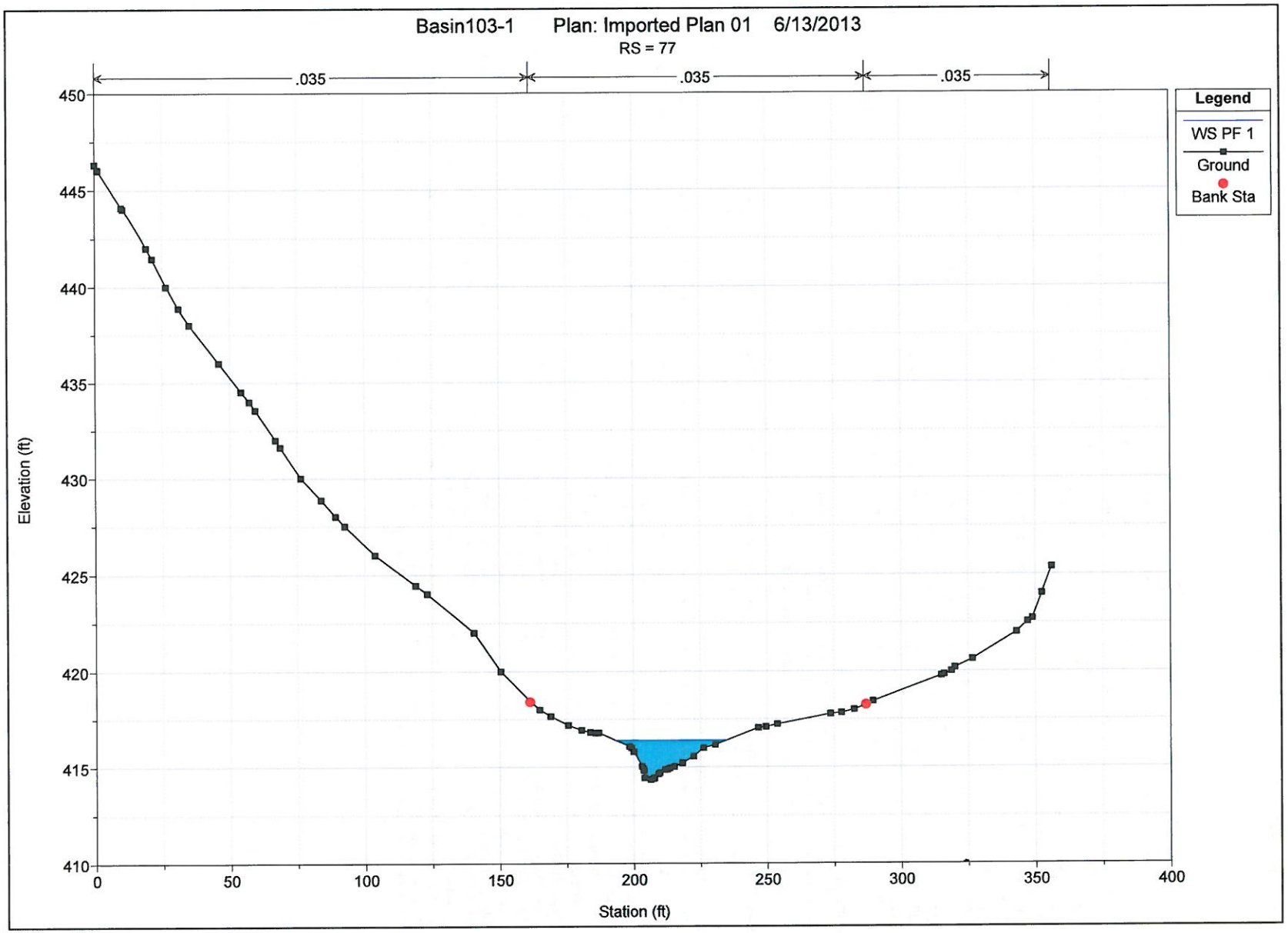
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	161.34	.035	286.93	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
161.34	286.93	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	417.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.		0.035	
W.S. Elev (ft)	416.41	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	416.55	Flow Area (sq ft)		38.03	
E.G. Slope (ft/ft)	0.027256	Area (sq ft)		38.03	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	41.86	Top Width (ft)		41.86	
Vel Total (ft/s)	6.53	Avg. Vel. (ft/s)		6.53	
Max Chl Dpth (ft)	2.07	Hydr. Depth (ft)		0.91	
Conv. Total (cfs)	1504.0	Conv. (cfs)		1504.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		42.31	
Min Ch El (ft)	414.34	Shear (lb/sq ft)		1.53	
Alpha	1.00	Stream Power (lb/ft s)	355.90	0.00	0.00
Frctn Loss (ft)	2.18	Cum Volume (acre-ft)		2.42	0.00
C & E Loss (ft)	0.03	Cum SA (acres)		3.01	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 77
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
450
445
440
435
430
425
420
415
410
0
50
100
150
200
250
300
350
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 76

INPUT
Description: 10
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	441.76	.14	441.74	9.69	440	15.52	438.99	16.78	438.8
26.52	437.08	32.35	436	44.43	434	55.04	432.51	58.32	432
62.25	431.22	67.98	430	73.99	428.98	75.05	428.81	87.35	426.56
90.71	426	102.23	424.31	104.54	424	118.21	422.33	121.06	422
132.11	420.74	135.13	420.42	136.45	420.31	146.47	418.95	152.58	418
164.01	416.51	168.09	416	175.9	414.99	176.9	414.92	178.24	414.81
183.03	414.31	186.58	414	186.86	413.96	186.92	413.94	187.01	413.92
187.15	413.89	193.57	412.74	194.14	412.58	194.64	412.46	196.57	412
201.02	411.68	204.39	411.22	204.6	411.18	204.79	411.16	205.19	411.14
205.88	411.14	206.75	411.18	207.72	411.25	208.96	411.38	209.03	411.39
210.83	411.77	211.24	411.88	211.91	412	212.82	412.19	222.07	413.02
230.18	413.81	230.27	413.82	230.32	413.83	230.44	413.84	230.79	413.87
233.21	414	238.52	414.4	240.03	414.55	252.17	416	261.41	416.41
264.18	416.5	267.41	416.54	271.48	416.56				

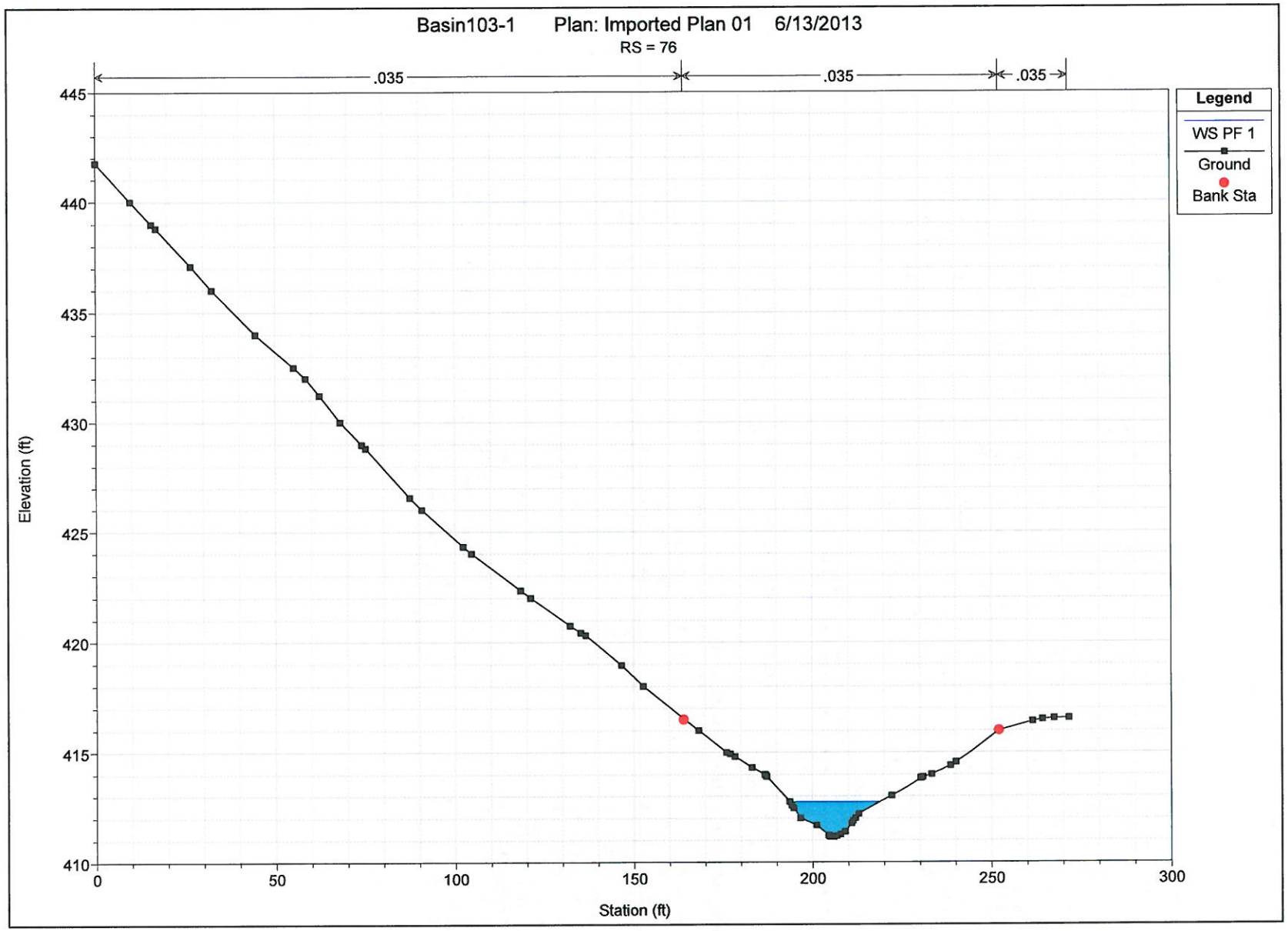
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	164.01	.035	252.17	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
164.01	252.17	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	414.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.96	Wt. n-Val.		0.035	
W.S. Elev (ft)	412.75	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	413.35	Flow Area (sq ft)		22.12	
E.G. Slope (ft/ft)	0.085944	Area (sq ft)		22.12	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	25.56	Top Width (ft)		25.56	
Vel Total (ft/s)	11.23	Avg. Vel. (ft/s)		11.23	
Max Chl Dpth (ft)	1.61	Hydr. Depth (ft)		0.87	
Conv. Total (cfs)	847.0	Conv. (cfs)		847.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		25.82	
Min Ch El (ft)	411.14	Shear (lb/sq ft)		4.60	
Alpha	1.00	Stream Power (lb/ft s)	271.48	0.00	0.00
Frctn Loss (ft)	2.23	Cum Volume (acre-ft)		2.39	0.00
C & E Loss (ft)	0.13	Cum SA (acres)		2.98	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 76
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
445
440
435
430
425
420
415
410
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 75

INPUT
Description: 11
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	437.45	2.58	437.01	8.26	436	12.74	435.15	18.93	434
25.68	432.65	29.52	432	32.05	431.54	41.16	430	43.64	429.74
54.99	428	68.57	426	77.89	424.52	81.33	424	84.75	423.46
93.66	422	96.26	421.59	99.42	421.15	103.02	420.62	108.04	420
125.5	418.15	126.98	418	139.5	416.53	142	416.26	144	416
156.67	414.05	157	414	157.05	413.99	157.28	413.95	164.57	412.7
165.48	412.56	166.17	412.44	166.38	412.4	166.87	412.34	168.88	412
170.96	410.87	171.91	410.31	172.31	410.1	172.48	410	172.9	409.78
176.23	408	181.21	408	182.46	408.35	184.4	408.96	189.54	410
206.12	411.64	208.99	412	215.61	412.22	222.1	412.41	223.18	412.43
226.3	412.51	242.09	413.34	244.65	413.41	249.22	413.52	249.91	413.55
250.63	413.57	260.67	414	267.07	414.85				

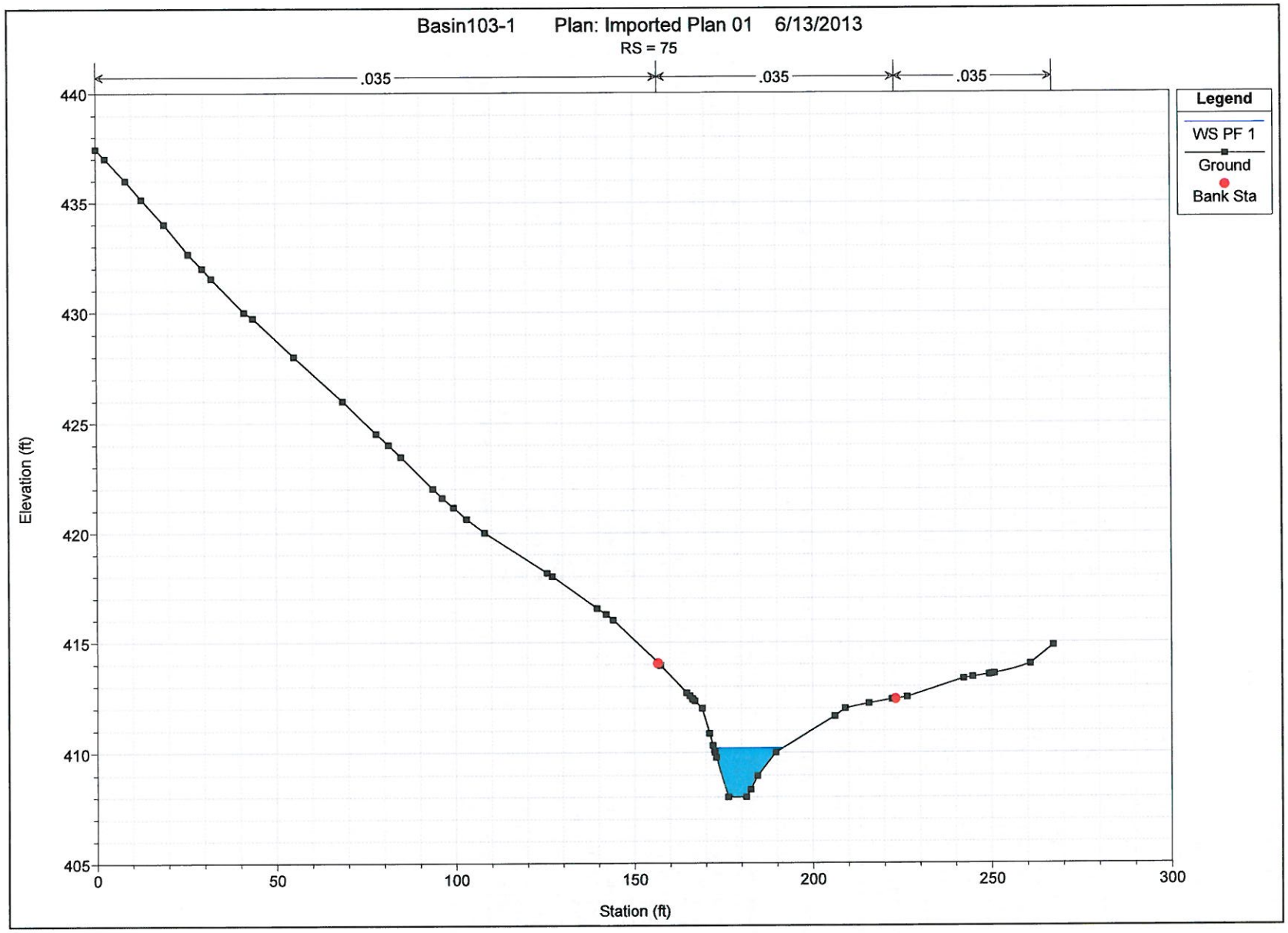
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	156.67	.035	223.18	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
156.67	223.18	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	411.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.50	Wt. n-Val.		0.035	
W.S. Elev (ft)	410.22	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	410.71	Flow Area (sq ft)		25.23	
E.G. Slope (ft/ft)	0.040610	Area (sq ft)		25.23	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	19.64	Top Width (ft)		19.64	
Vel Total (ft/s)	9.84	Avg. Vel. (ft/s)		9.84	
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)		1.28	
Conv. Total (cfs)	1232.1	Conv. (cfs)		1232.1	
Length Wtd. (ft)		Wetted Per. (ft)		20.45	
Min Ch El (ft)	408.00	Shear (lb/sq ft)		3.13	
Alpha	1.00	Stream Power (lb/ft s)	267.07	0.00	0.00
Frctn Loss (ft)	2.85	Cum Volume (acre-ft)		2.36	0.00
C & E Loss (ft)	0.14	Cum SA (acres)		2.95	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 75
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
440
435
430
425
420
415
410
405
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 74

INPUT
Description: 12
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	437.7	7.53	436.31	9.23	436	9.87	435.87	19.41	434
28.39	432.07	28.7	432	29.42	431.84	37.88	430	48.58	428.81
56.15	428	69.66	426	70.07	425.93	80.81	424	89.53	422.6
93.14	422	96.41	421.41	105.25	420	114.74	418.51	118.09	418
124.63	417.3	135.75	416	137.59	415.75	145.36	414.73	150.44	414
155.43	413.13	161.8	412	162.43	411.33	163.82	410	164.51	409.28
165.92	408	168.35	407.69	168.59	407.66	177.68	407.61	177.89	408
186.09	409.23	191.6	410	198	410.71	199.82	410.79	201.72	410.8
208.35	411.29	208.98	411.34	209.26	411.37	209.74	411.41	209.94	411.42
210.27	411.43	210.46	411.43	210.7	411.44	211.7	411.47	212.47	411.48
213.44	411.47	214.59	411.44	215.91	411.36	218.78	411.17	220.71	411.06
223.94	410.97	229.72	410.74	233.04	410.65	236.82	410.54	240.35	410.5
241.83	410.44	243.19	410.4	244.52	410.39	245.87	410.42	247.33	410.5
250.03	410.53	252.68	410.75	254.61	410.82	255.3	410.86	256.79	410.94
257.44	410.96	258.15	410.98	267.78	412	269.3	412.72	271.98	414
275.42	415.71	276.04	416	279.94	417.88	280.2	418	280.83	418.31
284.47	420	287.95	421.7	288.57	422	289.15	422.29	292.82	424
294.65	424.91	297.03	426						

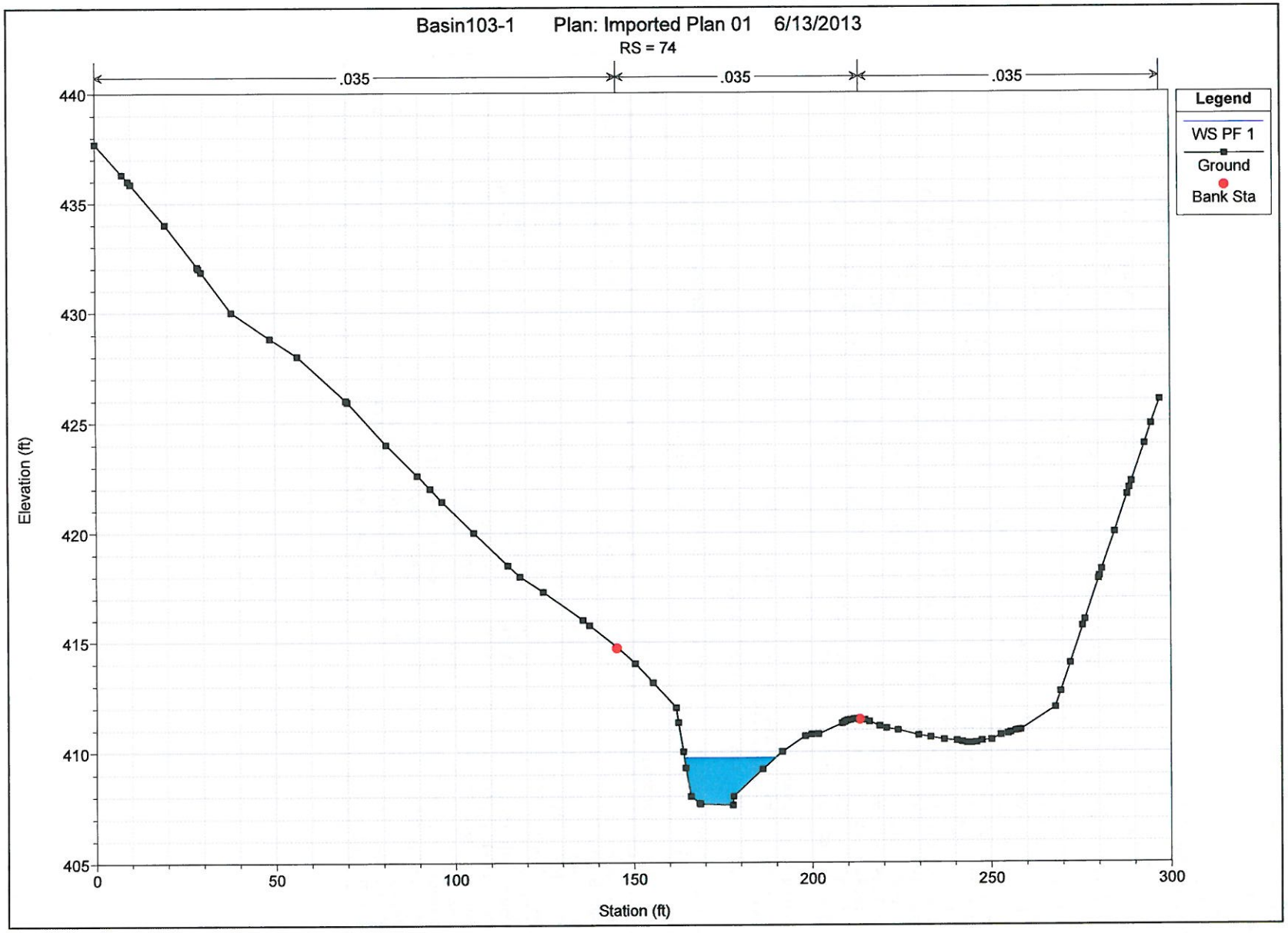
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	145.36	.035	213.44	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
145.36	213.44	5.67	50	94.03	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	410.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.		0.035	
W.S. Elev (ft)	409.74	Reach Len. (ft)	5.67	50.00	94.03
Crit W.S. (ft)	409.74	Flow Area (sq ft)		36.41	
E.G. Slope (ft/ft)	0.017083	Area (sq ft)		36.41	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	25.66	Top Width (ft)		25.66	
Vel Total (ft/s)	6.82	Avg. Vel. (ft/s)		6.82	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.42	
Conv. Total (cfs)	1899.7	Conv. (cfs)		1899.7	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		26.73	
Min Ch El (ft)	407.61	Shear (lb/sq ft)		1.45	
Alpha	1.00	Stream Power (lb/ft s)	297.03	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		2.32	0.00
C & E Loss (ft)		Cum SA (acres)		2.92	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 74
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
440
435
430
425
420
415
410
405
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 73

INPUT
Description: 13
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	436.71	.45	436.64	4.71	436	13.52	434.75	19.09	434
31.94	432	35.81	431.32	42.32	430	44.32	429.69	55.14	428
63.96	426.71	67.24	426.31	69.46	426	71.61	425.54	77	424.49
79.45	424	84.61	422.7	87.36	422	87.69	421.97	87.82	421.96
88.17	421.92	91.45	421.55	104.98	420	106.23	419.83	121.32	418
134.87	416	137.1	415.83	154.39	414	159.74	412.99	165.08	412
175.72	410.07	176.14	410	183.36	408.73	190.1	408	191.31	407.64
193.99	406.67	195.43	406	200.14	406	206.28	406	209.3	406.81
211.79	407.5	213.73	407.84	214.95	408	215.31	408.01	216.53	408.04
218.37	408.01	218.87	408	221.05	407.89	223.43	407.84	225.2	408
225.28	408.01	225.4	408	232.19	408.22	234.89	408.29	236.74	408.33
238.05	408.34	239.1	408.36	243.67	408.46	244.67	408.48	245.57	408.48
246.96	408.45	252.73	408.27	257.93	408.25	262.04	408.4	267.68	408.82
274.21	409.13	284.25	410	286.17	410.86	288.86	412	291.02	412.95
293.55	414								

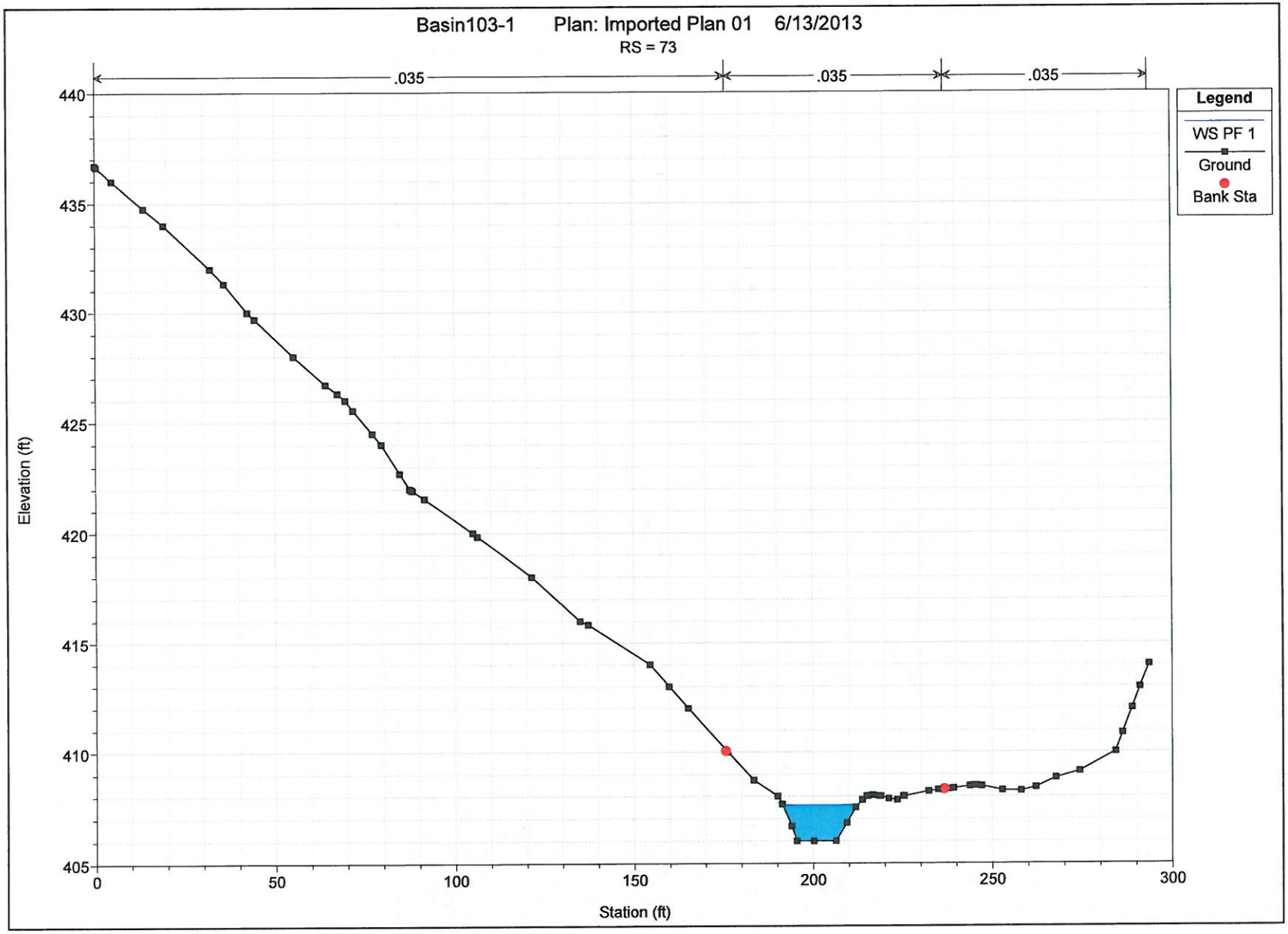
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	175.72	.035	236.74	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.72	236.74	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	409.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.		0.035	
W.S. Elev (ft)	407.61	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	408.24	Flow Area (sq ft)		25.37	
E.G. Slope (ft/ft)	0.042804	Area (sq ft)		25.37	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	21.04	Top Width (ft)		21.04	
Vel Total (ft/s)	9.79	Avg. Vel. (ft/s)		9.79	
Max Chl Dpth (ft)	1.61	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	1200.1	Conv. (cfs)		1200.1	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		21.56	
Min Ch El (ft)	406.00	Shear (lb/sq ft)		3.14	
Alpha	1.00	Stream Power (lb/ft s)	293.55	0.00	0.00
Frctn Loss (ft)	1.28	Cum Volume (acre-ft)		2.29	0.00
C & E Loss (ft)	0.08	Cum SA (acres)		2.90	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 73
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
440
435
430
425
420
415
410
405
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 72

INPUT
Description: 14
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	434.11	.42	434	.87	433.9	9.54	432	13.07	431.29
14.68	430.99	19.61	430	27.55	428.42	29.99	428	33.75	427.19
39.14	426	41.65	425.47	42.95	425.26	49.68	424.24	50.8	424.06
51.18	424	62.99	422.4	65.6	422	77.18	420.04	77.42	420
86.38	418.73	95.47	418.3	97.03	418.18	101.12	418	104.16	417.82
104.68	417.78	105.57	417.69	111.22	417.19	118.38	416.33	121.05	416
124.38	415.6	138.07	414	138.82	413.92	149.66	412.54	154.2	412
160.4	411.15	174.74	409.34	185.87	408	192.82	407.79	216.92	406.32
225.29	406.17	228.62	406.09	231.61	406	232.49	405.3	234.22	404
234.49	403.89	235.66	403.69	237.62	403.58	239.38	403.51	240.13	403.46
240.47	403.41	241.93	403.23	242.2	403.21	242.55	403.21	243.08	403.24
245.78	403.37	248.14	403.55	249	403.71	249.07	403.74	249.27	403.87
249.72	404	249.83	404.09	249.92	404.16	252.56	406	252.94	406.02
254.51	406.06	255.64	406.03	256.28	406	257.17	405.92	259.22	405.88
260.42	406	262.42	406.09	262.66	406.11	262.99	406.14	273.1	406.89
275.45	407.02	276.84	407.06	277.53	407.07	277.62	407.08	277.81	407.1
278.27	407.12	279.44	407.16	281.09	407.22	283	407.28	284.99	407.32
286.7	407.34	292.28	407.35	293.84	407.37	297.53	407.43	301.9	407.64
307.45	408	310.22	408.33	311.41	408.45	311.94	408.44	312.97	408.39
315.36	408.32								

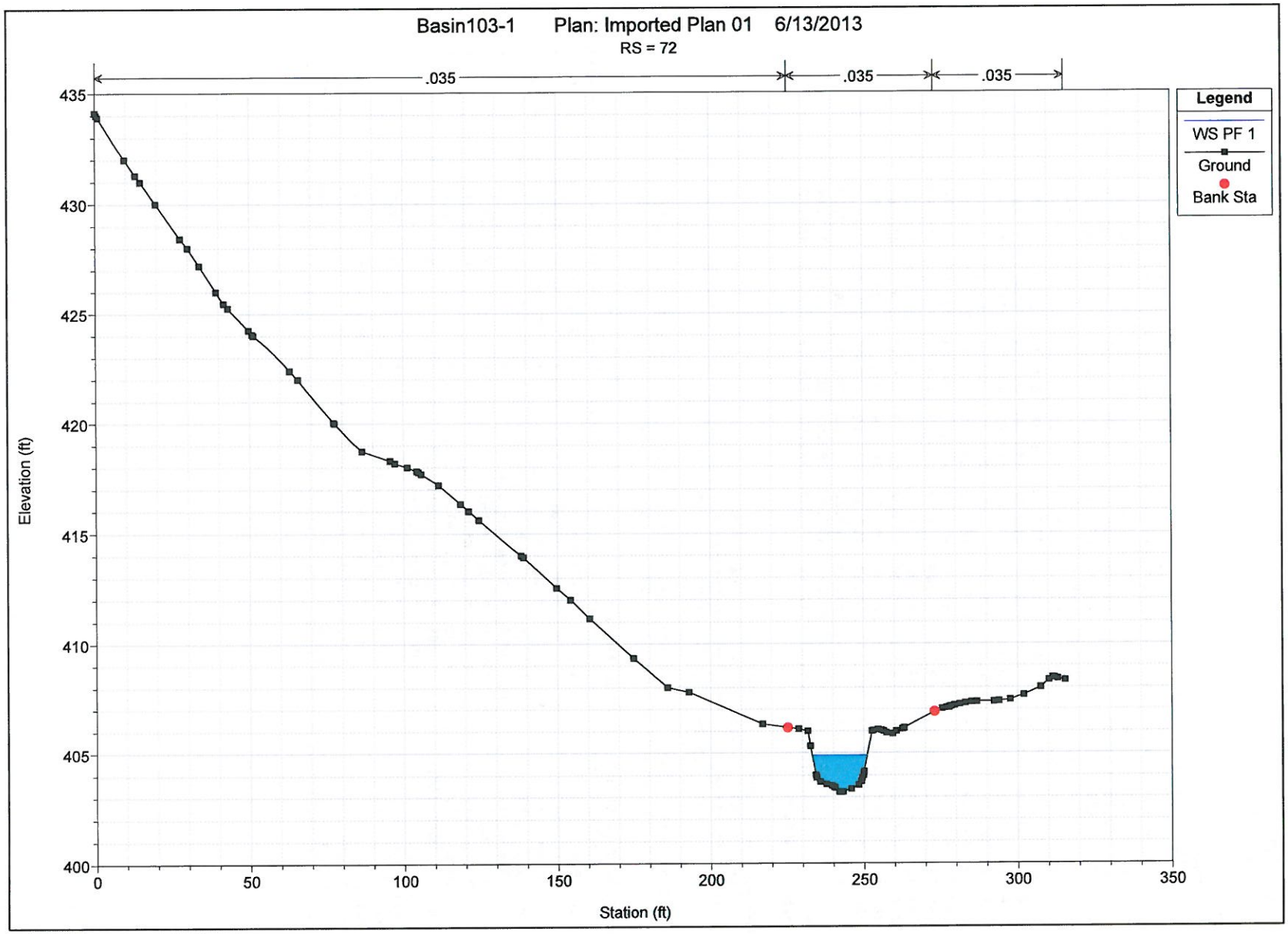
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	225.29	.035	273.1	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
225.29	273.1	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	406.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.84	Wt. n-Val.		0.035	
W.S. Elev (ft)	404.90	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	405.46	Flow Area (sq ft)		22.80	
E.G. Slope (ft/ft)	0.050495	Area (sq ft)		22.80	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	17.95	Top Width (ft)		17.95	
Vel Total (ft/s)	10.89	Avg. Vel. (ft/s)		10.89	
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)		1.27	
Conv. Total (cfs)	1105.0	Conv. (cfs)		1105.0	
Length Wtd. (ft)		Wetted Per. (ft)		18.69	
Min Ch El (ft)	403.21	Shear (lb/sq ft)		3.85	
Alpha	1.00	Stream Power (lb/ft s)	315.36	0.00	0.00
Frctn Loss (ft)	2.32	Cum Volume (acre-ft)		2.26	0.00
C & E Loss (ft)	0.04	Cum SA (acres)		2.87	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 72
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
435
430
425
420
415
410
405
400
0
50
100
150
200
250
300
350

CROSS SECTION
REACH: Reach-1 RS: 71

INPUT
Description: 15
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	427.82	3.61	426.98	8.81	426	13.27	425.06	18.37	424
27.8	422	34.64	420.5	37.09	420	40.73	419.22	43.15	418.81
48.56	418	54.21	417.53	54.43	417.51	54.63	417.49	54.9	417.45
64.21	416	67.4	415.4	70.03	414.92	74.09	414.25	76.04	414
76.37	413.96	76.5	413.96	79.68	413.69	86.82	413.24	91.18	413.04
97.54	412.67	106.37	412	111.24	411.7	112.9	411.66	116.12	411.49
121.74	411.18	131.24	410.82	136.58	410.51	137.51	410.46	141.61	410.11
142.67	410	149.5	409.32	150.64	409.2	154.37	408.76	161.92	408
170.36	407.51	170.47	407.51	177.85	407.05	182.91	407.08	186.46	407.06
189.91	407	194.85	406.83	204.83	406.46	205.17	406.45	214.14	406.13
218.23	406	222.89	405.8	226.35	405.59	239.14	405.01	251.35	404
252.87	402.75	253.81	402	261.09	402	266.36	403.41	269.48	404
271.06	404.06	271.41	404.07	279.12	404.36	280.98	404.44	290.24	404.86
298.55	405.21	306.76	405.59	307.17	405.61	317.71	405.98	317.79	405.99
317.96	405.99	318.22	406	321.18	406.06	324.39	406.1	329.82	406.39
333.7	406.61	336.1	406.74	347.78	407.46	356.25	408	363.24	408.41
386.35	410	388.65	410.55	391.41	410.67	400	411.93		

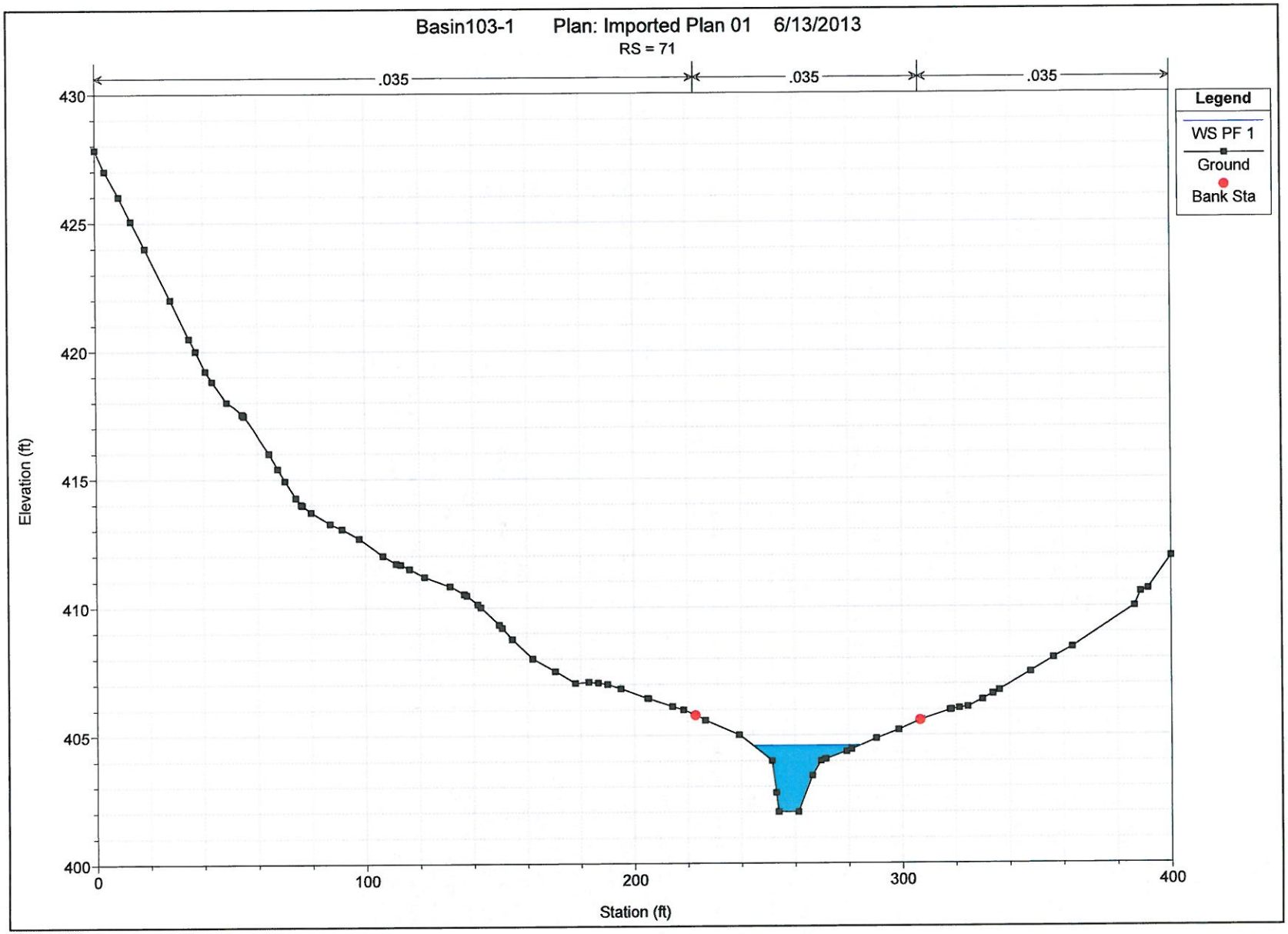
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	222.89	.035	306.76	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
222.89	306.76	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	405.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.		0.035	
W.S. Elev (ft)	404.60	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	404.60	Flow Area (sq ft)		42.39	
E.G. Slope (ft/ft)	0.018370	Area (sq ft)		42.39	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	40.27	Top Width (ft)		40.27	
Vel Total (ft/s)	5.86	Avg. Vel. (ft/s)		5.86	
Max Chl Dpth (ft)	2.60	Hydr. Depth (ft)		1.05	
Conv. Total (cfs)	1832.0	Conv. (cfs)		1832.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		41.26	
Min Ch El (ft)	402.00	Shear (lb/sq ft)		1.18	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		2.22	0.00
C & E Loss (ft)		Cum SA (acres)		2.84	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 71
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
430
425
420
415
410
405
400
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 70

INPUT
Description: 16
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	420.5	2.29	420	8.11	418.69	11.24	418	14.06	417.3
16.95	416.6	18.99	416.15	19.64	416	25.6	414.64	28.11	414
34.17	412.81	37.82	412	42.78	410.93	43.49	410.77	44.19	410.64
45.38	410.47	47.02	410.17	49.13	410	57.13	409.64	61.9	409.25
67.79	408.87	71.29	408.48	72.93	408.33	74.84	408	80.92	407.3
81.86	407.22	84.2	406.99	86.72	406.76	88.08	406.74	89	406.68
90.04	406.65	91.43	406.64	93.35	406.65	102.93	406.73	105.52	406.72
107.49	406.73	109.9	406.7	112.48	406.66	125.1	406.42	127.68	406.36
128.25	406.34	128.71	406.32	135.1	406	143.44	405.65	145.39	405.6
155.63	405.19	158.51	405.1	162.54	405.08	169.02	404.92	181.39	404.69
184.32	404.71	186.51	404.73	190.25	404.73	194.49	404.76	195.56	404.77
196.13	404.77	196.7	404.76	198.23	404.74	208.27	404.59	223.59	404.55
225.39	404.52	236.18	404.23	239.44	404.13	244.24	404	251.29	403.25
256.58	402.38	258.96	402	260.12	401.84	263.75	401.38	271.06	401.45
271.11	401.51	272.68	402	277.32	402.51	277.5	402.52	277.9	402.54
279.09	402.62	283.61	403.03	285.65	403.11	288.76	403.18	291.25	403.38
291.96	403.44	293.25	403.54	293.54	403.56	306.05	403.66	306.84	403.7
309.46	403.73	312.54	403.81	317.27	404	317.97	404.04	319.23	404.11
334.25	404.98	336.05	405.06	341.02	405.29	342.24	405.34	343.67	405.45
345.04	405.54	345.77	405.58						

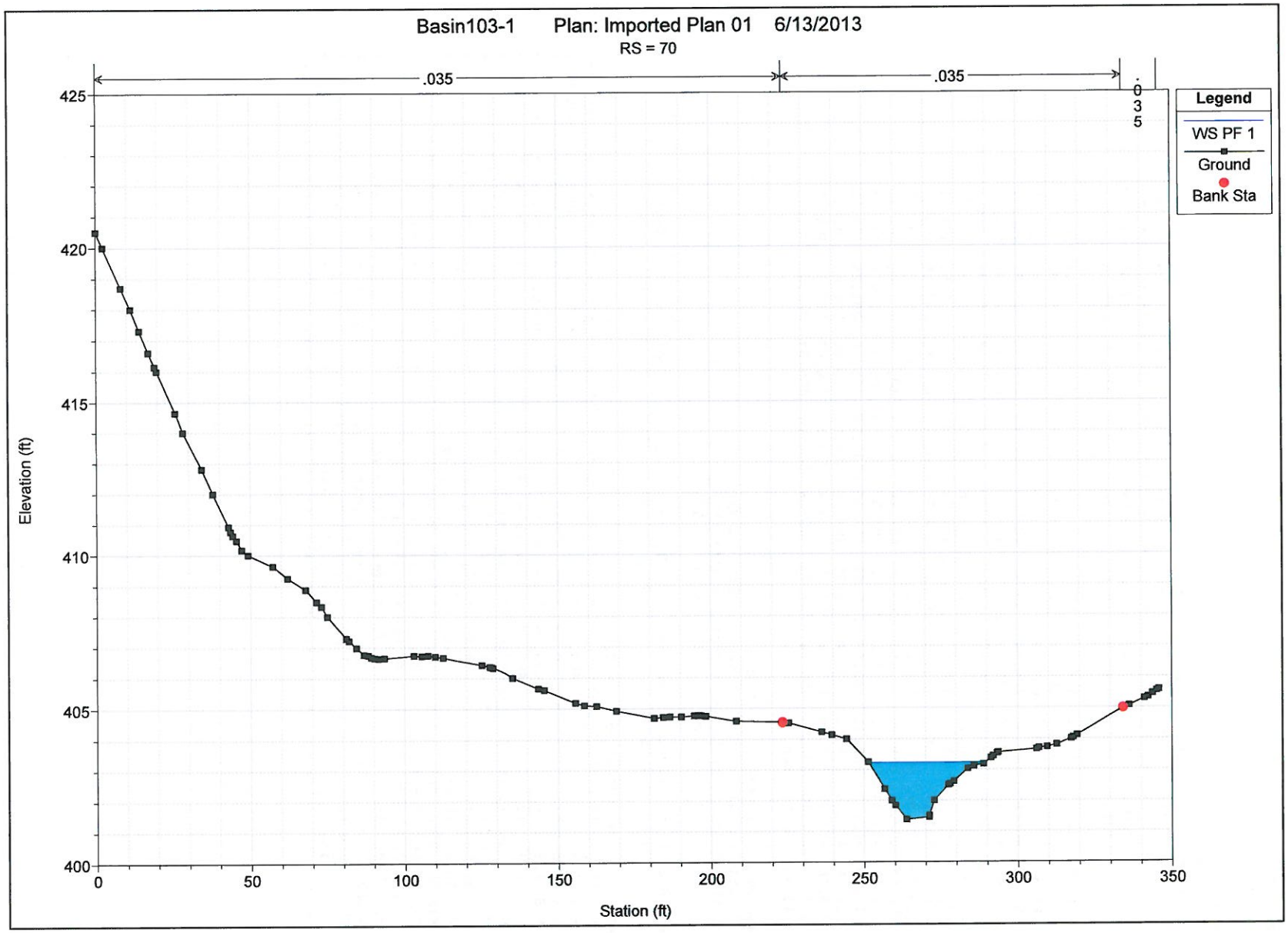
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	223.59	.035	334.25	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
223.59	334.25	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	403.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.		0.035	
W.S. Elev (ft)	403.24	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	403.40	Flow Area (sq ft)		36.09	
E.G. Slope (ft/ft)	0.028489	Area (sq ft)		36.09	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	38.07	Top Width (ft)		38.07	
Vel Total (ft/s)	6.88	Avg. Vel. (ft/s)		6.88	
Max Chl Dpth (ft)	1.86	Hydr. Depth (ft)		0.95	
Conv. Total (cfs)	1471.1	Conv. (cfs)		1471.1	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		38.37	
Min Ch El (ft)	401.38	Shear (lb/sq ft)		1.67	
Alpha	1.00	Stream Power (lb/ft s)	345.77	0.00	0.00
Frctn Loss (ft)	1.13	Cum Volume (acre-ft)		2.18	0.00
C & E Loss (ft)	0.02	Cum SA (acres)		2.80	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 70
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
425
420
415
410
405
400
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 69

INPUT
Description: 17
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	416	8.11	414.48	9.74	414.17	10.66	414	11.69	413.79
20.71	412	21.34	411.86	29.82	410	37.11	408.53	40.1	408
54.16	406.03	54.42	406	61.3	405.34	64.58	405.07	78.56	404.08
79.15	404.04	79.65	404	91.53	403.57	94.84	403.48	98.12	403.49
103.36	403.63	115.94	404	119.08	404.03	120.05	404	123.72	403.85
136.2	403.17	139.26	403.03	141.12	403	142.75	402.99	145.91	402.9
147.87	402.88	150.01	402.87	152.21	402.88	154.24	402.9	192.39	403.06
198.43	402.91	218.52	402.87	219.03	402.85	219.99	402.81	221.94	402.76
225.01	402.76	227.97	402.73	231.94	402.67	258.87	402.18	260.55	402.14
263.5	402.05	264.92	402	280.45	400.41	284.66	400	296.87	400
297.54	400.18	298.21	400.38	306.14	402	309.77	402.19	315.86	402.53
317.98	402.7	333.1	403.62	342.09	404	373.66	405.96	374.36	406
374.84	406.04	399.84	408	400	408.05				

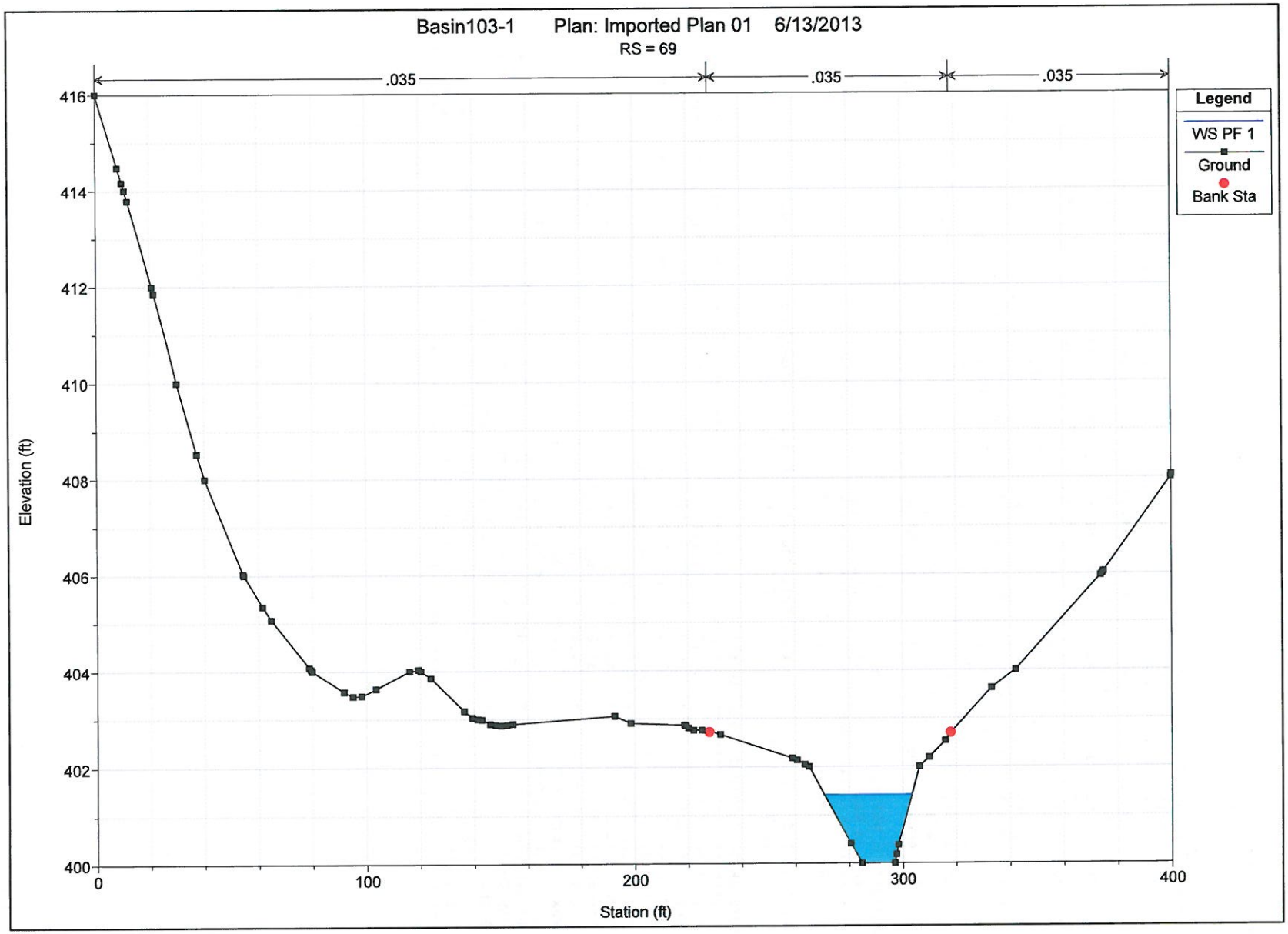
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	227.97	.035	317.98	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
227.97	317.98	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	402.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.94	Wt. n-Val.		0.035	
W.S. Elev (ft)	401.43	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	401.69	Flow Area (sq ft)		31.94	
E.G. Slope (ft/ft)	0.035069	Area (sq ft)		31.94	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	32.81	Top Width (ft)		32.81	
Vel Total (ft/s)	7.77	Avg. Vel. (ft/s)		7.77	
Max Chl Dpth (ft)	1.43	Hydr. Depth (ft)		0.97	
Conv. Total (cfs)	1325.9	Conv. (cfs)		1325.9	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		33.04	
Min Ch El (ft)	400.00	Shear (lb/sq ft)		2.12	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	1.58	Cum Volume (acre-ft)		2.14	0.00
C & E Loss (ft)	0.02	Cum SA (acres)		2.76	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 69
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
416
414
412
410
408
406
404
402
400
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 68

INPUT
Description: 18
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	414.75	.33	414.67	3.15	414	12.06	412	18.4	410.55
20.51	410	23.14	409.26	27.81	408	31.55	407.15	36.1	406
44.63	404.03	44.79	404	52.43	403.46	56.84	403.16	59.03	403.02
60.48	402.93	76.45	402	94.89	401.55	100.11	401.44	102.95	401.4
105.13	401.38	107.49	401.38	109.95	401.36	113.55	401.29	116.58	401.27
117.79	401.26	118.92	401.26	120.45	401.28	122.39	401.33	127.91	401.48
148.8	402	149.68	402.02	151.88	402.02	159.17	402	161.68	401.95
161.98	401.95	172.3	401.76	180.88	401.64	182.78	401.6	190.53	401.48
194.53	401.38	195.55	401.34	196.7	401.28	201.54	401.16	203.15	401.1
204.01	401.06	205.75	400.96	207.54	400.85	213.13	400.57	214.12	400.5
221.01	400	224.46	399.22	227.96	398.41	228.47	398.3	229.12	398.17
229.66	398.07	229.77	398.05	229.87	398.05	229.93	398.04	230.3	398
259.23	398	262.09	398.3	263.86	398.52	266.33	398.73	267.69	398.71
268.6	398.59	269.28	398.52	269.82	398.61	273.01	398.55	273.2	398.56
273.36	398.57	273.62	398.6	274.3	398.62	275.52	398.88	277.51	399.19
279.8	399.47	280.12	399.53	280.35	399.58	282.08	400	289.55	400.64
289.85	400.69	290.26	400.71	290.67	400.75	291.76	400.8	295.05	401.19
295.3	401.22	295.49	401.24	295.71	401.25	295.9	401.26	306.13	401.75
309.42	401.95	309.86	402	312.45	402.25	315.14	402.38	315.38	402.4
340.89	404	344.82	404.39						

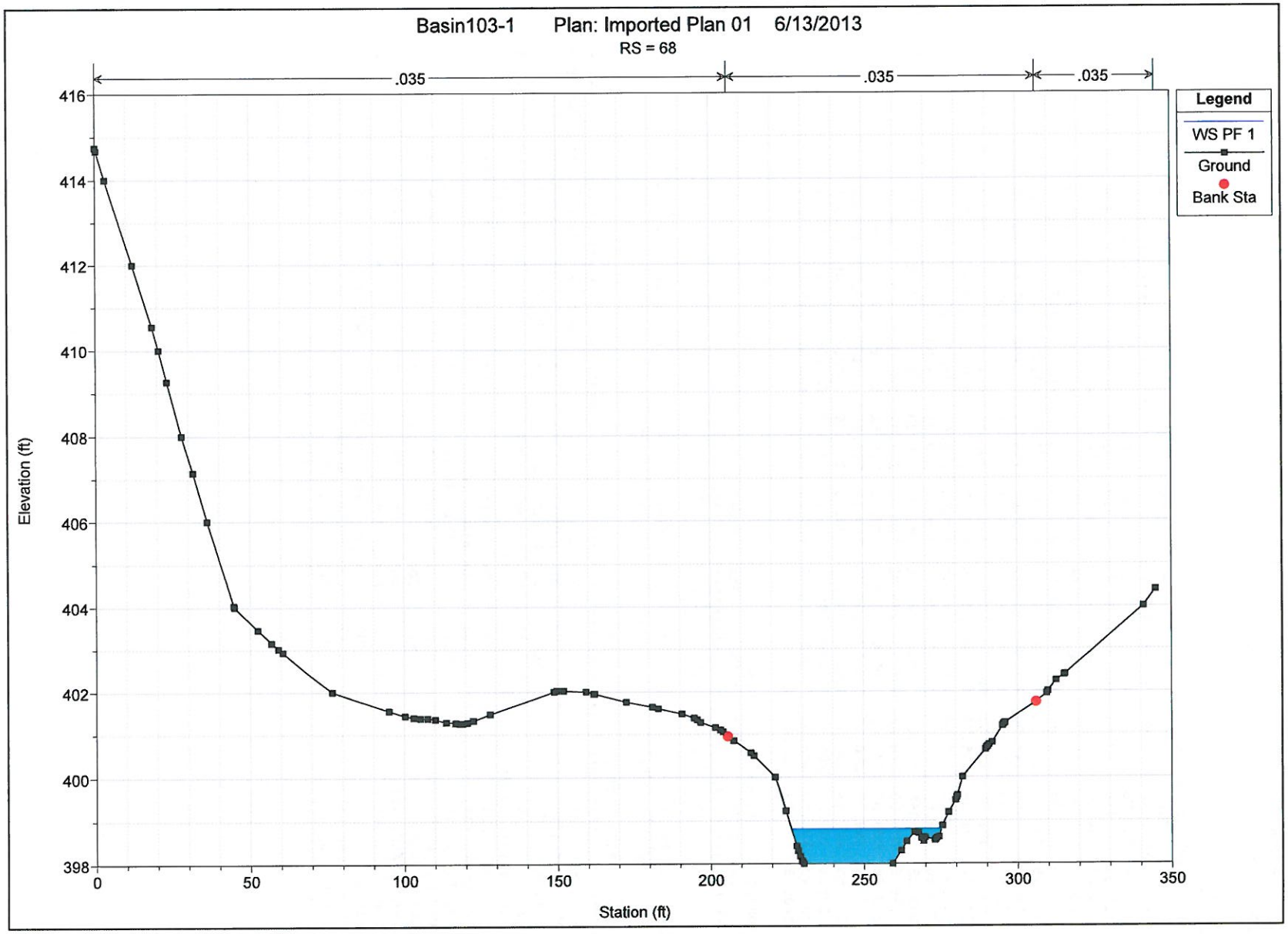
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	205.75	.035	306.13	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.75	306.13	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	399.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.07	Wt. n-Val.		0.035	
W.S. Elev (ft)	398.81	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	399.13	Flow Area (sq ft)		29.85	
E.G. Slope (ft/ft)	0.074522	Area (sq ft)		29.85	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	48.94	Top Width (ft)		48.94	
Vel Total (ft/s)	8.32	Avg. Vel. (ft/s)		8.32	
Max Chl Dpth (ft)	0.81	Hydr. Depth (ft)		0.61	
Conv. Total (cfs)	909.6	Conv. (cfs)		909.6	
Length Wtd. (ft)		Wetted Per. (ft)		49.10	
Min Ch El (ft)	398.00	Shear (lb/sq ft)		2.83	
Alpha	1.00	Stream Power (lb/ft s)	344.82	0.00	0.00
Frctn Loss (ft)	2.47	Cum Volume (acre-ft)		2.10	0.00
C & E Loss (ft)	0.01	Cum SA (acres)		2.71	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 68
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
416
414
412
410
408
406
404
402
400
398
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 67

INPUT
Description: 19
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	416.27	1.22	416	4.15	415.12	7.61	414	11.5	412.86
14.18	412	18.63	410.76	21.7	410	23.6	409.59	30.88	408
34.03	407.28	39.78	406	45.9	404.35	47.34	404	52.79	402.48
54.83	402	60.03	401.16	62.48	401.05	64.13	400.86	65.06	400.72
68.51	400.73	71.98	400.84	72.13	400.84	92.02	399.85	92.28	399.85
100.9	399.49	105.21	399.38	108.52	399.39	116.71	399.47	119.89	399.44
122.94	399.46	124.25	399.45	125.39	399.45	125.65	399.43	126.31	399.39
126.59	399.37	129.58	399.35	134.6	399.06	138.06	398.98	143.96	398.56
147.44	398.42	153.97	398	160.01	397.72	160.73	397.7	163.76	397.58
166.23	397.52	168.73	397.48	171.42	397.43	175.25	397.37	177.5	397.37
179.38	397.38	180.77	397.38	181.56	397.4	183.04	397.38	189.21	397.26
190.71	397.2	202.79	398	225.18	398	235.67	399.19	242.69	400
269.3	402	273.69	402.26	292.78	403.36				

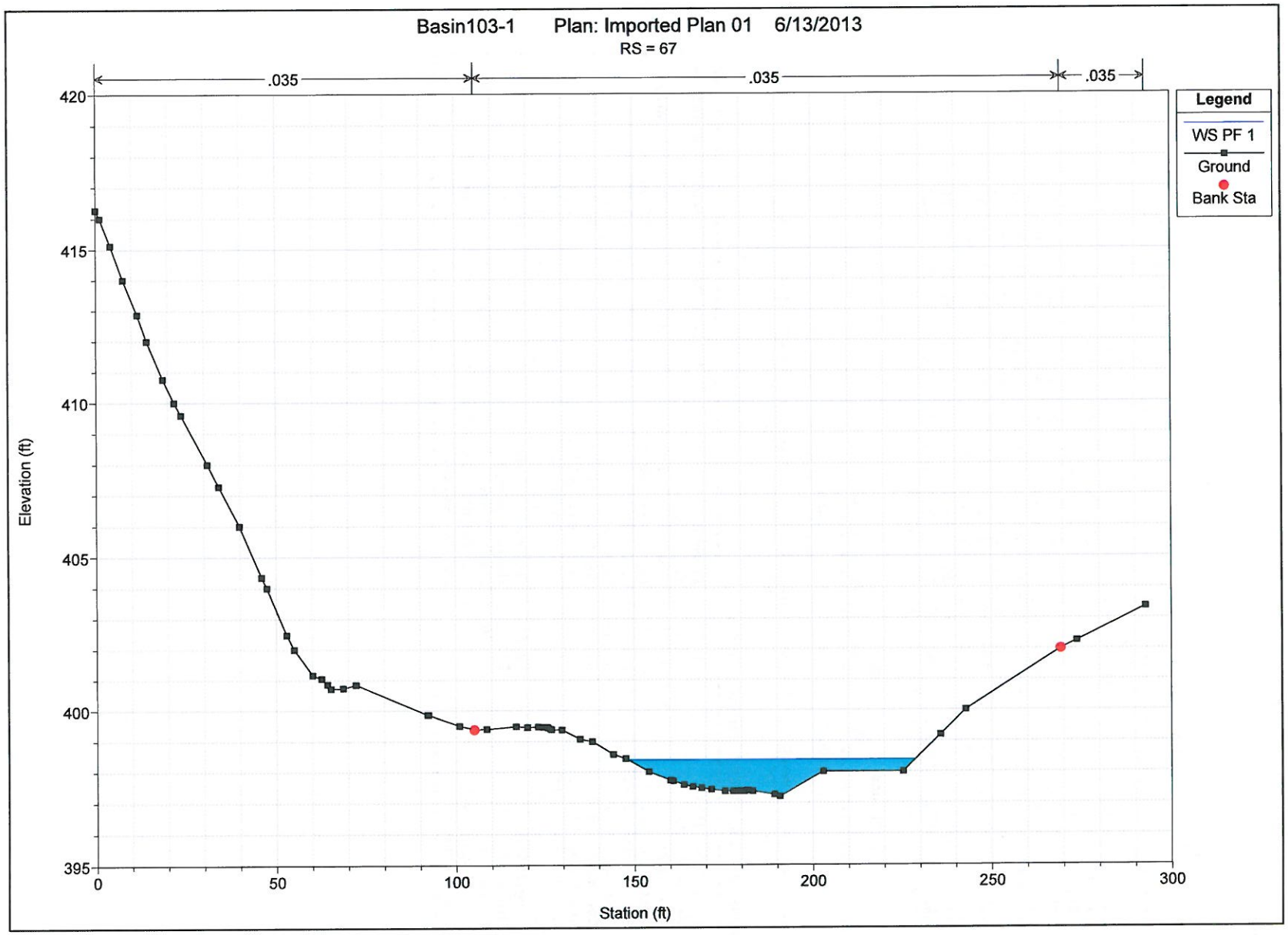
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	105.21	.035	269.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
105.21	269.3	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	398.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.035	
W.S. Elev (ft)	398.39	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	398.39	Flow Area (sq ft)		53.08	
E.G. Slope (ft/ft)	0.021274	Area (sq ft)		53.08	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	80.76	Top Width (ft)		80.76	
Vel Total (ft/s)	4.68	Avg. Vel. (ft/s)		4.68	
Max Chl Dpth (ft)	1.19	Hydr. Depth (ft)		0.66	
Conv. Total (cfs)	1702.4	Conv. (cfs)		1702.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		80.84	
Min Ch El (ft)	397.20	Shear (lb/sq ft)		0.87	
Alpha	1.00	Stream Power (lb/ft s)	292.78	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		2.06	0.00
C & E Loss (ft)		Cum SA (acres)		2.63	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 67
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
420
415
410
405
400
395
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 66

INPUT
Description: 20
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	415.22	.98	414.94	4.18	414	9.22	412.45	10.62	412
15.19	410.66	17.67	410	21.08	409.04	22.03	408.8	25.1	408
32.4	406	35.35	405.2	39.73	404	42.53	403.22	46.99	402
50.82	400.96	55.1	400	57.5	399.65	59.06	399.38	62.24	398.85
67.57	398	76.43	397.6	82.13	397.37	85.8	397.28	93.11	397.19
97.4	397.1	100.21	396.89	103.62	396.77	107.59	396.55	110.41	396.45
112.27	396.4	115.13	396.23	119.95	395.92	121.57	395.8	122.91	395.71
125.08	395.62	133.29	395.35	135.87	395.28	136.35	395.27	136.71	395.27
136.82	395.26	137.09	395.25	137.31	395.25	138.04	395.23	139.64	395.21
142.13	395.2	148.74	395.25	150.79	395.25	151.76	395.22	152.35	395.19
153.35	395.16	160.5	395.35	160.67	395.38	164.8	395.75	167.86	396
175.57	396.57	198.1	398	199.75	398.06	211.85	398.43	218.81	398.54
225.04	398.56	226.98	398.67	227.62	398.69	248.76	399.71		

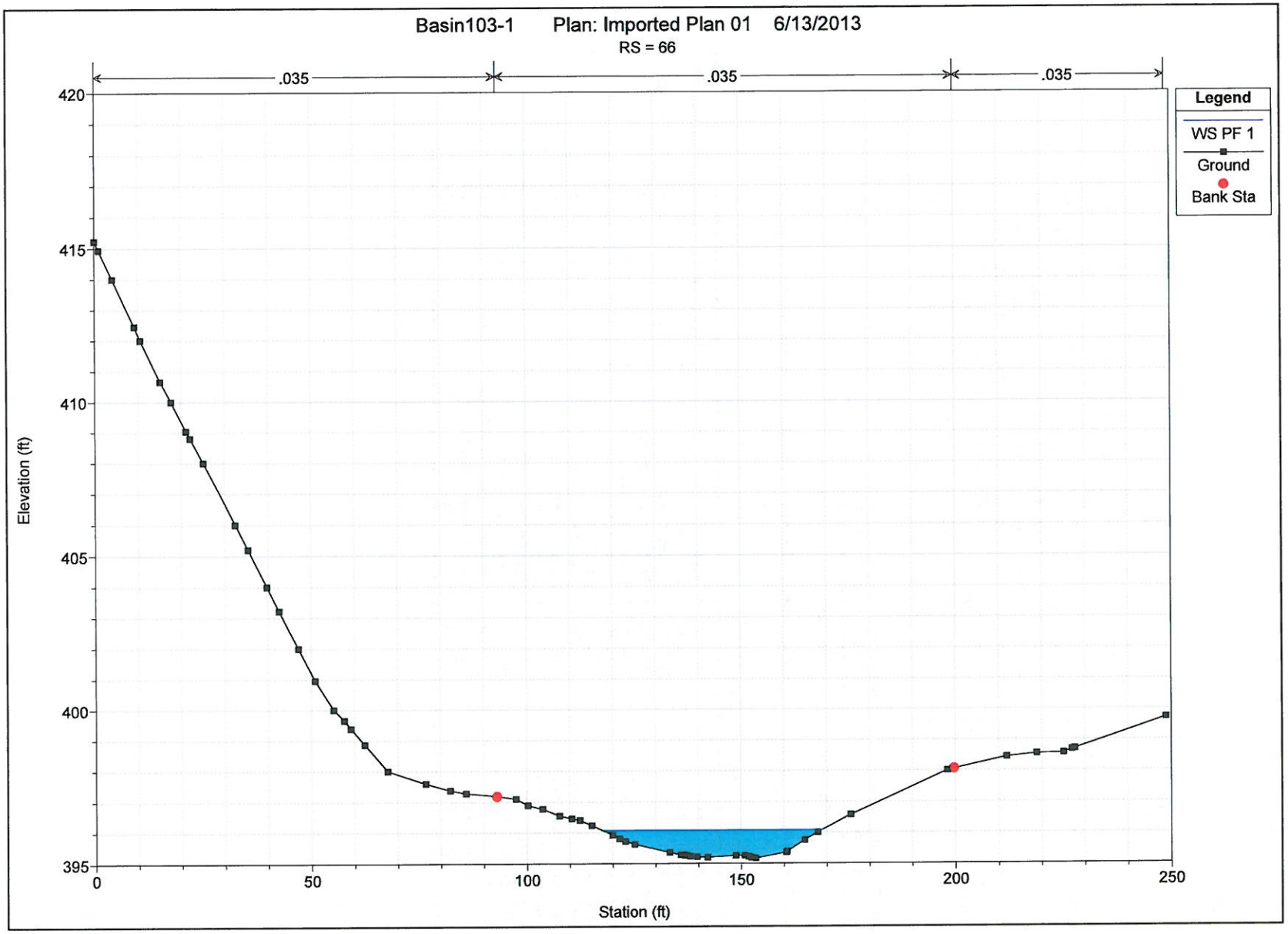
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	93.11	.035	199.75	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
93.11	199.75	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	397.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.		0.035	
W.S. Elev (ft)	396.08	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	396.37	Flow Area (sq ft)		32.26	
E.G. Slope (ft/ft)	0.061179	Area (sq ft)		32.26	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	51.34	Top Width (ft)		51.34	
Vel Total (ft/s)	7.70	Avg. Vel. (ft/s)		7.70	
Max Chl Dpth (ft)	0.92	Hydr. Depth (ft)		0.63	
Conv. Total (cfs)	1003.9	Conv. (cfs)		1003.9	
Length Wtd. (ft)		Wetted Per. (ft)		51.40	
Min Ch El (ft)	395.16	Shear (lb/sq ft)		2.40	
Alpha	1.00	Stream Power (lb/ft s)	248.76	0.00	0.00
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)		2.01	0.00
C & E Loss (ft)	0.06	Cum SA (acres)		2.56	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 66
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
420
415
410
405
400
395
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 65

INPUT
Description: 21
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	410.42	.91	410.19	1.22	410.09	1.58	410	4.23	409.18
8.73	408	10.36	407.59	13.13	406.94	14.38	406.58	17.21	405.89
17.34	405.86	17.5	405.81	19.77	405.08	21.38	404.48	23.35	404
31.03	402.34	32.5	402	38.62	400.6	41.54	400	44.03	399.73
53.94	398.73	58.44	398	80.49	396.47	87.71	396	95.29	395.33
99.26	395.01	102.57	394.77	103.69	394.71	104.75	394.68	115.77	394.23
125.66	394.07	130.57	394	144.62	394	146.03	394.14	146.57	394.15
146.87	394.16	147.26	394.19	150.43	394.39	160.37	395.09	172.18	396
173.64	396.01	214.68	397.29	236.16	397.88	241.18	398		

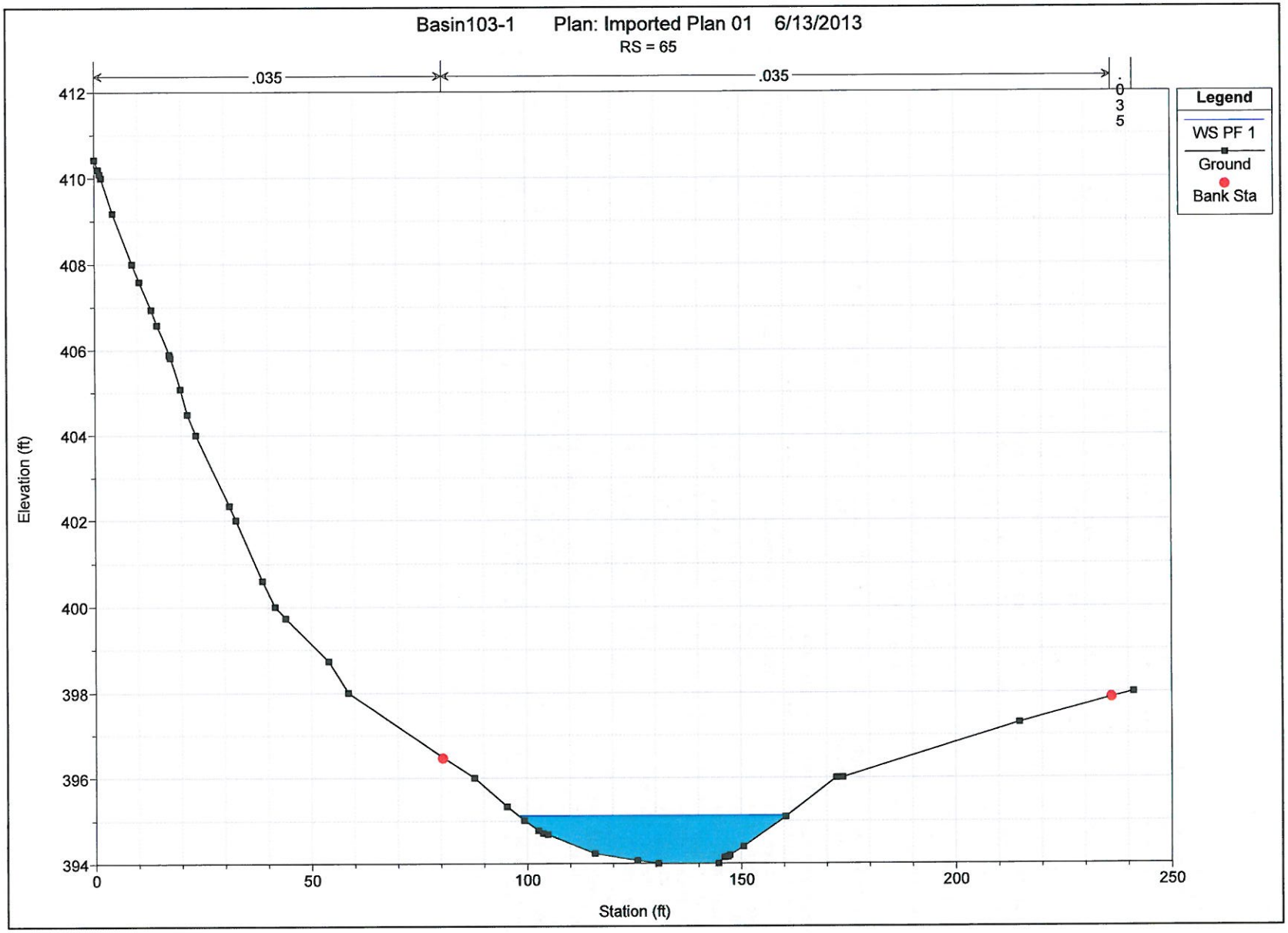
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	80.49	.035	236.16	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
80.49	236.16	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	395.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.035	
W.S. Elev (ft)	395.13	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	395.13	Flow Area (sq ft)		49.13	
E.G. Slope (ft/ft)	0.019769	Area (sq ft)		49.13	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	63.01	Top Width (ft)		63.01	
Vel Total (ft/s)	5.05	Avg. Vel. (ft/s)		5.05	
Max Chl Dpth (ft)	1.13	Hydr. Depth (ft)		0.78	
Conv. Total (cfs)	1766.0	Conv. (cfs)		1766.0	
Length Wtd. (ft)		Wetted Per. (ft)		63.07	
Min Ch El (ft)	394.00	Shear (lb/sq ft)		0.96	
Alpha	1.00	Stream Power (lb/ft s)	241.18	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.96	0.00
C & E Loss (ft)		Cum SA (acres)		2.49	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 65
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
412
410
408
406
404
402
400
398
396
394
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 64

INPUT
Description: 22
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	412.65	1.74	412.21	2.37	412.04	2.59	412	3.46	411.69
4.78	411.23	5.88	410.78	7.98	410	12.11	408.71	13.39	408.28
13.49	408.24	14.3	408	21.62	406.03	21.73	406	28.65	404.19
29.4	404	32.13	403.28	37.1	402	39.55	401.64	46.45	400
48.24	399.72	52.53	399.11	58.02	398	65.13	396.68	69.18	396
75.27	395.42	93.06	394	94.68	393.92	94.99	393.9	95.33	393.89
101.48	394	103.34	394	109.1	394.01	112.08	394.01	115.78	394
115.9	394	118.93	393.85	121.09	394	141.58	394	158.51	395.09
163.72	395.44	171.24	396	172.52	396.01	179	396.05	183.29	396.06
189.43	396.06	196.23	396.08	196.63	396.08				

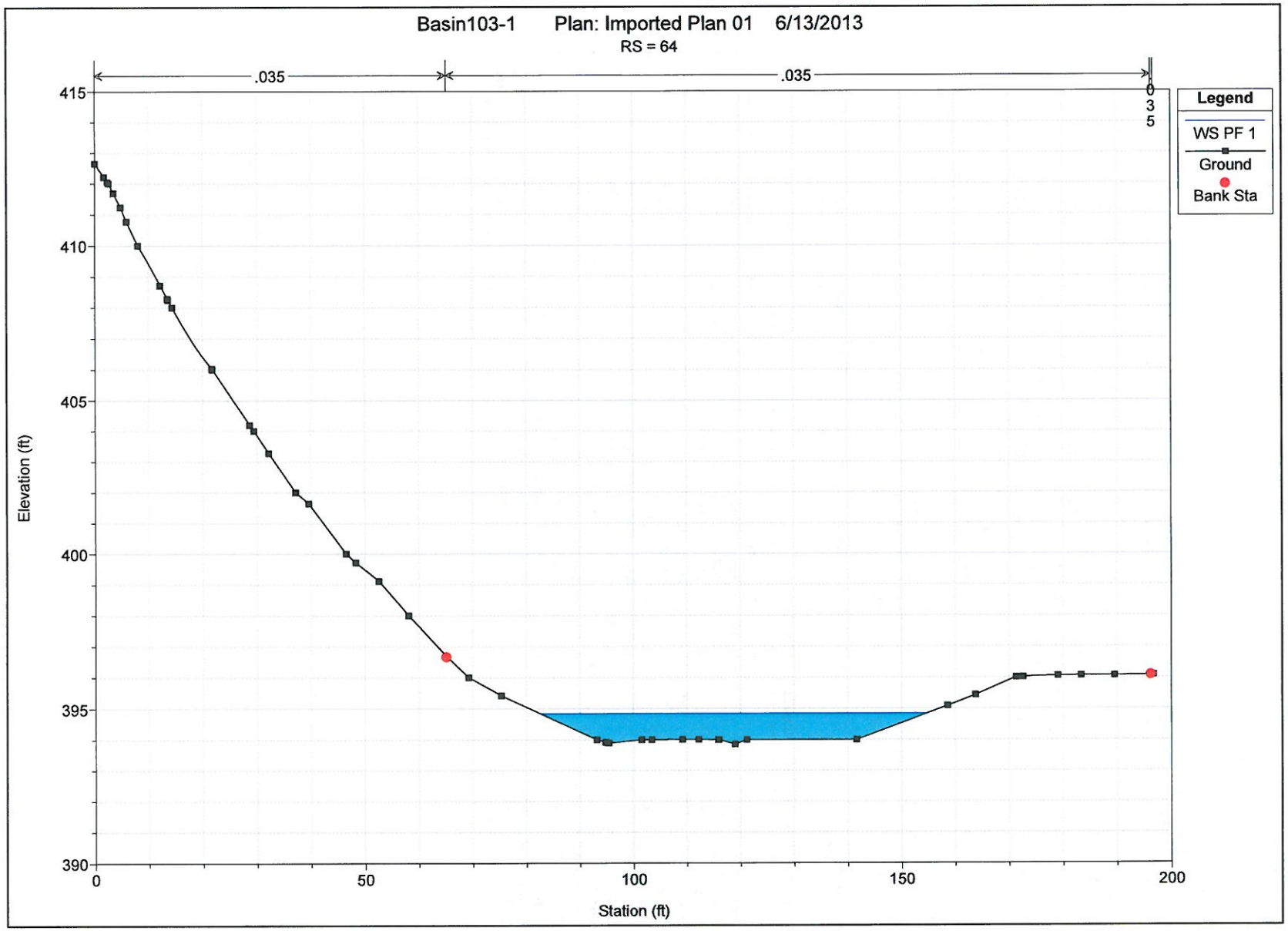
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	65.13	.035	196.23	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
65.13	196.23	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	395.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.035	
W.S. Elev (ft)	394.84	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	394.84	Flow Area (sq ft)		51.57	
E.G. Slope (ft/ft)	0.020154	Area (sq ft)		51.57	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	72.14	Top Width (ft)		72.14	
Vel Total (ft/s)	4.82	Avg. Vel. (ft/s)		4.82	
Max Chl Dpth (ft)	0.99	Hydr. Depth (ft)		0.71	
Conv. Total (cfs)	1749.0	Conv. (cfs)		1749.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		72.22	
Min Ch El (ft)	393.85	Shear (lb/sq ft)		0.90	
Alpha	1.00	Stream Power (lb/ft s)	196.63	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.90	0.00
C & E Loss (ft)		Cum SA (acres)		2.41	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 64
.035
.035
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
415
410
405
400
395
390
0
50
100
150
200
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 63

INPUT
Description: 23
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	408.28	3.65	407.69	11.06	406.22	11.85	406.06	11.98	406.03
12.16	406	24.62	404.23	26.21	404	26.27	403.99	35.68	402.57
38.71	402	42.22	401.44	43.72	401.18	51.1	400	57.99	398.77
60.41	398	62.69	397.15	63.1	397.02	65.32	396.41	65.81	396.27
66.28	396.15	66.89	396	68.63	395.49	74.63	394	94.89	392.96
97	392.86	97.8	392.82	102.24	392.62	111.57	392	115.04	392
115.41	392.02	121.72	392.3	123.82	392.4	127.2	392.58	137.38	393.15
149.25	393.64	156.89	394	158.1	394.06	161.54	394.21	169.62	394.27
170.21	394.27								

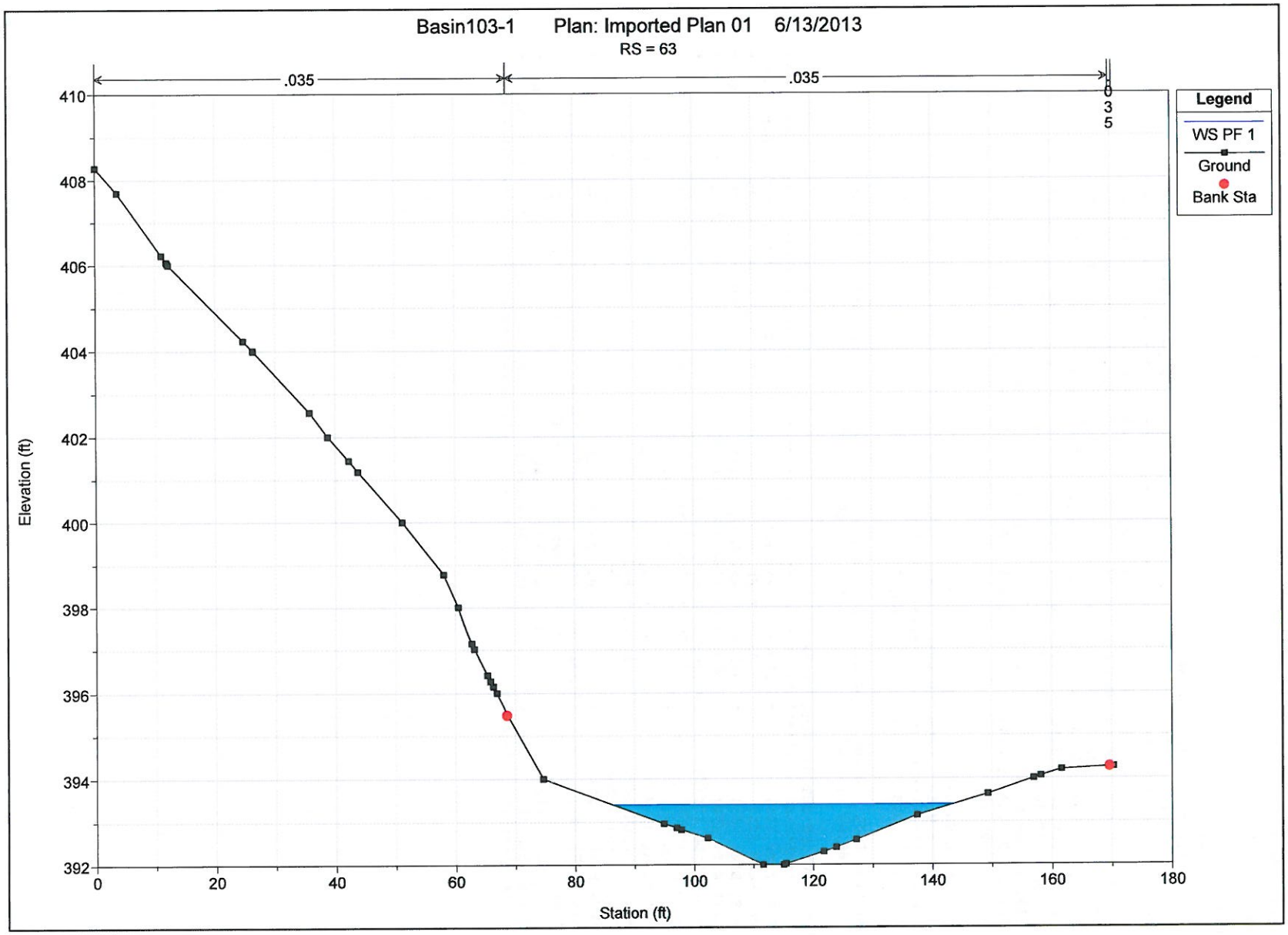
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	68.63	.035	169.62	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
68.63	169.62	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	393.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.		0.035	
W.S. Elev (ft)	393.41	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	393.53	Flow Area (sq ft)		41.61	
E.G. Slope (ft/ft)	0.030393	Area (sq ft)		41.61	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	57.40	Top Width (ft)		57.40	
Vel Total (ft/s)	5.97	Avg. Vel. (ft/s)		5.97	
Max Chl Dpth (ft)	1.41	Hydr. Depth (ft)		0.72	
Conv. Total (cfs)	1424.3	Conv. (cfs)		1424.3	
Length Wtd. (ft)		Wetted Per. (ft)		57.48	
Min Ch El (ft)	392.00	Shear (lb/sq ft)		1.37	
Alpha	1.00	Stream Power (lb/ft s)	170.21	0.00	0.00
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)		1.85	0.00
C & E Loss (ft)	0.02	Cum SA (acres)		2.34	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 63
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
410
408
406
404
402
400
398
396
394
392
0
20
40
60
80
100
120
140
160
180

CROSS SECTION
REACH: Reach-1 RS: 62

INPUT
Description: 24
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	403.86	15.83	402.26	18.99	402	21.11	401.76	30.32	400.78
37.44	400	42.26	399.62	43.49	399.5	46.01	399.28	53.38	398.66
58.52	398.09	59.29	398	71.22	396.48	74.21	396.12	74.49	396.08
75.33	396	90.14	394.35	93.39	394	98.02	393.38	104.36	392
124.15	392	124.86	392.06	130.08	392.42	144.16	393.1	146.03	393.1
147.25	393.11	148.49	393.13	149.54	393.15	150.81	393.17	156.06	393.28
164.01	393.42	170.13	393.51	191.84	393.7	195.44	393.78	196.02	393.77
198.29	393.81	200.14	393.83	200.57	393.83	204.42	393.96	214.54	393.96
219.39	393.97	224.1	394	224.54	394	229.37	394.11	274.38	394.35
279.56	394.39	281.45	394.39	308.93	396	309.17	396.02		

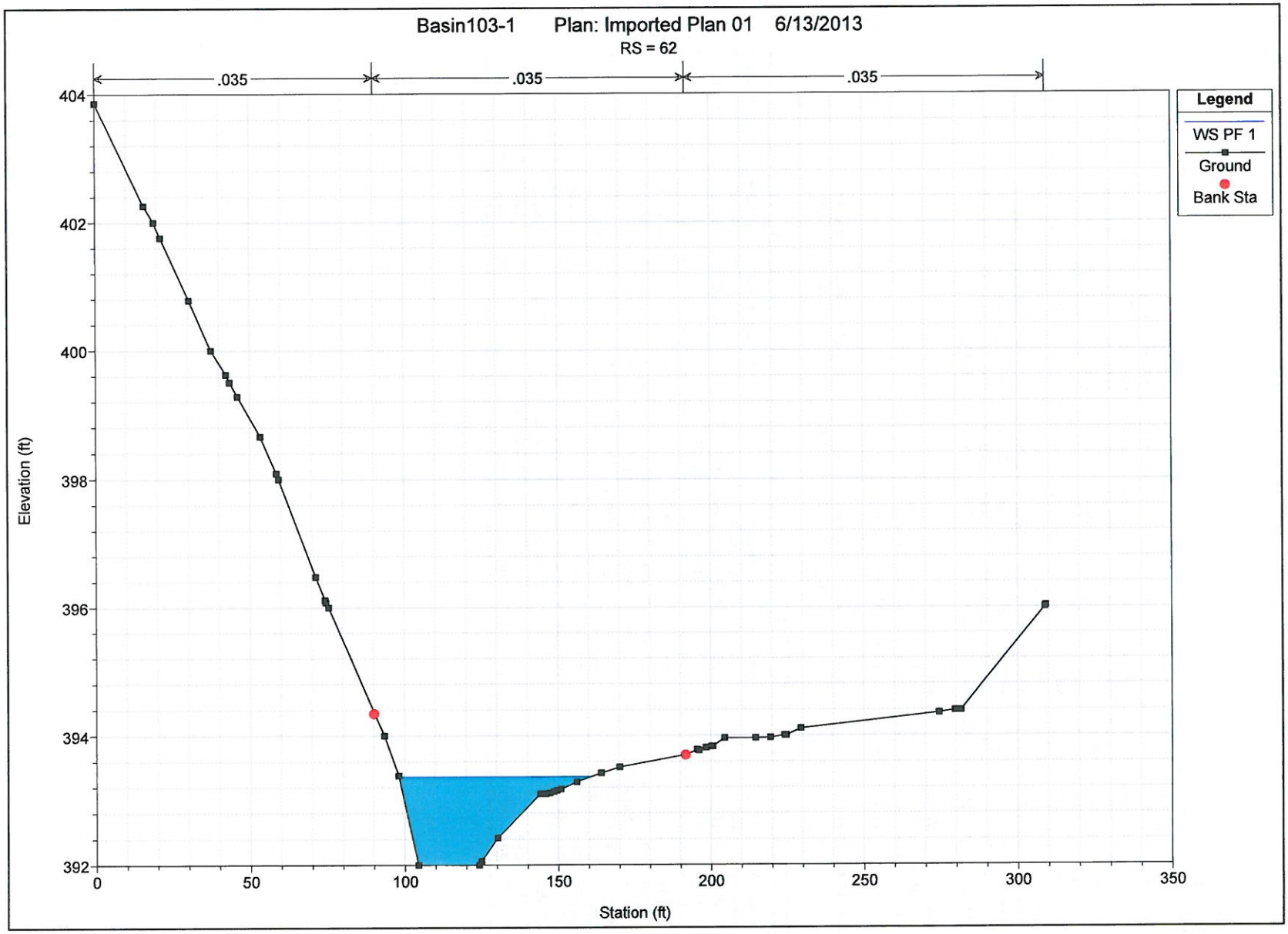
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	90.14	.035	191.84	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
90.14	191.84	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	393.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.035	
W.S. Elev (ft)	393.36	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	393.36	Flow Area (sq ft)		49.05	
E.G. Slope (ft/ft)	0.019781	Area (sq ft)		49.05	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	62.67	Top Width (ft)		62.67	
Vel Total (ft/s)	5.06	Avg. Vel. (ft/s)		5.06	
Max Chl Dpth (ft)	1.36	Hydr. Depth (ft)		0.78	
Conv. Total (cfs)	1765.4	Conv. (cfs)		1765.4	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		62.85	
Min Ch El (ft)	392.00	Shear (lb/sq ft)		0.96	
Alpha	1.00	Stream Power (lb/ft s)	309.17	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.80	0.00
C & E Loss (ft)		Cum SA (acres)		2.27	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 62
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
404
402
400
398
396
394
392
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 61

INPUT
Description: 25
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	404.76	3.36	404	10.93	402.52	13.52	402	16.82	401.51
26.49	400	36.28	398.62	40.87	398	55.11	396	63.12	394.65
67.14	394	68.86	393.75	81.36	392	84.34	391.77	86.51	391.61
87.83	391.53	89.21	391.47	91.34	391.43	98.25	391.36	101.33	391.31
102.78	391.32	104.94	391.27	105.95	391.23	106.28	391.18	106.73	390.9
117.26	390.88	121.82	391.14	123.89	391.25	127.46	391.4	128.37	391.42
145.22	392	145.33	392	146.19	392.04	147.69	392.08	150.22	392.11
153.89	392.13	162.06	392.15	165.99	392.15	176.75	392.05	183.91	392
189.51	391.97	194.12	391.99	194.47	392	201.18	392.16	207.38	392.34
216.39	392.64	220.61	392.77	223.09	392.87				

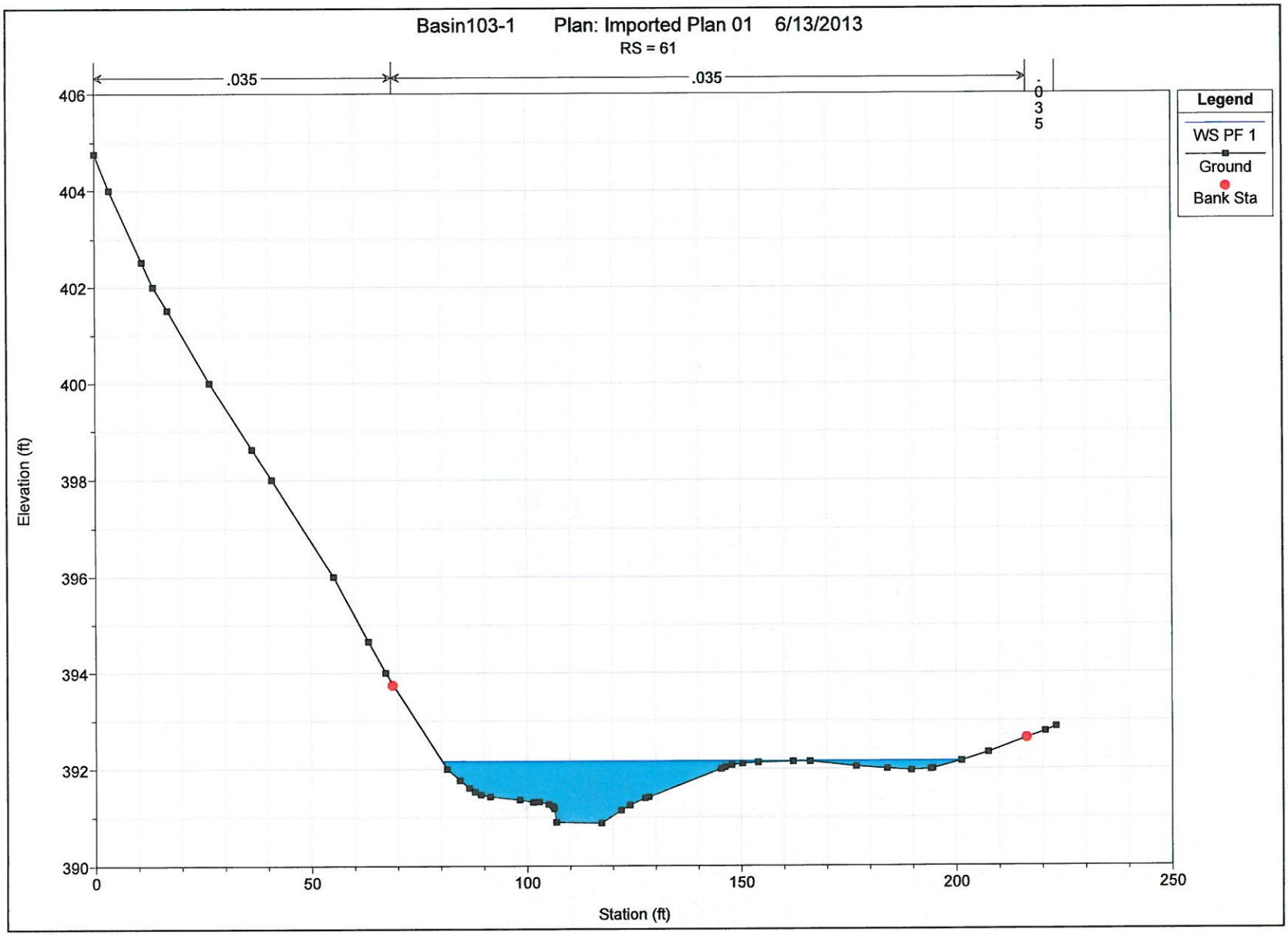
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	68.86	.035	216.39	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
68.86	216.39	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	392.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.035	
W.S. Elev (ft)	392.16	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	392.22	Flow Area (sq ft)		55.02	
E.G. Slope (ft/ft)	0.032417	Area (sq ft)		55.02	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	121.15	Top Width (ft)		121.15	
Vel Total (ft/s)	4.51	Avg. Vel. (ft/s)		4.51	
Max Chl Dpth (ft)	1.28	Hydr. Depth (ft)		0.45	
Conv. Total (cfs)	1379.1	Conv. (cfs)		1379.1	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		121.30	
Min Ch El (ft)	390.88	Shear (lb/sq ft)		0.92	
Alpha	1.00	Stream Power (lb/ft s)	223.09	0.00	0.00
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)		1.74	0.00
C & E Loss (ft)	0.02	Cum SA (acres)		2.17	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 61
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
406
404
402
400
398
396
394
392
390
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 60

INPUT
Description: 26
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	404.13	.49	404	6.8	402.21	7.55	402	11.17	400.95
14.53	400	25.34	398.13	26.08	398	26.32	397.96	34.86	396.47
41.72	395.15	48.08	394	55.48	392.63	59.31	392	65.33	391.02
72.04	390	75.03	389.89	78.48	389.79	80.95	389.77	82.03	389.75
82.76	389.72	84.18	389.67	92.11	389.5	94.33	389.47	97.55	389.45
100.65	389.45	102.43	389.47	104.29	389.55	115.29	389.92	118.24	390
120.51	390.08	128.57	390.31	129.37	390.31	140.62	390.59	143.92	390.61
164.37	390.44	178.43	390.57	179.91	390.58	182.15	390.6	184.82	390.61
186.55	390.63	190.27	390.66	190.63	390.66	195.34	390.63	196.12	390.63
199.74	390.64	200.79	390.64	201.56	390.64	202.28	390.63	203.48	390.63
225.04	391.43	229.11	391.42	232.55	391.43	234.62	391.42	256.19	391.08
258.11	391.08	260	391.1	262.75	391.15	263.3	391.15	263.9	391.14
266.93	390.98	267.68	390.96	268.35	390.95	269.74	390.95	270.79	390.97
273.67	391.03	275.83	391.08	311.84	392	318.65	392.6	339.98	394
341.54	394.58								

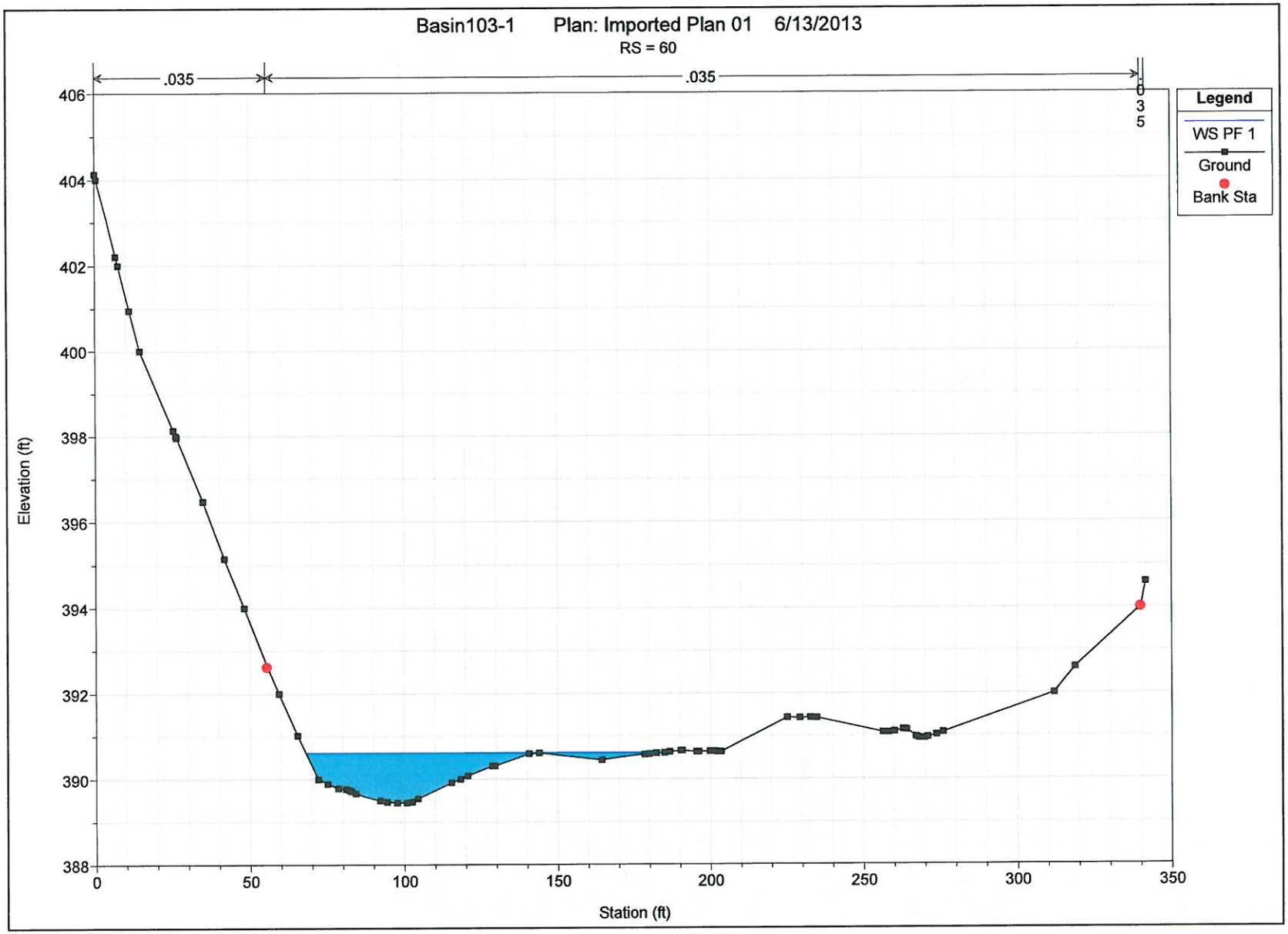
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	55.48	.035	339.98	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
55.48	339.98	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	390.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.035	
W.S. Elev (ft)	390.62	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	390.70	Flow Area (sq ft)		55.94	
E.G. Slope (ft/ft)	0.029609	Area (sq ft)		55.94	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	118.04	Top Width (ft)		118.04	
Vel Total (ft/s)	4.44	Avg. Vel. (ft/s)		4.44	
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)		0.47	
Conv. Total (cfs)	1443.0	Conv. (cfs)		1443.0	
Length Wtd. (ft)		Wetted Per. (ft)		118.11	
Min Ch El (ft)	389.45	Shear (lb/sq ft)		0.88	
Alpha	1.00	Stream Power (lb/ft s)	341.54	0.00	0.00
Frctn Loss (ft)	1.55	Cum Volume (acre-ft)		1.67	0.00
C & E Loss (ft)	0.00	Cum SA (acres)		2.03	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 60
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
406
404
402
400
398
396
394
392
390
388
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 59

INPUT
Description: 27
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	400.3	1.2	400	3.48	399.39	9.35	398	11.1	397.54
17.35	396.15	17.73	396.06	18.01	396	28.09	394.55	30.79	394
37.04	392.59	39.71	392	42.75	391.27	44.72	390.84	48.78	390
50.11	389.94	55.28	389.72	59.48	389.51	61	389.47	68.14	389.08
74.57	388.75	75.42	388.7	76.33	388.65	79.84	388.51	82.03	388.43
82.5	388.42	82.82	388.41	83.39	388.41	83.64	388.4	83.8	388.39
84.13	388.38	85.95	388.34	86.46	388.34	87.19	388.33	87.9	388.33
88.31	388.34	88.53	388.34	88.74	388.35	90.1	388.4	91.26	388.44
92.39	388.47	95.97	388.98	96.3	389.09	97.41	389.21	99.54	389.42
100.82	389.55	103.36	389.75	108.06	390	108.15	390	110.87	390.04
113.83	390.05	119.5	390.02	121.75	390	126.34	389.97	126.52	389.96
132.64	389.89	133.47	389.87	136.6	389.83	172.16	389.99	174.75	389.99
193.01	389.91	195.18	389.91	205.45	389.93	208.55	389.93	214.6	389.85
217.1	389.84	219.43	389.82	222.58	389.8	233.31	389.79	238.52	389.76
242.68	389.76	246.58	389.81	254.93	389.96	255.86	390	259.99	390.14
300.4	391.6	304.3	391.85	307	392				

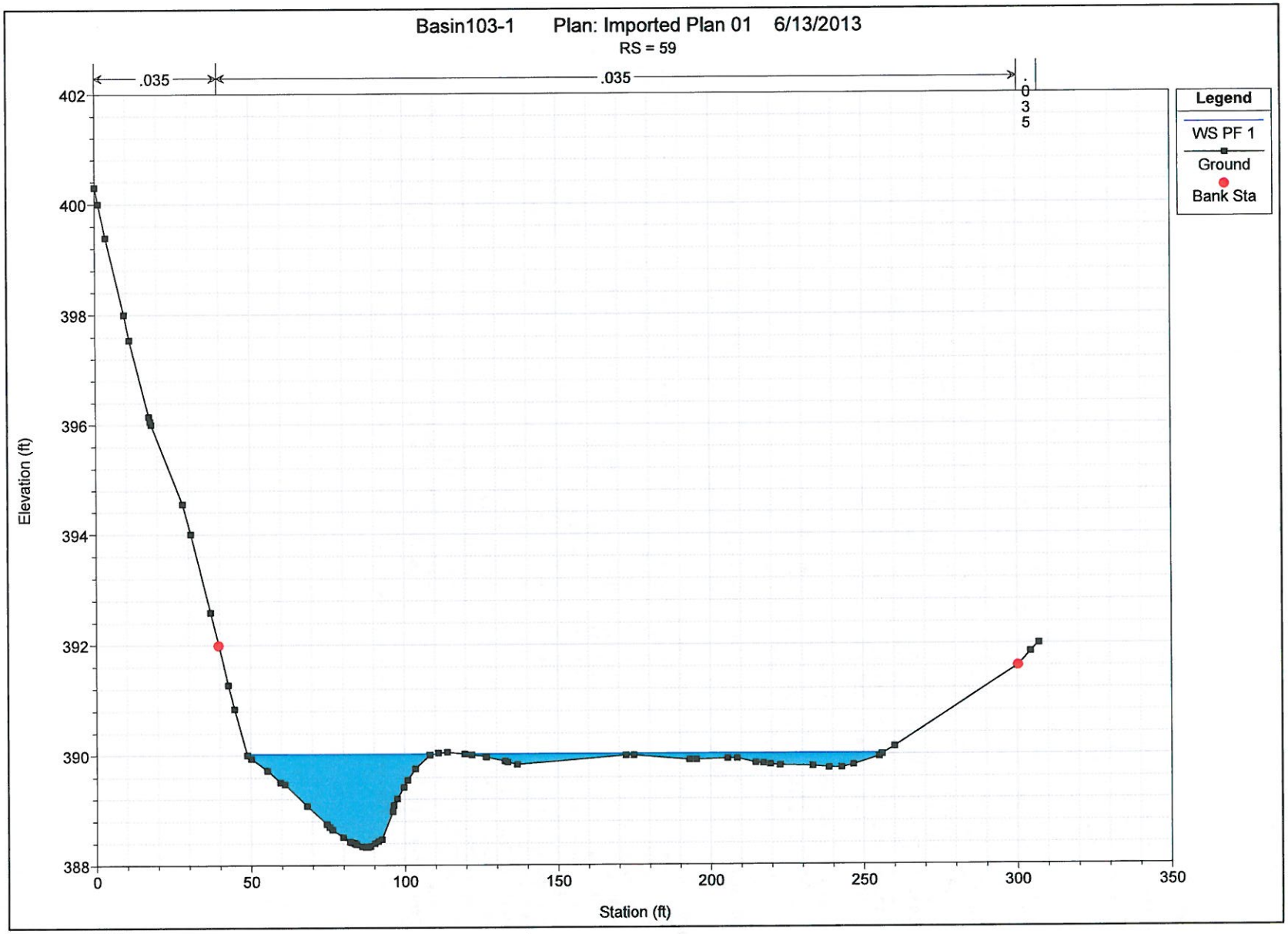
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	39.71	.035	300.4	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.71	300.4	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	390.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.035	
W.S. Elev (ft)	390.03	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	390.03	Flow Area (sq ft)		71.93	
E.G. Slope (ft/ft)	0.025755	Area (sq ft)		71.93	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	199.30	Top Width (ft)		199.30	
Vel Total (ft/s)	3.45	Avg. Vel. (ft/s)		3.45	
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)		0.36	
Conv. Total (cfs)	1547.2	Conv. (cfs)		1547.2	
Length Wtd. (ft)		Wetted Per. (ft)		199.44	
Min Ch El (ft)	388.33	Shear (lb/sq ft)		0.58	
Alpha	1.00	Stream Power (lb/ft s)	307.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.60	0.00
C & E Loss (ft)		Cum SA (acres)		1.85	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 59
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
402
400
398
396
394
392
390
388
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 58

INPUT
Description: 28
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	394.52	4.18	394	4.46	393.97	4.6	393.95	9.76	393.29
14.39	392.84	15.19	392.74	20.06	392	25.12	391.31	32.79	390
42.38	389.21	48.32	388.67	51.3	388.42	56.09	388	78.16	388
93.52	388.84	95.76	388.94	98.32	389.03	99.11	389.06	99.6	389.08
103.64	389.36	104.57	389.36	105.09	389.35	105.16	389.35	105.42	389.34
105.65	389.35	107.08	389.35	108.44	389.36	203.37	389.32	204.61	389.32
206.68	389.29	259.75	389.66	270.51	389.85	277.47	390		

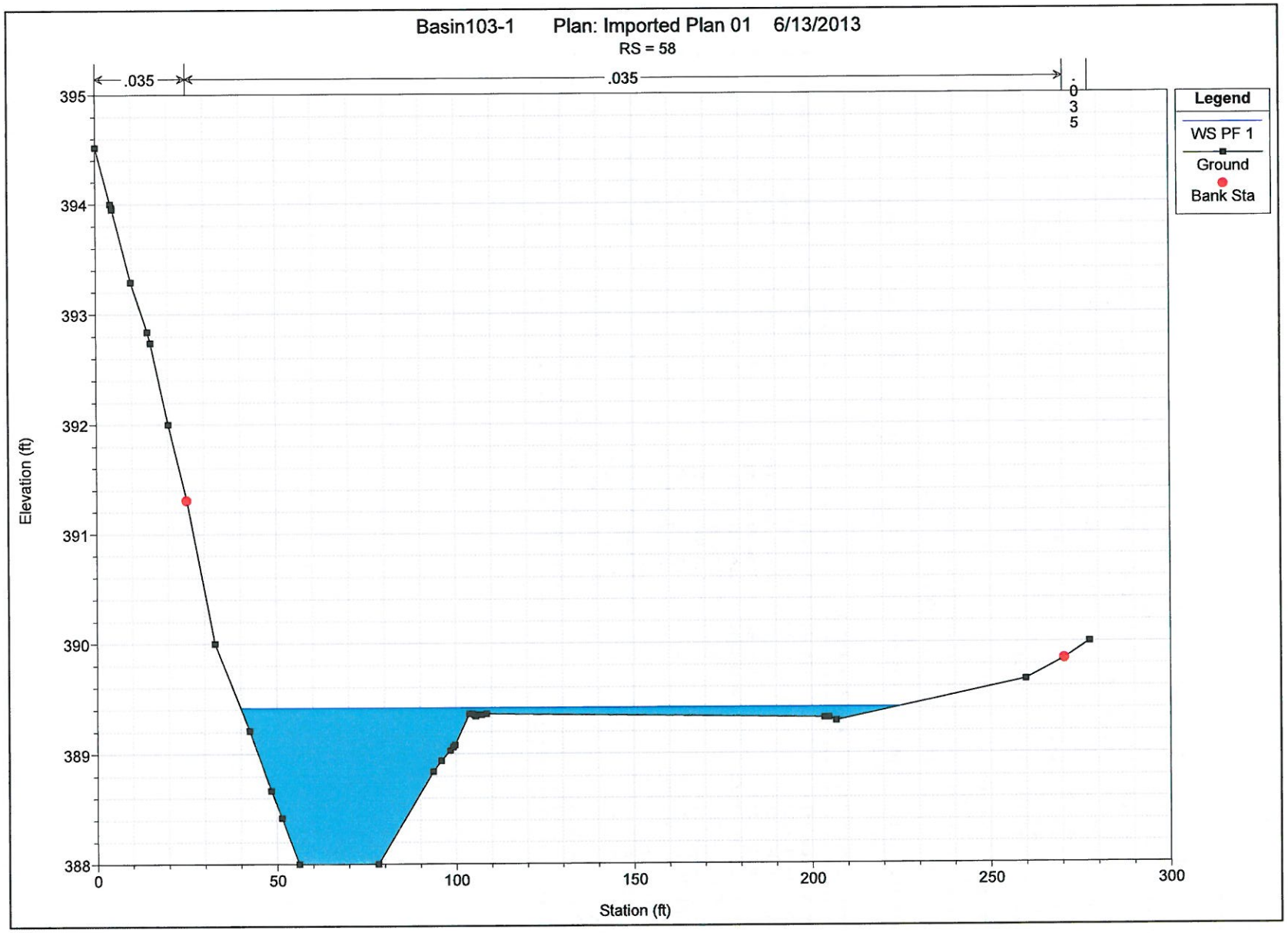
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	25.12	.035	270.51	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
25.12	270.51	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	389.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.035	
W.S. Elev (ft)	389.42	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	389.42	Flow Area (sq ft)		70.59	
E.G. Slope (ft/ft)	0.024802	Area (sq ft)		70.59	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	184.91	Top Width (ft)		184.91	
Vel Total (ft/s)	3.52	Avg. Vel. (ft/s)		3.52	
Max Chl Dpth (ft)	1.42	Hydr. Depth (ft)		0.38	
Conv. Total (cfs)	1576.7	Conv. (cfs)		1576.7	
Length Wtd. (ft)		Wetted Per. (ft)		185.01	
Min Ch El (ft)	388.00	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)	277.47	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.52	0.00
C & E Loss (ft)		Cum SA (acres)		1.63	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 58
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
395
394
393
392
391
390
389
388
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 57

INPUT
Description: 29
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	396.17	.43	396.1	1	396	1.96	395.8	11.1	394
20.42	392.19	21.47	392	27.88	390.79	32.16	390	38.71	389.67
44.91	389.38	59.18	388.74	64.27	388.52	65.15	388.48	65.71	388.47
66.65	388.44	67.04	388.43	67.29	388.42	67.77	388.4	70.68	388.3
71.46	388.29	72.14	388.28	72.51	388.27	72.7	388.28	72.88	388.28
73.97	388.3	75.51	388.32	77.4	388.57	77.55	388.63	78.03	388.67
78.85	388.73	79.3	388.77	80.07	388.81	81.3	388.81	83.14	388.86
84.51	388.83	88.2	389.05	89.63	388.98	103.53	389.7	106.42	389.67
109.33	389.62	109.41	389.62	112.08	389.56	112.41	389.55	113.61	389.52
119.55	389.52	123.04	389.51	145.54	389.3	184.47	388.54	188.65	388.53
210.52	389.66	258.29	388.04	260.54	388.04	263.08	388.01	263.99	388
267.36	387.98	272.03	387.98	276.13	387.99	278.09	388	281.05	388.05
286.75	388.16	290.91	388.31	292.84	388.44	293.77	388.5	294.91	388.47
296.67	388.39	298.62	388.35	300.15	388.37	301.14	388.43	301.83	388.46
302.69	388.43	304.41	388.39	317.79	388.65	320.61	388.63	324.64	388.68
328.08	388.76	332.5	390	332.53	390.2	332.54	390.29	332.65	391.15
333.01	394	333.05	393.55						

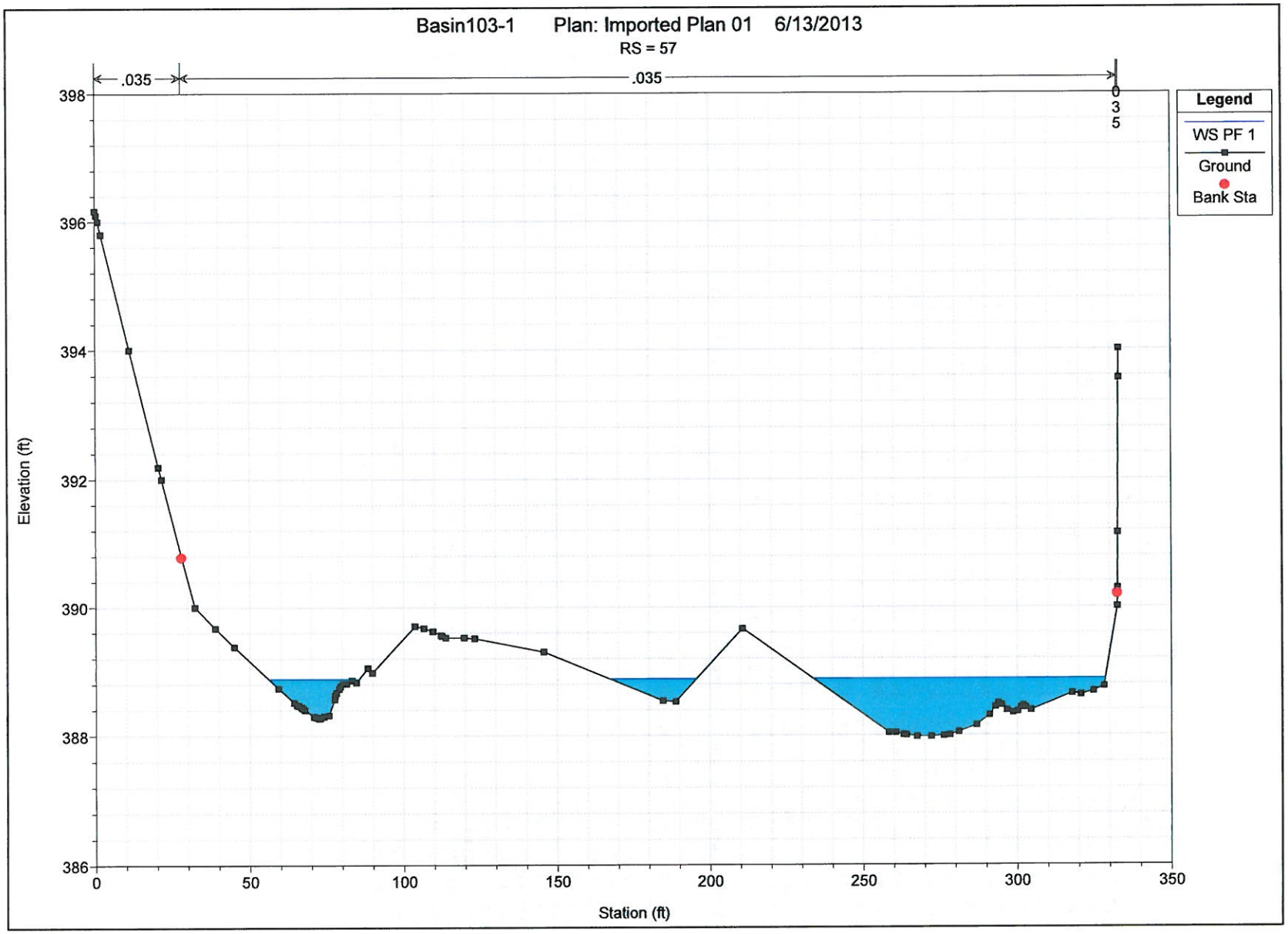
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	27.88	.035	332.53	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
27.88	332.53	103.95	50	196.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	389.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.035	
W.S. Elev (ft)	388.88	Reach Len. (ft)	103.95	50.00	196.60
Crit W.S. (ft)	388.88	Flow Area (sq ft)		65.72	
E.G. Slope (ft/ft)	0.024478	Area (sq ft)		65.72	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	153.11	Top Width (ft)		153.11	
Vel Total (ft/s)	3.78	Avg. Vel. (ft/s)		3.78	
Max Chl Dpth (ft)	0.90	Hydr. Depth (ft)		0.43	
Conv. Total (cfs)	1587.0	Conv. (cfs)		1587.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		153.22	
Min Ch El (ft)	387.98	Shear (lb/sq ft)		0.66	
Alpha	1.00	Stream Power (lb/ft s)	333.05	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.44	0.00
C & E Loss (ft)		Cum SA (acres)		1.43	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 57
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
398
396
394
392
390
388
386
0
50
100
150
200
250
300
350

CROSS SECTION
REACH: Reach-1 RS: 56

INPUT
Description: 30
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	401.38	6.21	400	6.44	399.95	7.21	399.76	12.01	398.54
13.98	398	14.78	397.76	21.16	396	24.2	395.43	32.48	394
42.18	392.53	45.77	392	52.7	391.12	60.23	390	69.86	389.16
75.83	388.58	80.48	388.14	81.86	388	110.45	388	117.28	388.31
119.55	388.42	122.32	388.48	126.78	388.49	132.17	388.45	138.15	388.3
144.86	388.07	146.56	388	202.6	388	202.9	388.01	207.26	388.13
212.91	388.22	218.76	388.27	224.22	388.21	229.47	388.08	231.54	388
234.17	387.91	235.25	387.89	240.54	387.68	243.11	387.63	248.6	387.39
252.05	387.23	253.99	387.16	261.13	387.01	267.6	386.91	272.04	386.8
274.87	386.7	276.42	386.64	277.33	386.61	278.25	386.59	282.14	386.59
284.79	386.61	286.08	386.64	286.95	386.68	287.66	386.71	291.03	386.69
310.43	387.1	310.95	387.1	311.58	387.08	312.49	387.08	312.92	387.09
313.25	387.09	322.47	388.85	324.34	389.54	325.47	389.82	325.56	390
326.03	393.46	326.05	393.59						

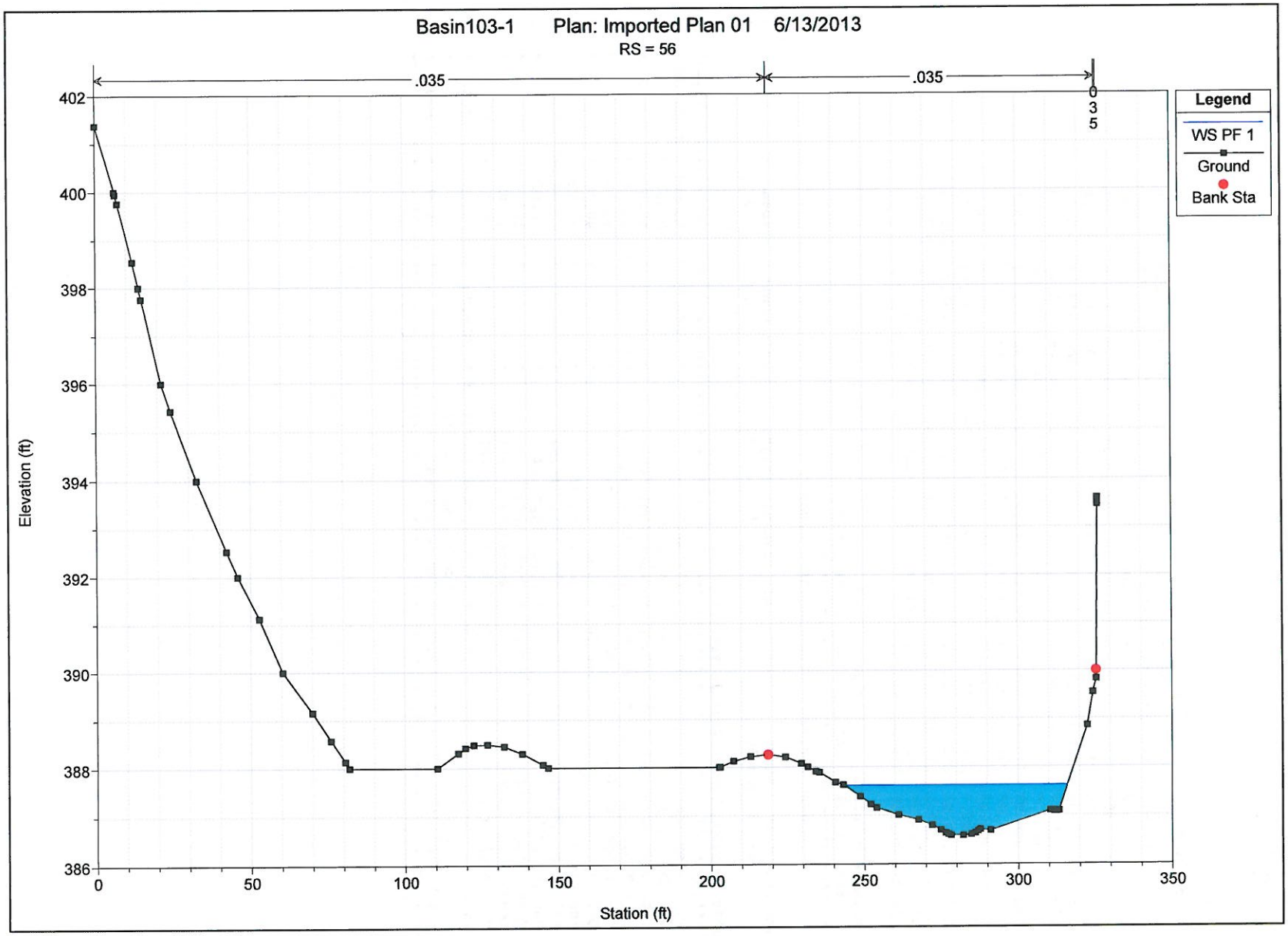
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	218.76	.035	325.56	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.76	325.56	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	388.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.035	
W.S. Elev (ft)	387.62	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	387.67	Flow Area (sq ft)		48.74	
E.G. Slope (ft/ft)	0.024587	Area (sq ft)		48.74	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	72.72	Top Width (ft)		72.72	
Vel Total (ft/s)	5.09	Avg. Vel. (ft/s)		5.09	
Max Chl Dpth (ft)	1.03	Hydr. Depth (ft)		0.67	
Conv. Total (cfs)	1583.5	Conv. (cfs)		1583.5	
Length Wtd. (ft)		Wetted Per. (ft)		72.80	
Min Ch El (ft)	386.59	Shear (lb/sq ft)		1.03	
Alpha	1.00	Stream Power (lb/ft s)	326.05	0.00	0.00
Frctn Loss (ft)	1.12	Cum Volume (acre-ft)		1.37	0.00
C & E Loss (ft)	0.01	Cum SA (acres)		1.30	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 56
.035
.035
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
402
400
398
396
394
392
390
388
386
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 55

INPUT
Description: 31
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	404.14	.56	404	2.33	403.58	6.05	402.67	8.76	402
9.98	401.73	17.35	400	20.29	399.27	25.59	398	32.18	396.45
34.16	396	36.1	395.66	44.98	394	49.41	393.31	58.43	392
65.47	390.93	72.31	390	90.18	388.94	95.86	388.59	104.12	388
110.86	388	117.67	387.38	140.11	387.36	142.39	387.55	149.34	388
152.02	388.34	152.53	388.39	153.54	388.41	155.65	388.4	159.36	388.35
169.46	388.12	212.78	386.96	224.57	386.6	229.47	386.47	233.17	386.4
235.27	386.38	237.02	386.38	239	386.35	241.02	386.31	249.64	386.02
251.04	386.01	255.54	386.02	264.56	386	266.27	385.96	268.92	385.86
268.96	385.79	274.36	385.62	280.46	385.57	283.92	385.56	288.06	385.59
295.39	385.66	297.44	385.7	298.75	385.74	299.66	385.79	302.28	386
304.31	386.53	308.52	387.6	310.23	388	311.3	388.54	316.87	391.32

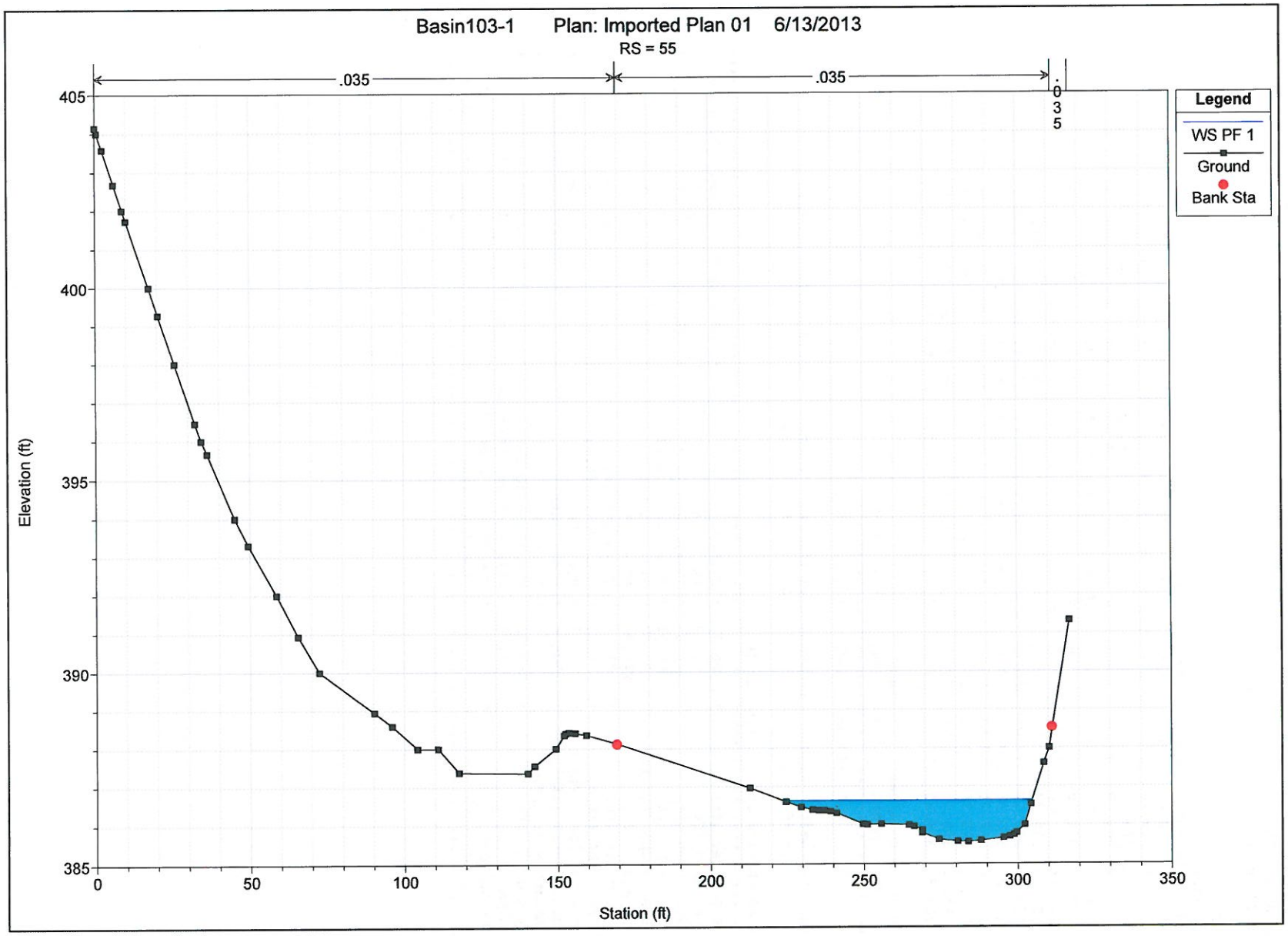
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	169.46	.035	311.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
169.46	311.3	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.035	
W.S. Elev (ft)	386.63	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	386.63	Flow Area (sq ft)		53.30	
E.G. Slope (ft/ft)	0.021197	Area (sq ft)		53.30	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	81.30	Top Width (ft)		81.30	
Vel Total (ft/s)	4.66	Avg. Vel. (ft/s)		4.66	
Max Chl Dpth (ft)	1.07	Hydr. Depth (ft)		0.66	
Conv. Total (cfs)	1705.4	Conv. (cfs)		1705.4	
Length Wtd. (ft)		Wetted Per. (ft)		81.44	
Min Ch El (ft)	385.56	Shear (lb/sq ft)		0.87	
Alpha	1.00	Stream Power (lb/ft s)	316.87	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.31	0.00
C & E Loss (ft)		Cum SA (acres)		1.21	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 55
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
405
400
395
390
385
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 54

INPUT
Description: 32
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	402.46	2.03	402	9.61	400.38	11.23	400	16.66	398.99
21.53	398	28.87	396.75	32.96	396	36.5	395.61	49.87	394
64.29	392.38	68.72	392	77.34	391.49	80.07	391.36	104.1	390
111.14	389.48	132.07	388	135.64	387.73	140.26	387.39	141.73	387.3
151.97	386.73	170.06	386.03	170.33	386.02	170.81	386	191.74	386
192.15	386.03	195.46	386.17	203.23	386.4	207.7	386.53	208.34	386.55
209.32	386.57	210.65	386.58	216.32	386.46	234.84	386.11	239.97	386
248.71	385.7	256.17	385.42	262	385.17	265.4	385.03	266.28	384.99
267.43	384.93	267.87	384.91	268.96	384.93	269.83	384.92	270.62	384.9
271.09	384.88	272.06	384.84	273.15	384.83	274.51	384.83	275.25	384.84
275.81	384.85	276.18	384.85	276.41	384.86	276.58	384.87	277.06	384.91
277.35	384.92	288.65	385.29	308.48	386	317.06	390.29	322.64	393.09

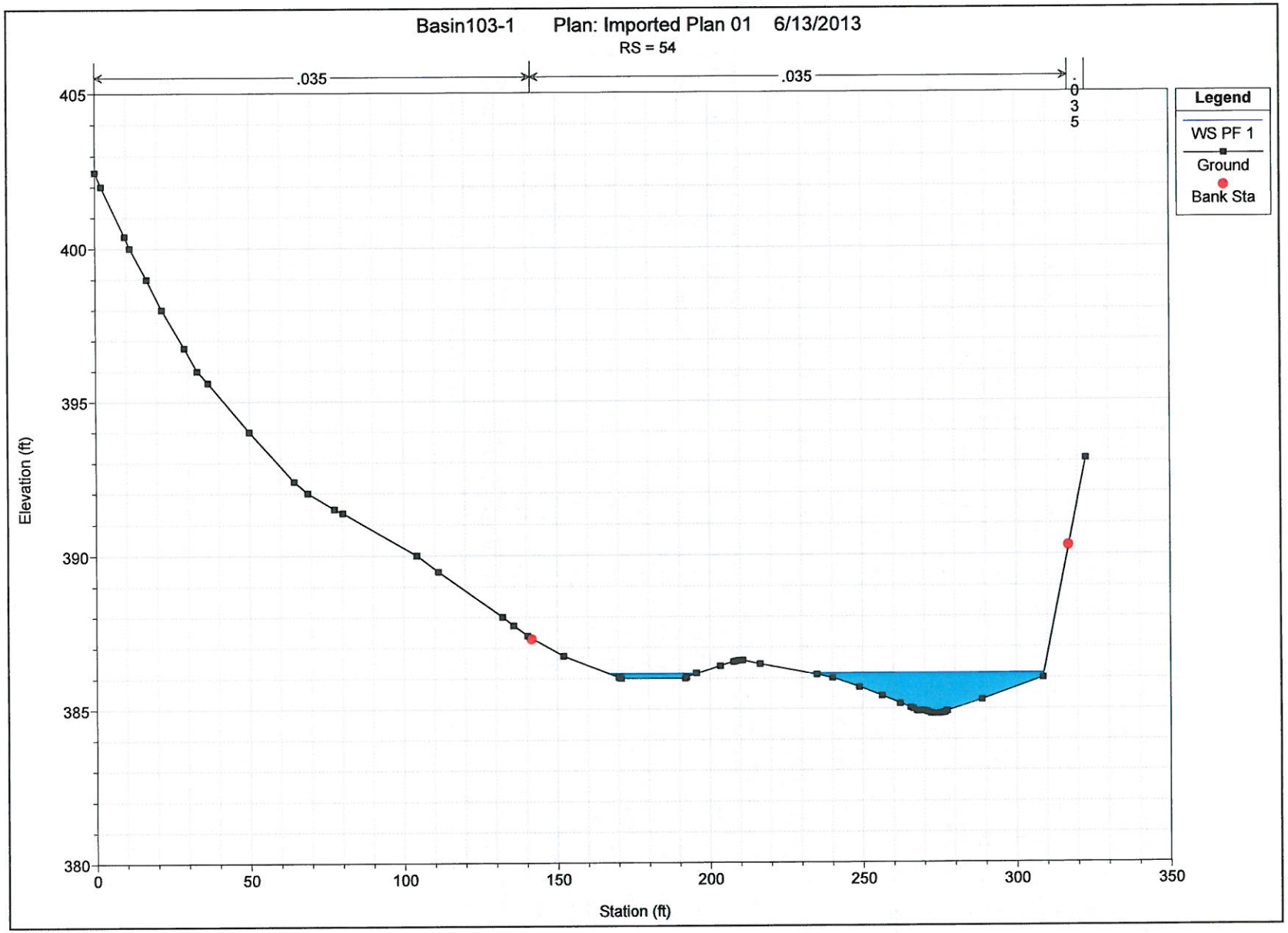
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	141.73	.035	317.06	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
141.73	317.06	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.035	
W.S. Elev (ft)	386.16	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	386.16	Flow Area (sq ft)		57.99	
E.G. Slope (ft/ft)	0.022602	Area (sq ft)		57.99	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	105.43	Top Width (ft)		105.43	
Vel Total (ft/s)	4.28	Avg. Vel. (ft/s)		4.28	
Max Chl Dpth (ft)	1.33	Hydr. Depth (ft)		0.55	
Conv. Total (cfs)	1651.6	Conv. (cfs)		1651.6	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		105.52	
Min Ch El (ft)	384.83	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)	322.64	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.25	0.00
C & E Loss (ft)		Cum SA (acres)		1.11	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 54
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
405
400
395
390
385
380
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 53

INPUT
Description: 33
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	400.83	4.6	400	16.99	398.47	20	398	25.61	397.26
36.75	396	40.26	395.79	41.05	395.74	42.74	395.62	57.61	394.72
62.67	394.36	63.61	394.29	68.75	394	81.5	393.1	84.93	392.81
98.06	392	102.91	391.6	103.12	391.58	106.71	391.33	108.16	391.2
116.62	390.54	122.4	390	133.76	389.02	144.43	388	156.37	387.42
183.65	386	185.41	385.9	187.53	385.71	188.67	385.68	190.97	385.64
193.58	385.61	195.75	385.58	196.88	385.56	202.34	385.5	211.14	385.55
211.93	385.56	213.82	385.56	261.03	386	274.53	385.66	300.39	385.89
305.53	386	308.15	387.05	310.14	388	310.51	388.18	317.05	391.32

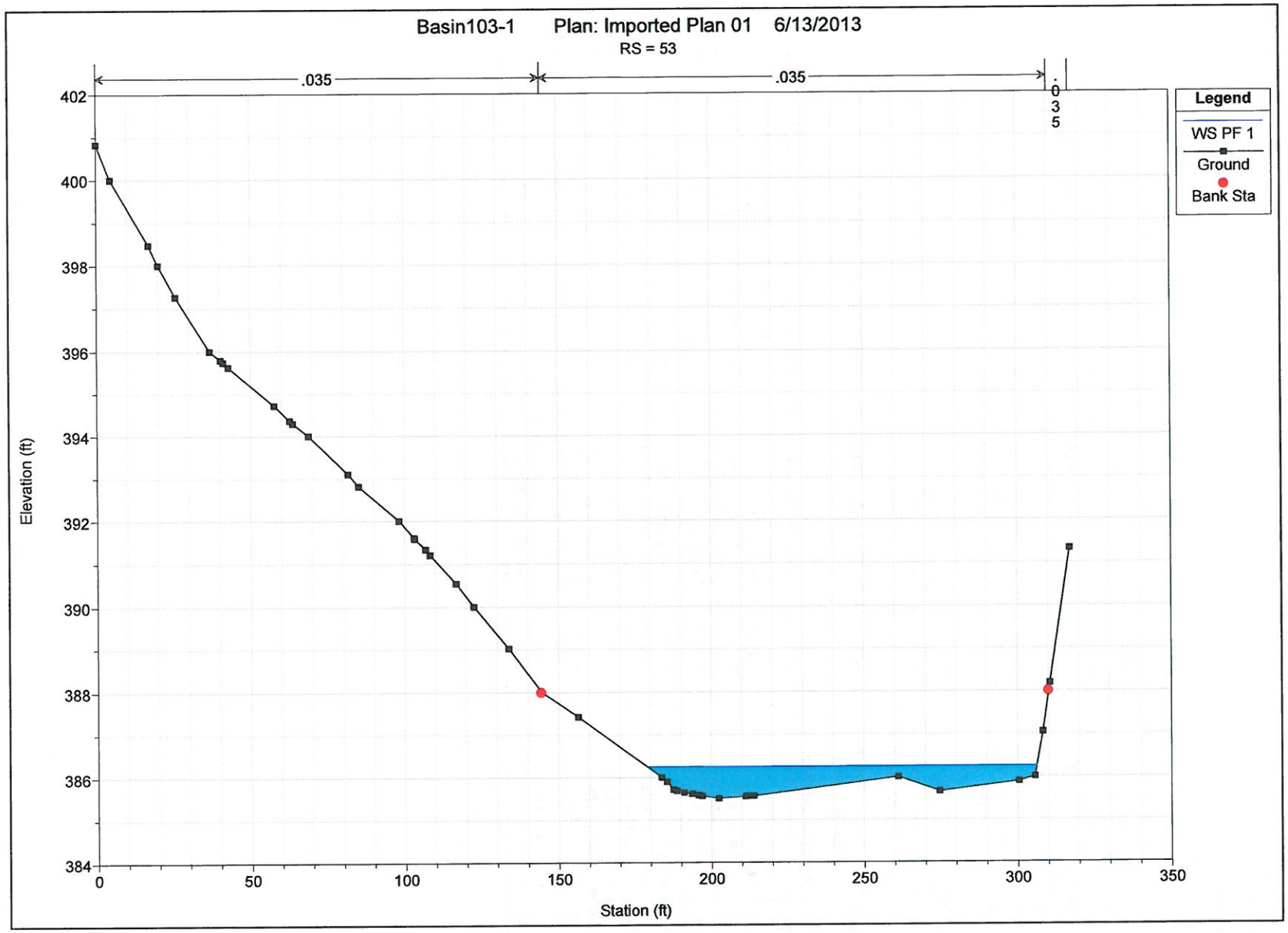
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	144.43	.035	310.14	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
144.43	310.14	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.035	
W.S. Elev (ft)	386.25	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	386.25	Flow Area (sq ft)		62.26	
E.G. Slope (ft/ft)	0.022940	Area (sq ft)		62.26	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	127.38	Top Width (ft)		127.38	
Vel Total (ft/s)	3.99	Avg. Vel. (ft/s)		3.99	
Max Chl Dpth (ft)	0.75	Hydr. Depth (ft)		0.49	
Conv. Total (cfs)	1639.4	Conv. (cfs)		1639.4	
Length Wtd. (ft)		Wetted Per. (ft)		127.46	
Min Ch El (ft)	385.50	Shear (lb/sq ft)		0.70	
Alpha	1.00	Stream Power (lb/ft s)	317.05	0.00	0.00
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)		1.18	0.00
C & E Loss (ft)	0.01	Cum SA (acres)		0.97	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 53
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
402
400
398
396
394
392
390
388
386
384
0
50
100
150
200
250
300
350
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 52

INPUT
Description: 34
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	398.21	1.18	398	10.16	396.65	13.83	396	27.29	394.57
28.55	394.44	28.77	394.42	28.99	394.41	30.56	394.31	32.96	394
41.11	393.32	46.71	393.12	48.25	393.04	52.85	392.93	54.69	392.83
58.97	392.74	67.92	392.22	68.35	392.2	72.49	392	74.79	391.91
75.65	391.85	84.94	391.47	85.8	391.39	89.2	391.28	89.83	391.23
90.26	391.21	98.66	391	99.1	390.99	104.03	390.93	104.65	390.91
108.9	390.8	113.22	390.52	113.65	390.48	118.48	390	130.12	388.93
130.6	388.91	132.22	388.79	136.66	388.54	148.63	388	150.52	387.94
150.84	387.92	152.41	387.83	170.24	386.97	171.14	386.89	172.58	386.78
174.86	386.65	178.12	386.43	184.95	386	195.02	384.88	206.32	384
223.23	384	225.01	384.83	229.12	386.76	236.04	390	237.31	390.6
240.31	392	241.41	392.51	244.58	394	248.85	396	249.59	396.34
253.12	398	253.67	398.26	257.39	400	257.76	400.17	261.66	402
261.83	402.08	265.39	403.74	265.88	403.97	265.95	404	269.77	405.73
270.36	406	275.88	406.11	280	406.17	344.53	407.28	360.58	407.44
368.86	407.57	400	407.84						

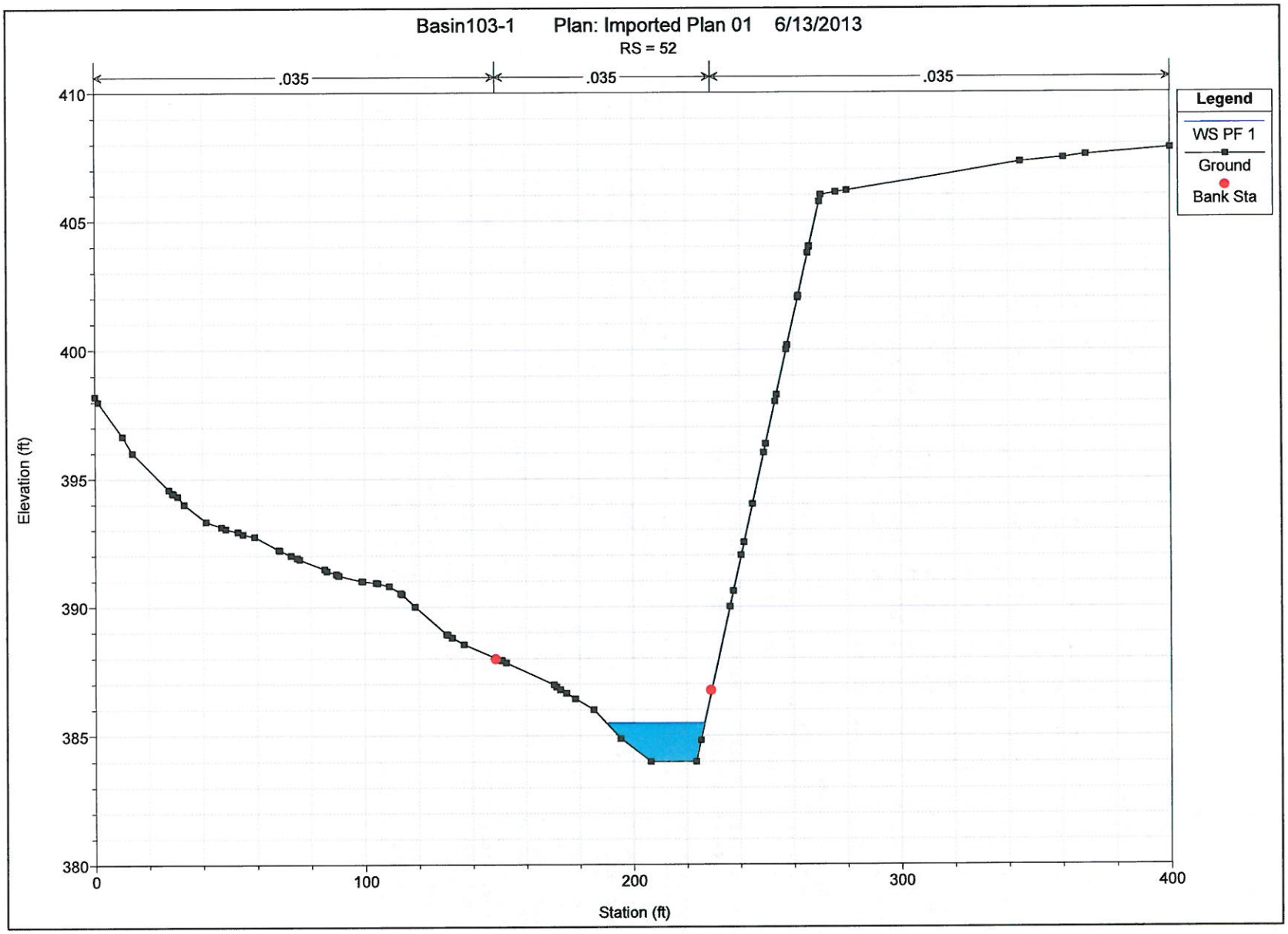
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	148.63	.035	229.12	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
148.63	229.12	59.3	50	155.5	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.57	Wt. n-Val.		0.035	
W.S. Elev (ft)	385.49	Reach Len. (ft)	59.30	50.00	155.50
Crit W.S. (ft)	385.49	Flow Area (sq ft)		41.14	
E.G. Slope (ft/ft)	0.017732	Area (sq ft)		41.14	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	36.89	Top Width (ft)		36.89	
Vel Total (ft/s)	6.04	Avg. Vel. (ft/s)		6.04	
Max Chl Dpth (ft)	1.49	Hydr. Depth (ft)		1.12	
Conv. Total (cfs)	1864.7	Conv. (cfs)		1864.7	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		37.29	
Min Ch El (ft)	384.00	Shear (lb/sq ft)		1.22	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.12	0.00
C & E Loss (ft)		Cum SA (acres)		0.88	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 52
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
410
405
400
395
390
385
380
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 51

INPUT
Description: 35
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	402.41	2.47	402	12.18	400.19	13.02	400.03	13.2	400
28.62	398.09	29.71	398	39.93	397.1	43.5	396.85	53.31	396.55
57.61	396.35	58.44	396.3	64.03	396	64.16	395.99	64.28	395.99
72.32	395.53	77.68	395.18	93.81	394.48	102.97	394.1	105.03	394
108.4	393.66	110.28	393.58	112.36	393.46	117.85	393.07	131.28	392
136.03	391.65	157.35	390	182.02	388	182.89	387.78	185.2	387.11
188.15	386	190.72	384.72	192.15	384	202.31	384	208.32	384
212.4	386	213.71	386.64	226.56	392.94	228.71	394	230.86	395.05
232.79	396	235.17	397.16	236.87	398	243.81	401.4	245.03	402
248.14	403.52	249.11	404	252.48	405.65	253.19	406	305.39	406.69
313.55	406.75	375.56	407.47	383.3	407.55	400	407.61		

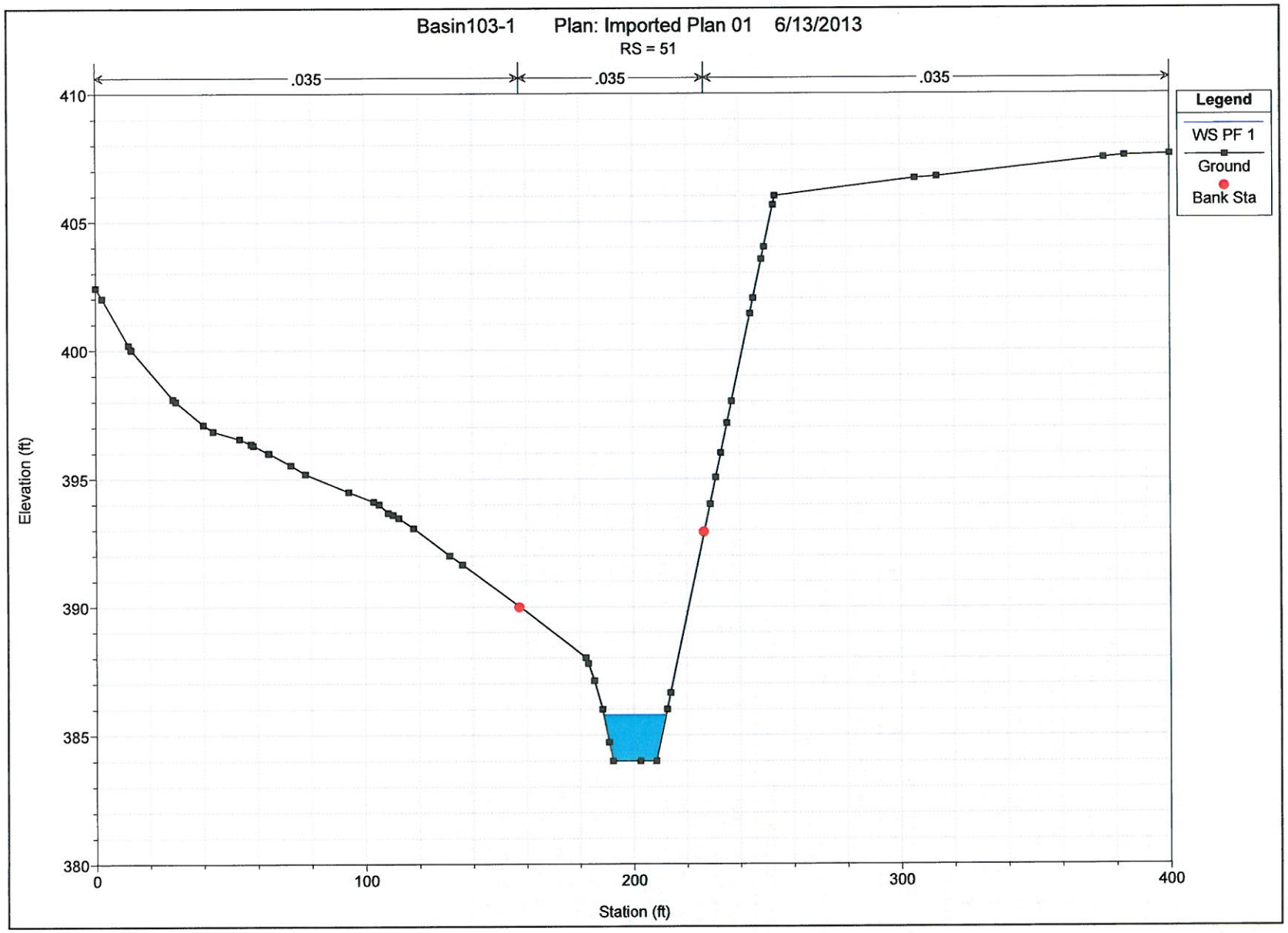
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	157.35	.035	226.56	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
157.35	226.56	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.		0.035	
W.S. Elev (ft)	385.79	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	385.79	Flow Area (sq ft)		35.37	
E.G. Slope (ft/ft)	0.016512	Area (sq ft)		35.37	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	23.39	Top Width (ft)		23.39	
Vel Total (ft/s)	7.02	Avg. Vel. (ft/s)		7.02	
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)		1.51	
Conv. Total (cfs)	1932.3	Conv. (cfs)		1932.3	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		24.23	
Min Ch El (ft)	384.00	Shear (lb/sq ft)		1.50	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	0.86	Cum Volume (acre-ft)		1.08	0.00
C & E Loss (ft)	0.02	Cum SA (acres)		0.84	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 51
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
410
405
400
395
390
385
380
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 50

INPUT
Description: 36
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	403.49	9.23	402	11.53	401.71	25.34	400.16	25.98	400.1
26.42	400.06	26.95	400	37.04	399.39	39.01	399.29	41.43	399.19
43.9	399.08	46.31	398.94	49.3	398.76	56.71	398.37	62.22	398.06
62.34	398.05	63.39	398	74.2	396.73	77.08	396.43	81.69	396
84.65	395.87	87.14	395.63	95.31	395.02	103.99	394	116.99	392.81
128.24	392	157.15	389.52	170.34	388.58	174.09	388.28	175.58	388.18
178.47	388	179.28	387.94	180.63	387.83	186.93	386	189.14	385.2
192.4	384	204.51	384	208.51	386	210.64	387.07	212.51	388
216.51	390	218.66	391.08	220.51	392	224.51	394	226.68	395.09
228.51	396	232.51	398	234.7	399.1	236.51	400	244.51	404
246.74	405.11	248.51	406	331.75	406.94	337.96	407	396.38	407.21
400	407.21								

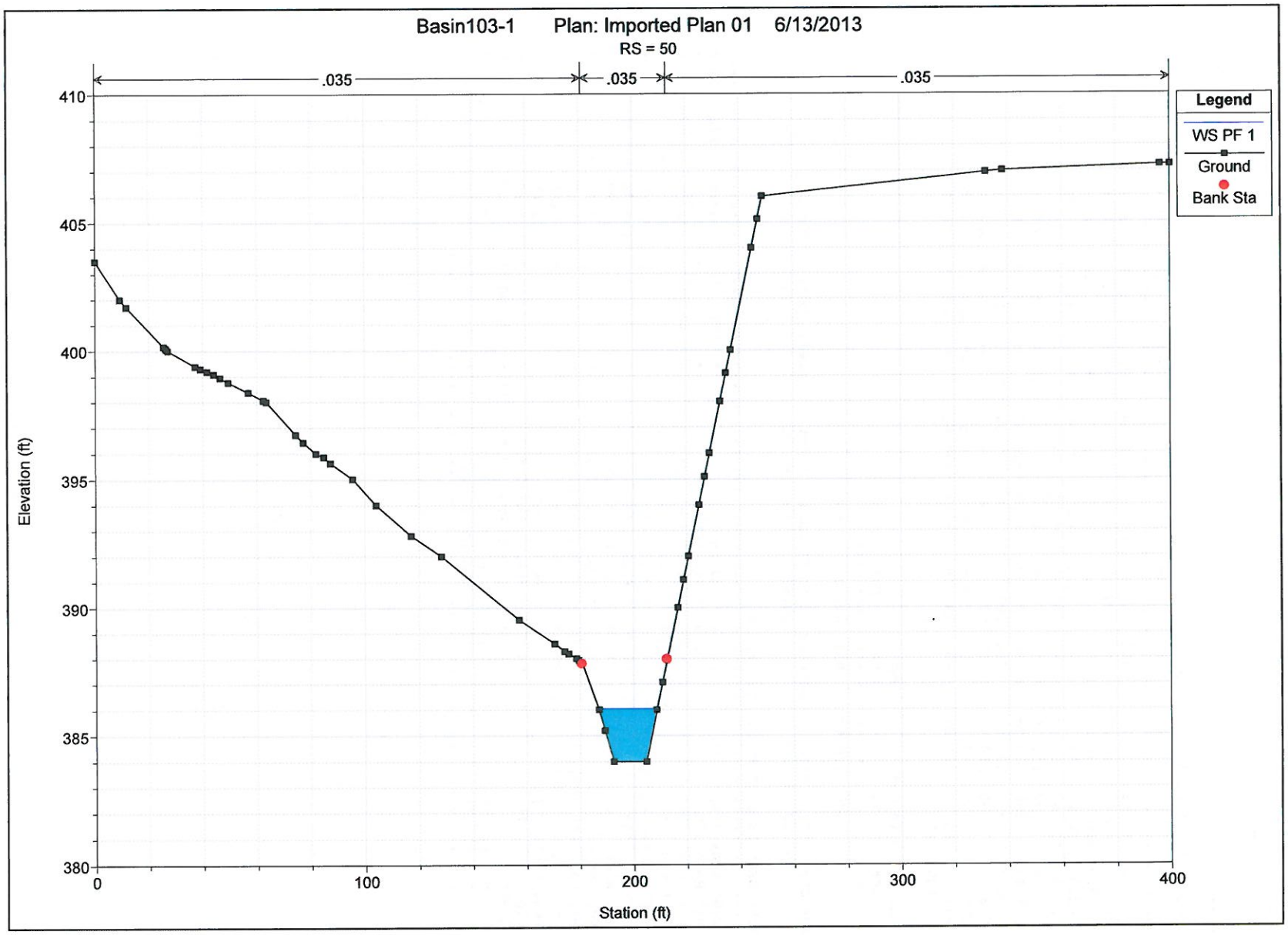
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	180.63	.035	212.51	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
180.63	212.51	39.68	50	60.31	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.84	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.80	Wt. n-Val.		0.035		
W.S. Elev (ft)	386.04	Reach Len. (ft)	39.68	50.00	60.31	
Crit W.S. (ft)	386.04	Flow Area (sq ft)		34.56		
E.G. Slope (ft/ft)	0.016299	Area (sq ft)		34.56		
Q Total (cfs)	248.30	Flow (cfs)		248.30		
Top Width (ft)	21.80	Top Width (ft)		21.80		
Vel Total (ft/s)	7.18	Avg. Vel. (ft/s)		7.18		
Max Chl Dpth (ft)	2.04	Hydr. Depth (ft)		1.59		
Conv. Total (cfs)	1944.9	Conv. (cfs)		1944.9		
Length Wtd. (ft)		Wetted Per. (ft)		22.65		
Min Ch El (ft)	384.00	Shear (lb/sq ft)		1.55		
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00	
Frctn Loss (ft)	0.82	Cum Volume (acre-ft)		1.04	0.00	
C & E Loss (ft)	0.00	Cum SA (acres)		0.82	0.01	


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 50
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
410
405
400
395
390
385
380
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 49

INPUT
Description: 37
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	405.12	2.07	405.06	2.4	405.03	3.02	405	9.35	404.82
14.04	404.61	16.67	404.51	20.4	404.31	25.28	404	25.89	403.95
25.95	403.94	26.89	403.85	38.34	402.69	45.57	402	45.97	401.96
52.18	401.5	57.61	401.15	65.02	400.8	70.62	400.46	77.24	400
78.11	399.9	78.93	399.78	83.48	399.12	90.67	398	92.25	397.75
94.1	397.5	100.51	396.58	112.27	395.29	118.36	394.64	123.74	394
126.94	393.59	138.44	392	143.98	391.53	147.51	391.27	150.85	391
155.94	390.64	163.08	390	172.95	389.31	182.83	388	186.83	386
189.16	384.84	190.84	384	206.1	384	208.77	385.34	210.1	386
212.76	387.33	214.11	388	218.11	390	220.74	391.31	222.12	392
224.73	393.3	226.13	394	228.72	395.29	230.13	396	232.71	397.29
234.14	398	236.69	399.28	238.14	400	240.68	401.27	242.15	402
246.15	404	248.66	405.25	250.16	406	291.19	406.46	300.28	406.54
385.61	406.85	400	406.86						

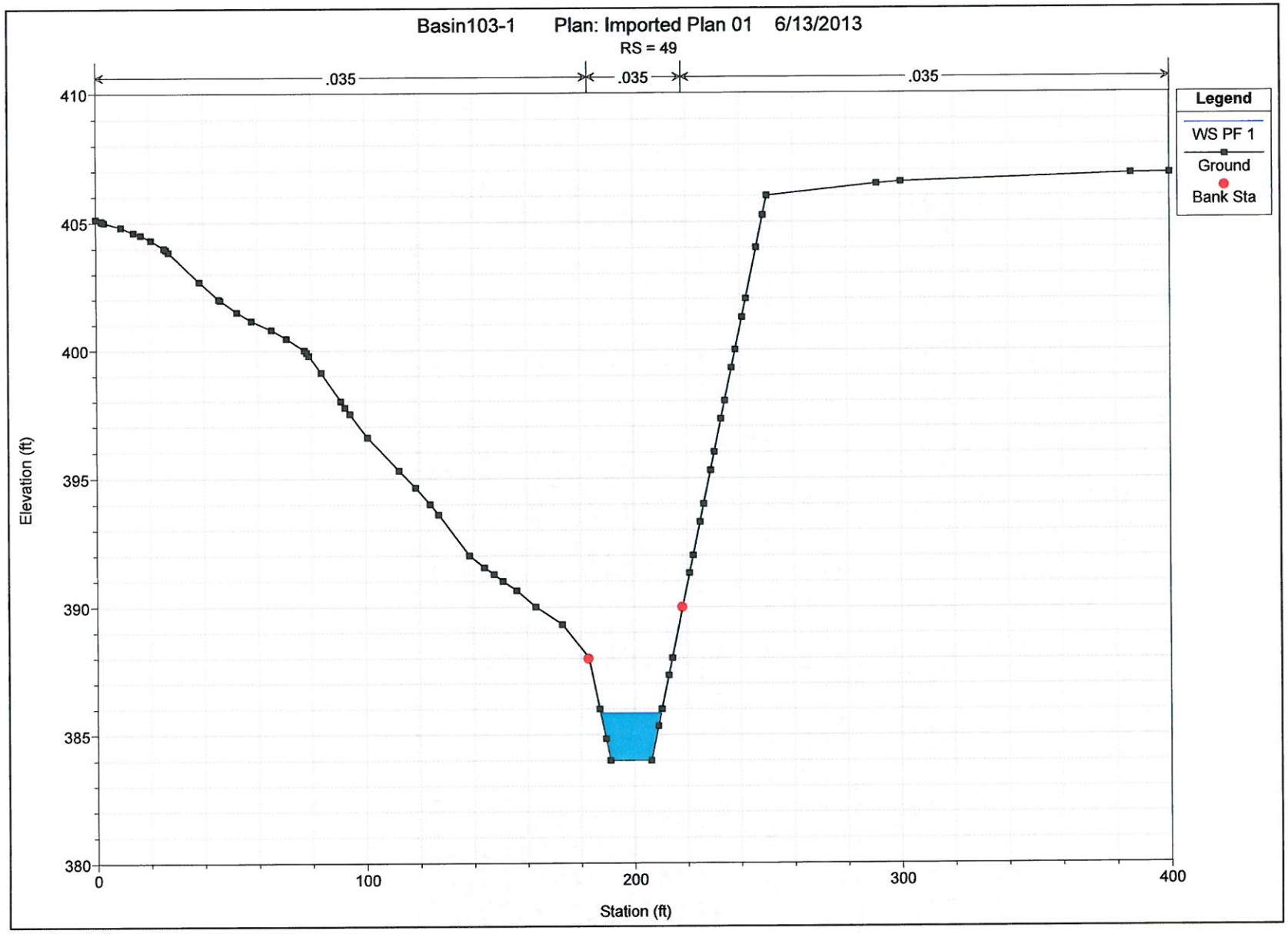
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	182.83	.035	218.11	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.83	218.11	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.78	Wt. n-Val.		0.035	
W.S. Elev (ft)	385.85	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	385.85	Flow Area (sq ft)		34.99	
E.G. Slope (ft/ft)	0.016453	Area (sq ft)		34.99	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	22.65	Top Width (ft)		22.65	
Vel Total (ft/s)	7.10	Avg. Vel. (ft/s)		7.10	
Max Chl Dpth (ft)	1.85	Hydr. Depth (ft)		1.54	
Conv. Total (cfs)	1935.8	Conv. (cfs)		1935.8	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		23.52	
Min Ch El (ft)	384.00	Shear (lb/sq ft)		1.53	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		1.00	0.00
C & E Loss (ft)		Cum SA (acres)		0.79	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 49
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
410
405
400
395
390
385
380
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 48

INPUT
Description: 38
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	427.45	4.13	427.18	11.71	426.75	16.67	426.15	16.93	426.12
17.67	426	27.71	424.41	30.04	424	35.36	423.11	41.13	422
44.45	421.35	51.96	420	54.54	419.55	56.7	419.11	59.09	418.66
64.45	417.47	71.14	416	71.48	415.93	80.25	414	80.91	413.86
89.02	412	92.65	411.2	99.03	410	102.54	409.37	107.26	408.45
108.67	408.17	112.53	407.34	121.39	405.29	126.77	404	135.17	402.25
136.31	402	136.77	401.91	137.63	401.77	142.52	400.82	146.83	400
147.92	399.8	157.53	398	162.12	397.17	168.11	396	170.86	395.13
178.2	390.25	178.58	390	182.03	388.28	182.59	388	185.97	386.32
186.61	386	189.92	384.35	190.62	384	200.21	384	204.61	384
211.65	387.49	212.69	388	216.72	390	219.64	391.44	220.76	392
224.8	394	227.61	395.4	228.83	396	231.6	397.37	232.87	398
235.58	399.34	236.91	400	239.56	401.32	240.94	402	243.54	403.29
244.98	404	247.52	405.26	249.02	406	257.14	406.09	270.77	406.21
382.25	406.76	387.27	406.76	400	406.8				

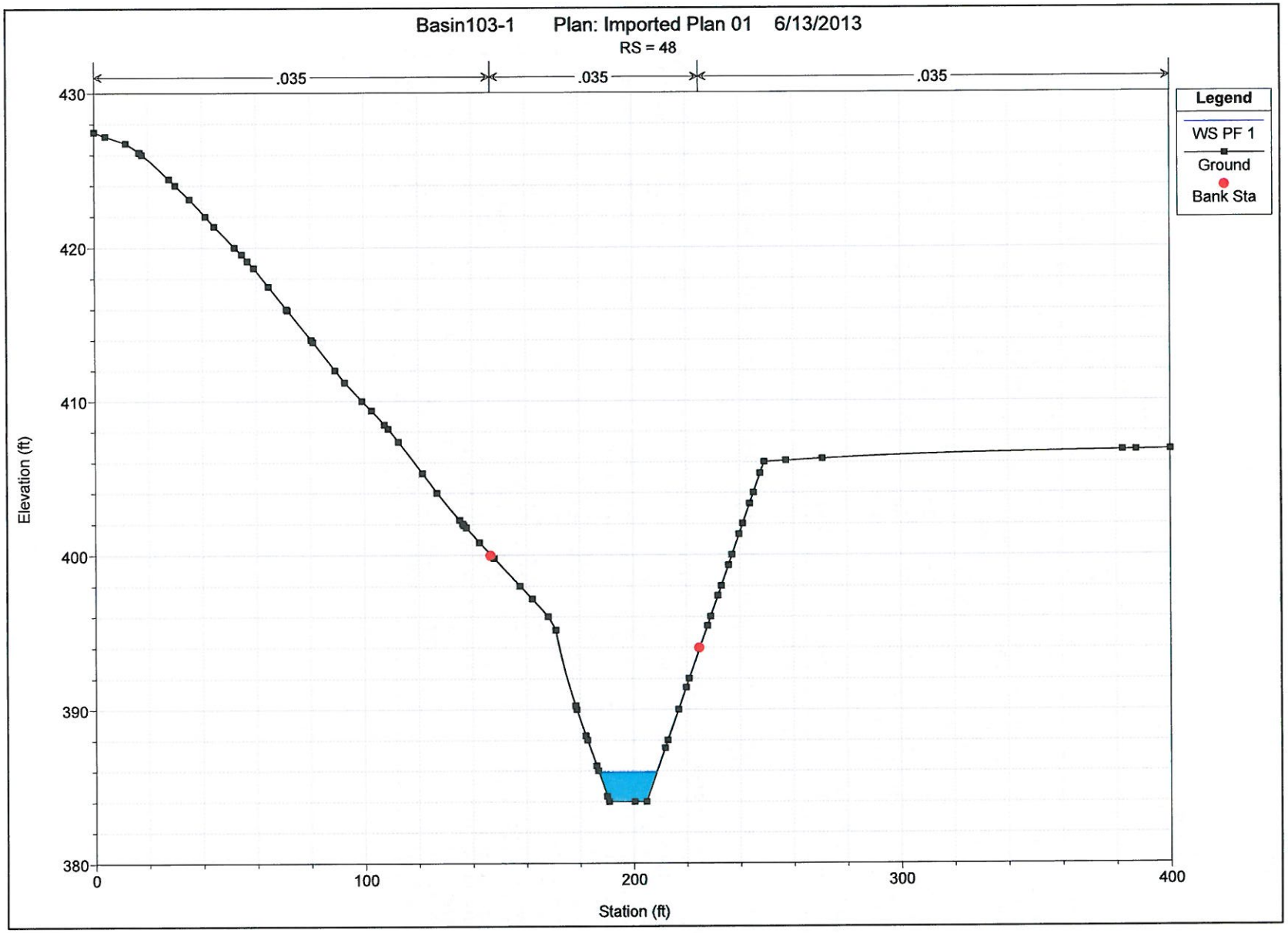
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	146.83	.035	224.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
146.83	224.8	153.56	40.25	78.21	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	386.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.035	
W.S. Elev (ft)	385.93	Reach Len. (ft)	153.56	40.25	78.21
Crit W.S. (ft)	385.93	Flow Area (sq ft)		34.54	
E.G. Slope (ft/ft)	0.016353	Area (sq ft)		34.54	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	21.76	Top Width (ft)		21.76	
Vel Total (ft/s)	7.19	Avg. Vel. (ft/s)		7.19	
Max Chl Dpth (ft)	1.93	Hydr. Depth (ft)		1.59	
Conv. Total (cfs)	1941.7	Conv. (cfs)		1941.7	
Length Wtd. (ft)	40.25	Wetted Per. (ft)		22.67	
Min Ch El (ft)	384.00	Shear (lb/sq ft)		1.56	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	0.82	Cum Volume (acre-ft)		0.96	0.00
C & E Loss (ft)	0.00	Cum SA (acres)		0.77	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 48
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
430
420
410
400
390
380
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 38.1

INPUT
Description: 38.1
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	477.53	104.9	430	169.81	400.43	185.56	390	197.65	384
207.49	384	216.01	390	257.59	406	400	407.08		

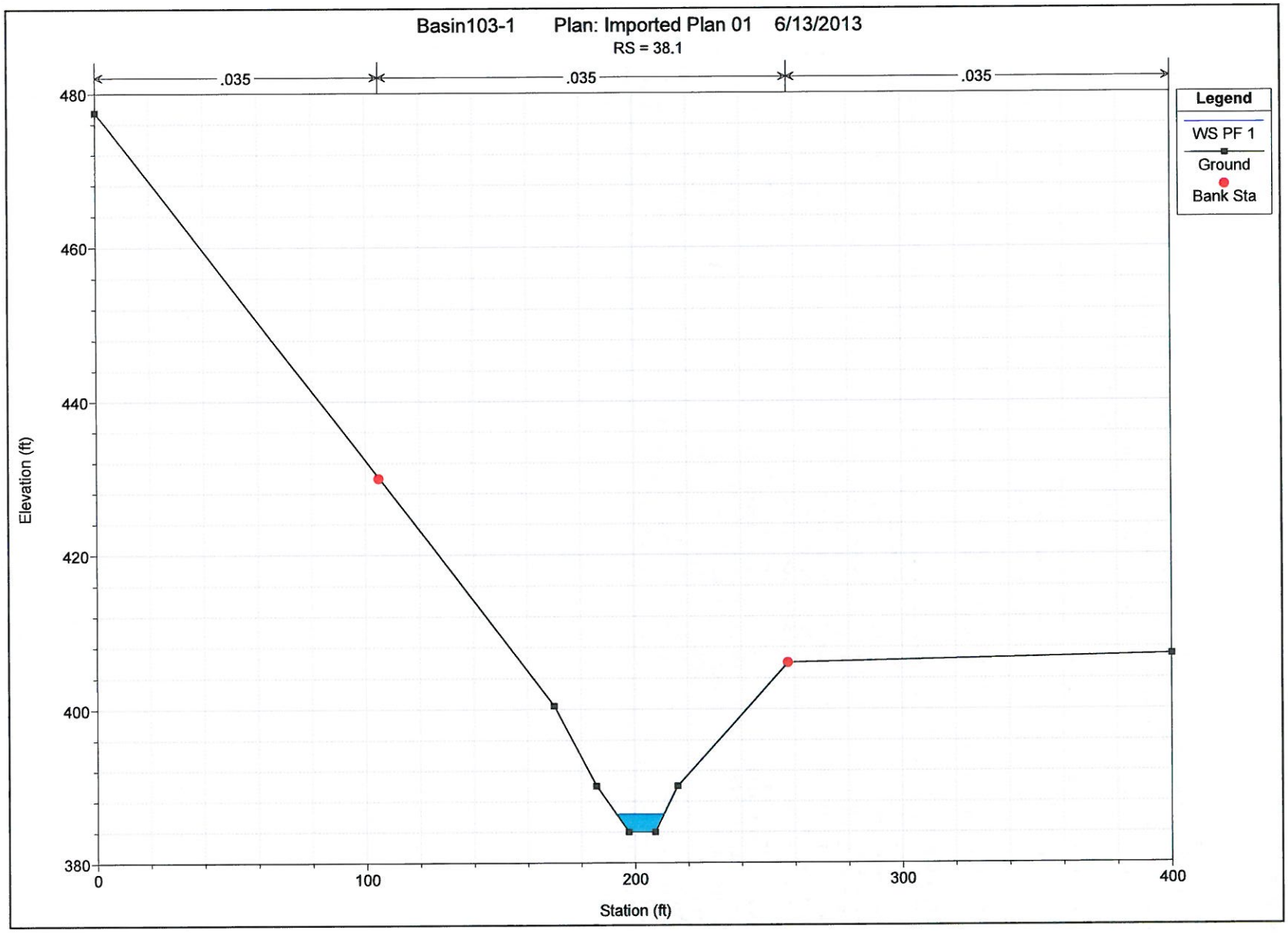
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	104.9	.035	257.59	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
104.9	257.59	2022.92	2022.92	2022.92	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

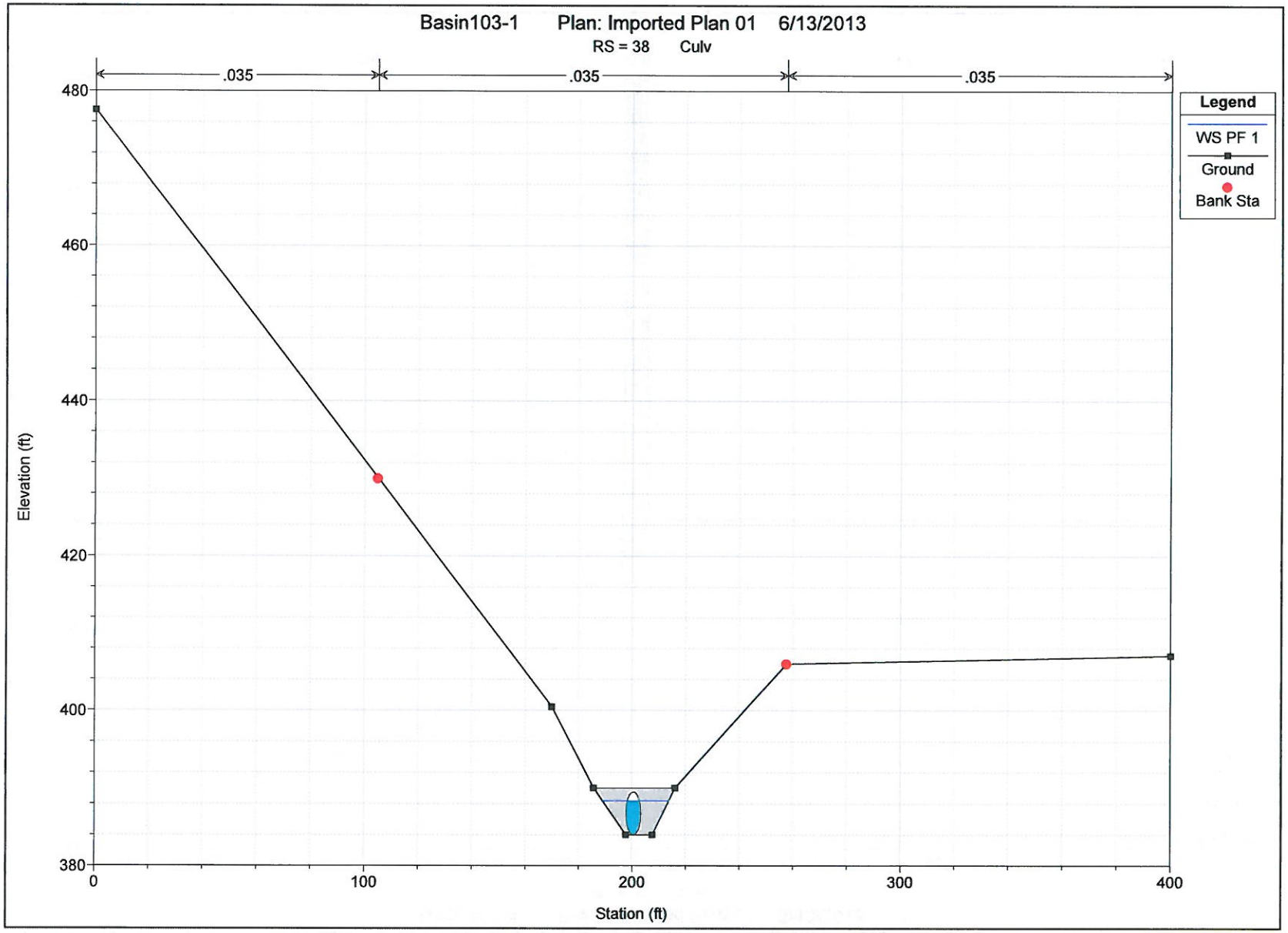
E.G. Elev (ft)	387.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.		0.035	
W.S. Elev (ft)	386.33	Reach Len. (ft)	2022.92	2022.92	2022.92
Crit W.S. (ft)	386.33	Flow Area (sq ft)		32.30	
E.G. Slope (ft/ft)	0.016312	Area (sq ft)		32.30	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	17.85	Top Width (ft)		17.85	
Vel Total (ft/s)	7.69	Avg. Vel. (ft/s)		7.69	
Max Chl Dpth (ft)	2.33	Hydr. Depth (ft)		1.81	
Conv. Total (cfs)	1944.1	Conv. (cfs)		1944.1	
Length Wtd. (ft)	2022.92	Wetted Per. (ft)		19.14	
Min Ch El (ft)	384.00	Shear (lb/sq ft)		1.72	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	0.66	Cum Volume (acre-ft)		0.93	0.00
C & E Loss (ft)	0.01	Cum SA (acres)		0.75	0.01

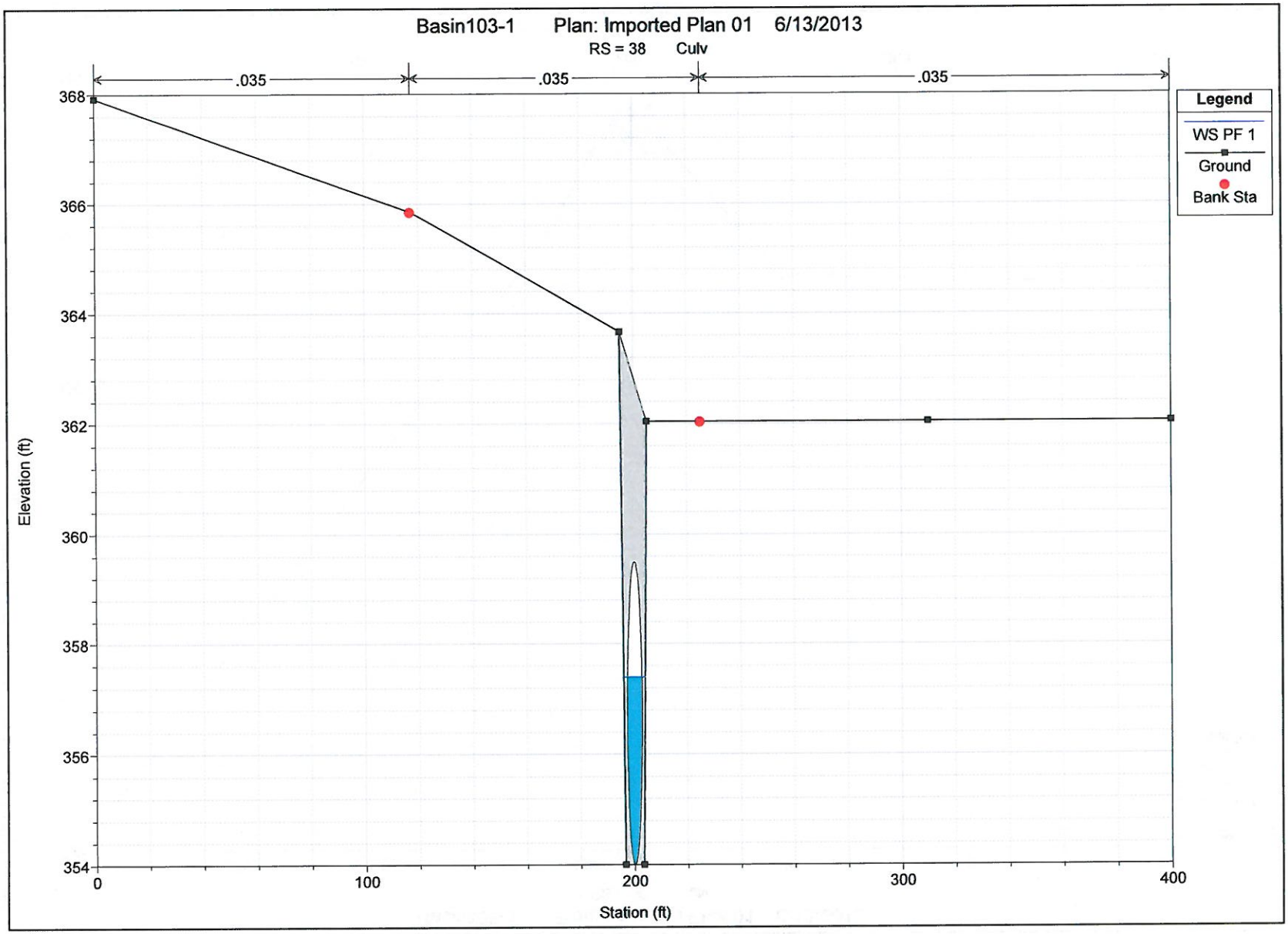

Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 38.1
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
480
460
440
420
400
380
0
100
200
300
400
Station (ft)

```
CULVERT
REACH: Reach-1            RS: 38

INPUT
Description: RCP-Culvert 66in
Distance from Upstream XS =       1
Deck/Roadway Width        =    2020
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**************************************************
  185.56     390     384  216.01     390     384

Upstream Bridge Cross Section Data
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  477.53   104.9     430  169.81  400.43  185.56     390  197.65     384
  207.49     384  216.01     390  257.59     406     400  407.08

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
       0    .035   104.9    .035  257.59    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
         104.9  257.59             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**************************************************
  194.88  363.66     354   204.8  362.04     354

Downstream Bridge Cross Section Data
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  367.92  116.96  365.85  194.88  363.66  196.58     354  203.47     354
   204.8  362.04   225.1  362.04  309.92  362.04     400  362.04

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
       0    .035  116.96    .035   225.1    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
        116.96   225.1             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular     5.5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  1    2020     .015     .015        0                  .2                 1
Upstream   Elevation =  384
           Centerline Station =  200.43
Downstream Elevation =  354
           Centerline Station =  200.02
```

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (cfs)	248.30	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	12.20
Q Barrel (cfs)	248.30	Culv Vel DS (ft/s)	16.14
E.G. US. (ft)	387.25	Culv Inv El Up (ft)	384.00
W.S. US. (ft)	386.33	Culv Inv El Dn (ft)	354.00
E.G. DS (ft)	358.88	Culv Frctn Ls (ft)	29.27
W.S. DS (ft)	357.32	Culv Exit Loss (ft)	2.56
Delta EG (ft)	28.37	Culv Entr Loss (ft)	0.00
Delta WS (ft)	29.01	Q Weir (cfs)	
E.G. IC (ft)		Weir Sta Lft (ft)	
E.G. OC (ft)		Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	388.40	Weir Max Depth (ft)	
Culv WS Outlet (ft)	357.39	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.39	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	4.40	Min El Weir Flow (ft)	390.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 38 Culv
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
480
460
440
420
400
380
0
100
200
300
400
Station (ft)


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 38 Culv
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 6.1

INPUT
Description: 80.1
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	367.92	116.96	365.85	194.88	363.66	196.58	354	203.47	354
204.8	362.04	225.1	362.04	309.92	362.04	400	362.04		

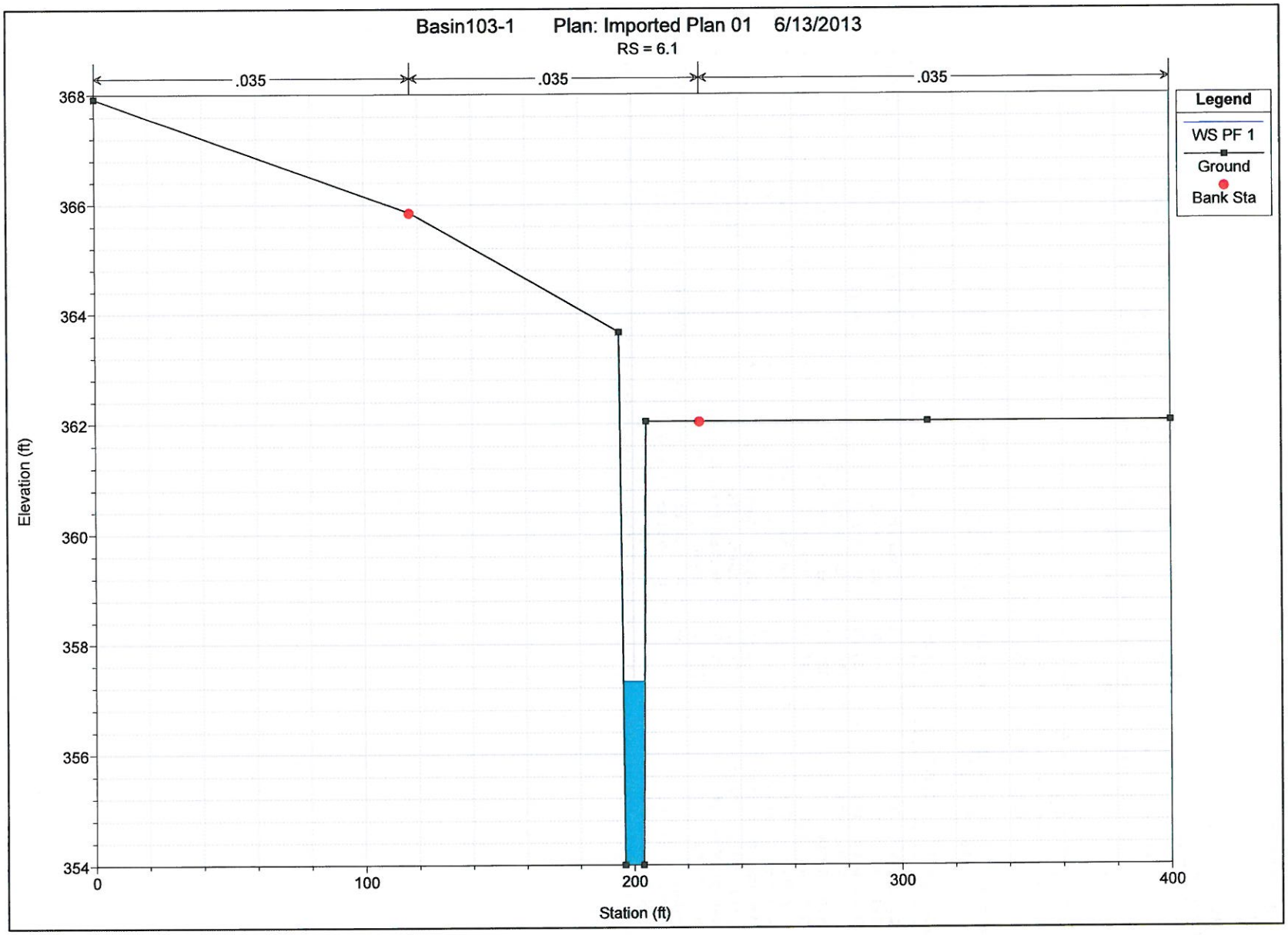
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	116.96	.035	225.1	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
116.96	225.1	56.91	37.57	18.27	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	358.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.56	Wt. n-Val.		0.035	
W.S. Elev (ft)	357.32	Reach Len. (ft)	56.91	37.57	18.27
Crit W.S. (ft)	357.32	Flow Area (sq ft)		24.78	
E.G. Slope (ft/ft)	0.025107	Area (sq ft)		24.78	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	8.02	Top Width (ft)		8.02	
Vel Total (ft/s)	10.02	Avg. Vel. (ft/s)		10.02	
Max Chl Dpth (ft)	3.32	Hydr. Depth (ft)		3.09	
Conv. Total (cfs)	1567.0	Conv. (cfs)		1567.0	
Length Wtd. (ft)	37.57	Wetted Per. (ft)		13.63	
Min Ch El (ft)	354.00	Shear (lb/sq ft)		2.85	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.20	0.00
C & E Loss (ft)		Cum SA (acres)		0.15	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 6.1
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 6

INPUT
Description: 80
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	368	7.98	368	35.61	367.02	42.82	366.9	45.45	366.77
49.01	366.65	53.23	366.54	57.1	366.47	60.1	366.44	63.44	366.42
64.77	366.42	66.72	366.41	98.8	366	106.45	365.89	106.75	365.89
107.62	365.88	108.08	365.87	108.61	365.86	108.94	365.85	109.22	365.85
109.7	365.83	110.39	365.82	111.14	365.8	112.45	365.75	116.53	365.58
122.03	365.37	130.63	365.09	161.1	364	163.77	362.66	165.1	362
167.87	360.61	169.1	360	173.1	358	174.94	357.39	182.1	355
183.4	354.56	185.1	354	188.1	353	202.28	353	204.14	353.38
205.29	353.39	206.39	353.23	209.89	353.48	213.75	354	215.8	354.71
215.89	356	215.97	357.29	217.49	358	219.29	359.1	221.42	360
233.13	360	234.51	359.3	234.83	359.33	234.89	359.19	235.49	358.94
236.65	358.7	237.78	358.57	237.85	358.61	237.99	358.6	244.97	358.36
265.03	358	284.46	357.75	286.22	357.76	287.12	357.78	289.25	357.86
291.78	357.84	291.89	357.84	294.78	357.81	300.27	357.72	332.27	357.43
400	356.31								

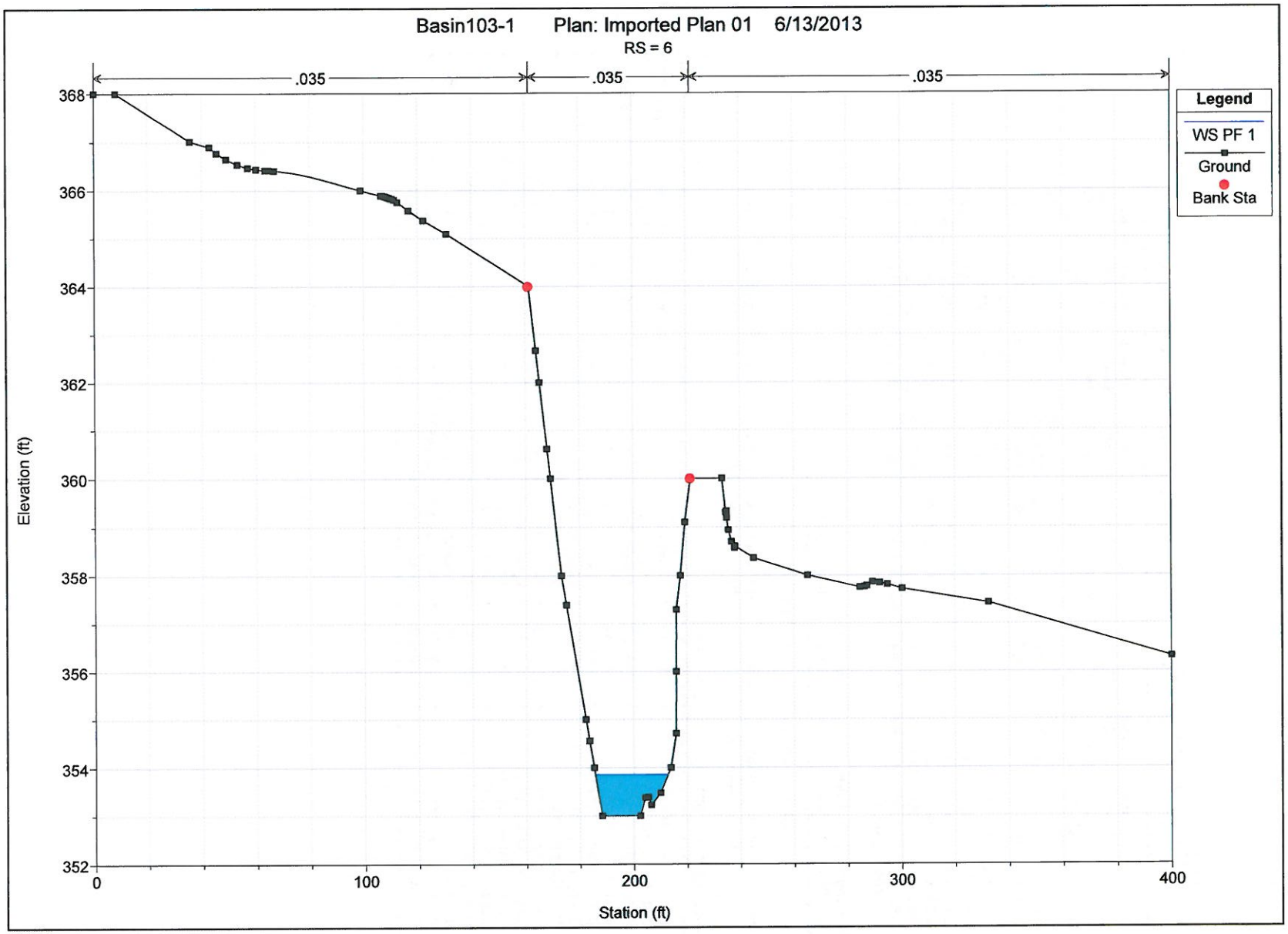
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	161.1	.035	221.42	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
161.1	221.42	75.91	50	23.95	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.75	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.89	Wt. n-Val.		0.035		
W.S. Elev (ft)	353.87	Reach Len. (ft)	75.91	50.00	23.95	
Crit W.S. (ft)	354.57	Flow Area (sq ft)		18.22		
E.G. Slope (ft/ft)	0.178511	Area (sq ft)		18.22		
Q Total (cfs)	248.30	Flow (cfs)		248.30		
Top Width (ft)	27.27	Top Width (ft)		27.27		
Vel Total (ft/s)	13.63	Avg. Vel. (ft/s)		13.63		
Max Chl Dpth (ft)	0.87	Hydr. Depth (ft)		0.67		
Conv. Total (cfs)	587.7	Conv. (cfs)		587.7		
Length Wtd. (ft)		Wetted Per. (ft)		27.50		
Min Ch El (ft)	353.00	Shear (lb/sq ft)		7.38		
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00	
Frctn Loss (ft)	2.00	Cum Volume (acre-ft)		0.18	0.00	
C & E Loss (ft)	0.13	Cum SA (acres)		0.13	0.01	


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 6
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
352
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 5

INPUT
Description: 81
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	368	20.27	368	40.98	367.17	61.74	366	84.31	365.36
104.66	365.06	135.03	364.63	145.54	364.51	157.48	364.31	161.42	364.22
167.75	364.05	170.6	364	170.74	364	173.62	362.75	175.34	362
177.08	361.25	179.94	360	180.84	359.61	184.54	358	185.2	357.87
185.61	357.75	186.66	357.38	190.21	356.21	196.57	354.1	196.86	354
197.14	353.91	198.06	353.74	199.87	353	203.29	353	207.55	353
209.61	353.64	210.79	354	217.25	356	219.83	357.2	221.56	358
229.55	358	231.11	357.29	243.76	356.04	243.88	356.02	244	356.01
244.71	356	251.35	355.98	252.51	356	267.83	356	278.47	356.07
285.77	356.19	303.1	356.83	323.59	356.71	324.04	356.7	324.5	356.7
347.98	356.48	349.44	356.46	399.06	356.02	400	356.01		

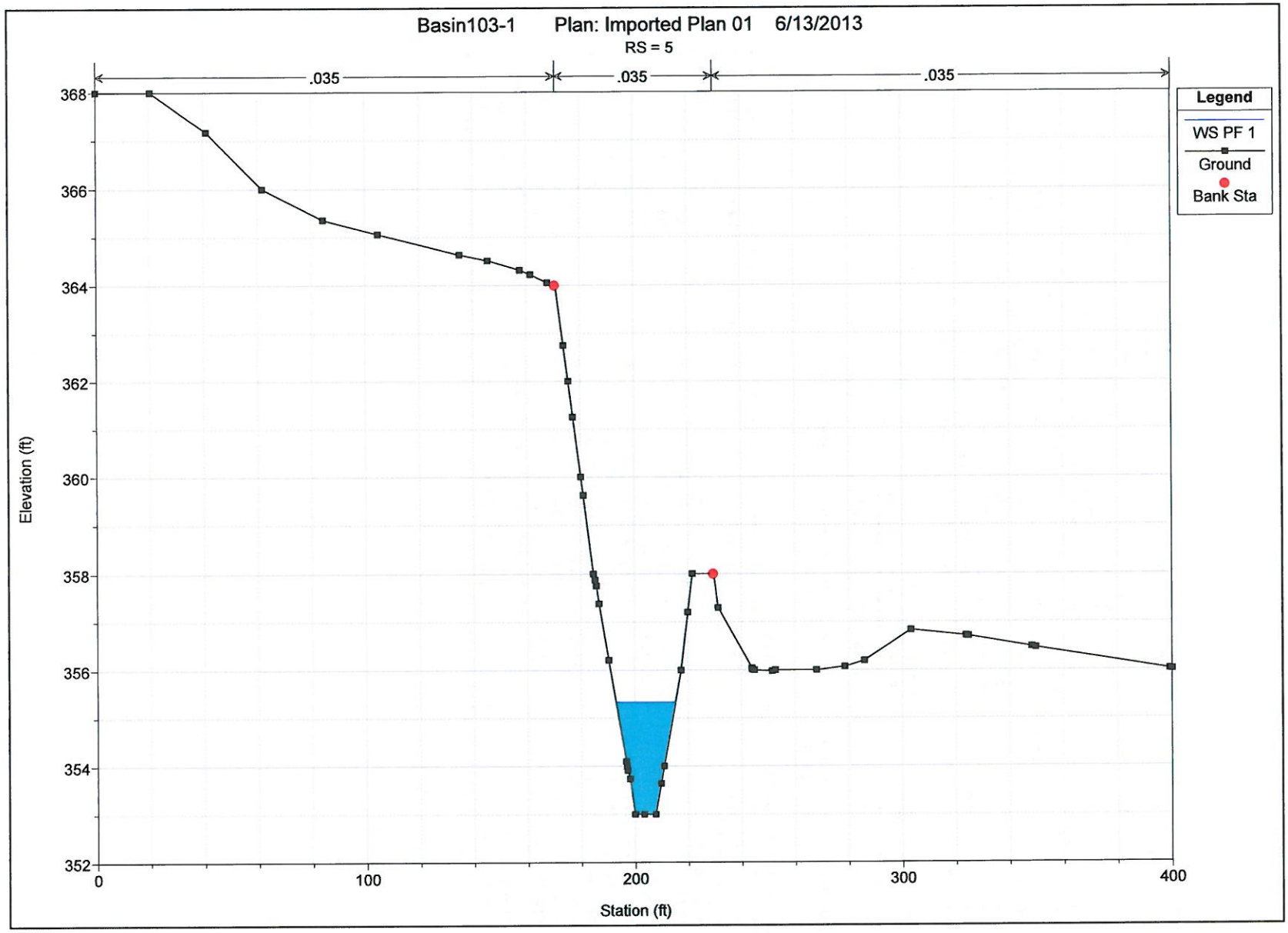
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	170.6	.035	229.55	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
170.6	229.55	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	356.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.035	
W.S. Elev (ft)	355.33	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	355.33	Flow Area (sq ft)		34.74	
E.G. Slope (ft/ft)	0.016343	Area (sq ft)		34.74	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	22.25	Top Width (ft)		22.25	
Vel Total (ft/s)	7.15	Avg. Vel. (ft/s)		7.15	
Max Chl Dpth (ft)	2.33	Hydr. Depth (ft)		1.56	
Conv. Total (cfs)	1942.3	Conv. (cfs)		1942.3	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		23.00	
Min Ch El (ft)	353.00	Shear (lb/sq ft)		1.54	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.15	0.00
C & E Loss (ft)		Cum SA (acres)		0.10	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 5
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
352
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 4

INPUT
Description: 82
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	367.56	77.78	366	169.5	364	169.51	363.94	169.75	362
170.34	361.58	171.79	360.37	172.25	360	176.25	358	176.94	357.86
185.12	356	194.12	353	195.18	352.65	197.12	352	203.82	352
207.52	351.95	207.62	352	208.29	352.22	210.62	353	211.3	353.23
213.62	354	216.62	355	217.12	355	238.82	354.72	240.05	354.72
303.35	354	310.58	353.82	313.79	353.75	316.77	353.77	319.61	353.8
321.21	353.84	322.25	353.9	324.18	353.93	330.09	354	361.68	354.15
365.2	354.15	367.62	354.14	370.67	354.14	375.9	354.12	387.34	354.05
393.47	354	395.04	353.99	400	353.94				

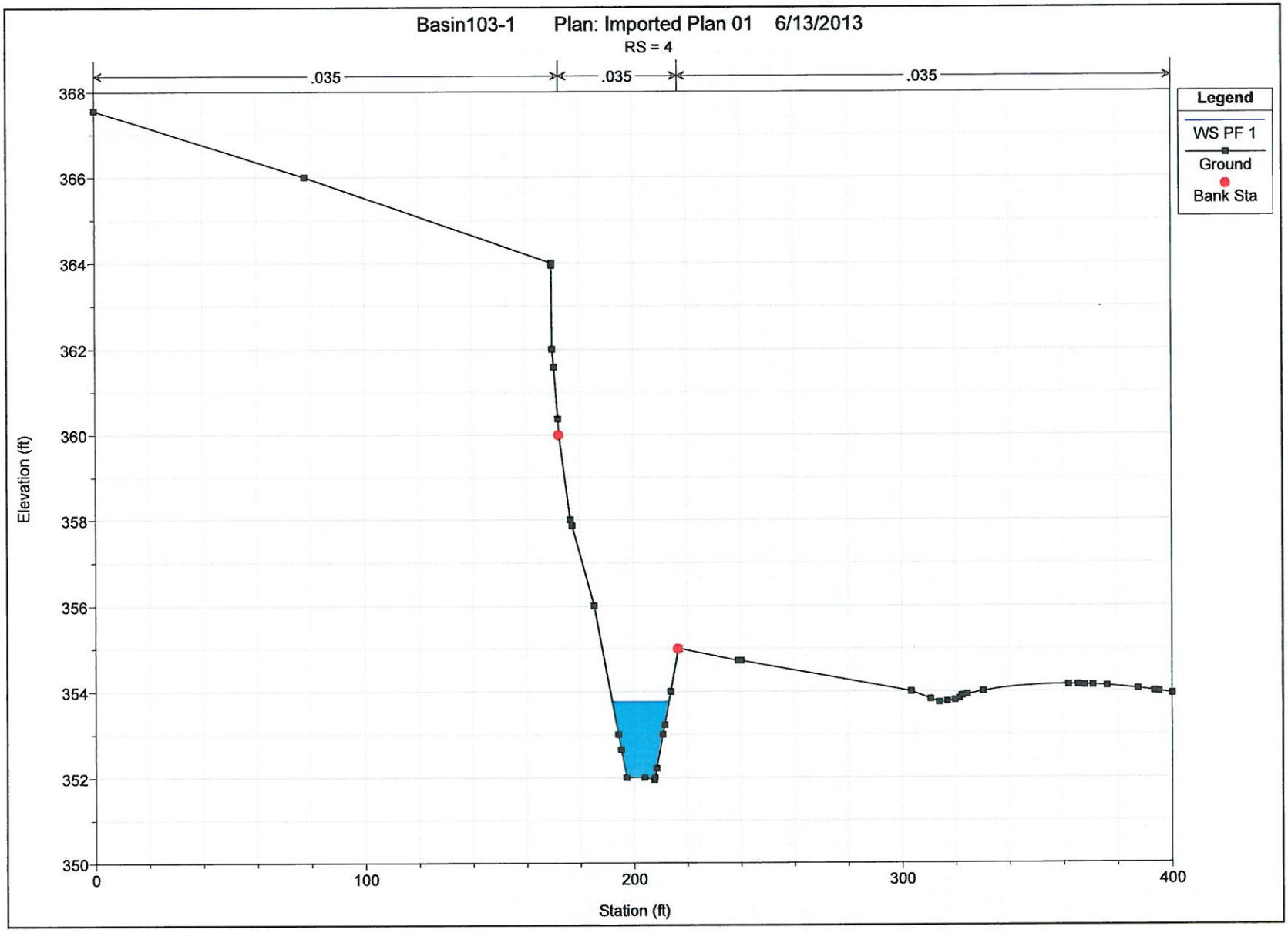
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	172.25	.035	216.62	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.25	216.62	114.7	50	206.29	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.23	Wt. n-Val.		0.035	0.035
W.S. Elev (ft)	353.76	Reach Len. (ft)	114.70	50.00	206.29
Crit W.S. (ft)	354.36	Flow Area (sq ft)		27.95	0.02
E.G. Slope (ft/ft)	0.031193	Area (sq ft)		27.95	0.02
Q Total (cfs)	248.30	Flow (cfs)		248.29	0.01
Top Width (ft)	23.79	Top Width (ft)		21.08	2.71
Vel Total (ft/s)	8.88	Avg. Vel. (ft/s)		8.88	0.27
Max Chl Dpth (ft)	1.81	Hydr. Depth (ft)		1.33	0.01
Conv. Total (cfs)	1405.9	Conv. (cfs)		1405.9	0.0
Length Wtd. (ft)		Wetted Per. (ft)		21.67	2.71
Min Ch El (ft)	351.95	Shear (lb/sq ft)		2.51	0.01
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)		0.12	0.00
C & E Loss (ft)	0.04	Cum SA (acres)		0.08	0.01


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 4
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
352
350
0
100
200
300
400
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 3

INPUT
Description: 83
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	367.89	1.9	367.84	61.17	366.67	75.8	366	86.59	365.76
115.75	365.48	131.57	365.38	134.44	365.27	142.34	365.04	147.02	364.89
162.71	364.34	171.9	364	172.02	363.1	172.15	362	172.27	361.08
172.41	360	173.28	359.38	175.92	358	181.05	356.82	184.8	356
186.91	355.3	187.8	355	189.92	354.29	190.8	354	195.94	352.29
196.8	352	197.41	351.95	206.28	351.84	206.59	352	211.85	353.75
212.59	354	214.86	354.76	215.59	355	216.09	355	286.83	354.1

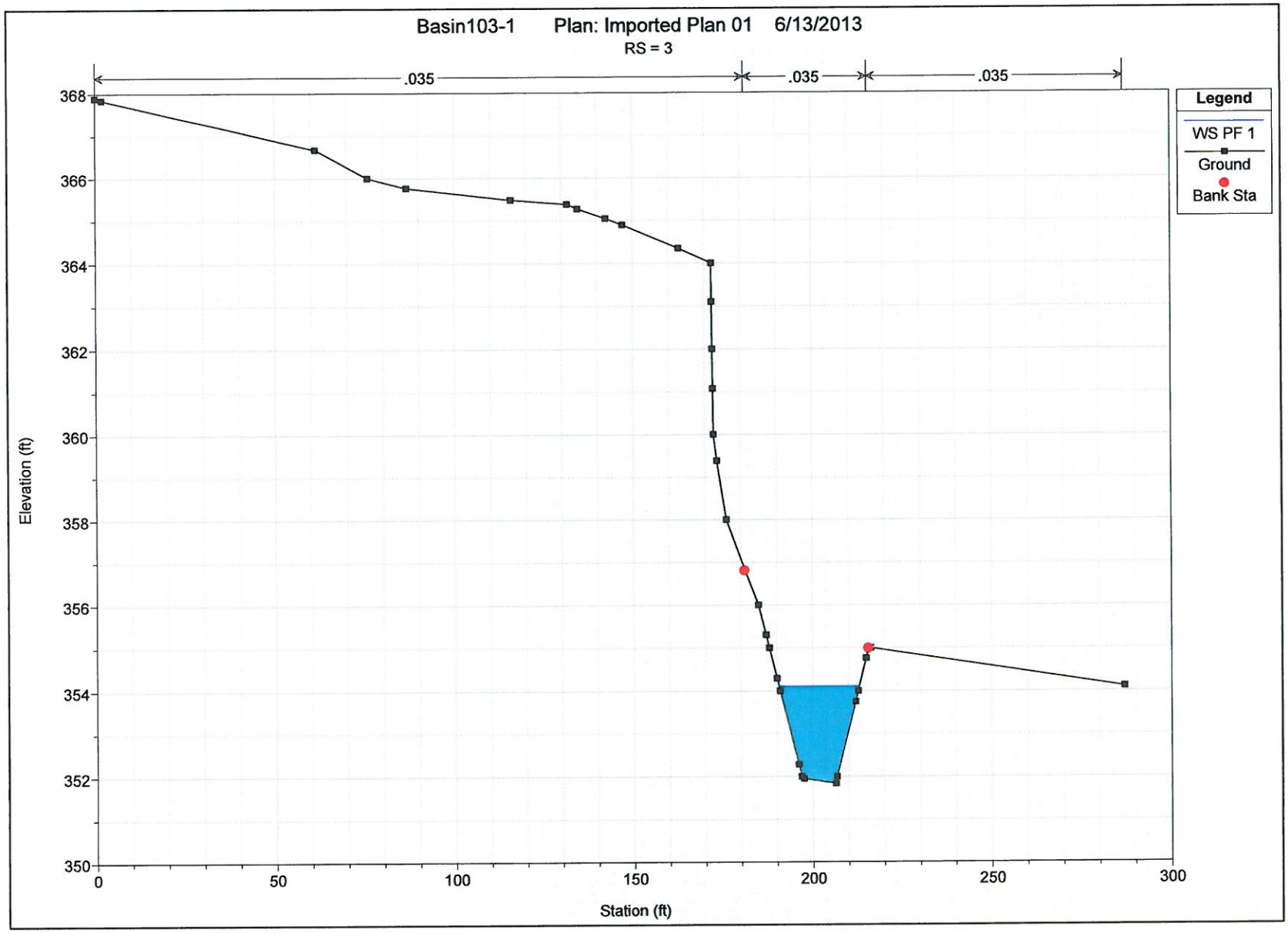
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	181.05	.035	215.59	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
181.05	215.59	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.035	0.000
W.S. Elev (ft)	354.11	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	354.11	Flow Area (sq ft)		34.90	0.00
E.G. Slope (ft/ft)	0.016251	Area (sq ft)		34.90	0.00
Q Total (cfs)	248.30	Flow (cfs)		248.30	0.00
Top Width (ft)	22.92	Top Width (ft)		22.43	0.49
Vel Total (ft/s)	7.11	Avg. Vel. (ft/s)		7.11	0.11
Max Chl Dpth (ft)	2.27	Hydr. Depth (ft)		1.56	0.00
Conv. Total (cfs)	1947.8	Conv. (cfs)		1947.8	0.0
Length Wtd. (ft)		Wetted Per. (ft)		23.15	0.49
Min Ch El (ft)	351.84	Shear (lb/sq ft)		1.53	
Alpha	1.00	Stream Power (lb/ft s)	286.83	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.08	0.00
C & E Loss (ft)		Cum SA (acres)		0.06	0.00


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 3
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
352
350
0
50
100
150
200
250
300
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 2

INPUT
Description: 84
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	368	61.24	368	65.01	367.4	78.64	367.46	82.8	368
116.54	368	119.94	366.4	120.78	366	122.99	364.96	127.6	364
132.36	363.35	133.53	363.37	134.96	364	138.98	365.24	139.81	365.33
140.34	365.33	145.01	365.19	146.56	364.99	149.16	364	150.3	362.64
152.46	362.73	153.98	363.18	154.41	363.4	156.86	362.99	161.01	362
165.93	359.57	169.12	358	171.48	357.65	182.34	356	183.57	355.6
185.38	355	186.52	354.62	188.42	354	189.48	353.65	191.46	353
192.44	352.68	194.5	352	197.17	351.95	199.09	351.8	205.04	351.73
205.36	351.9	206.89	351.93	207.62	352	209.71	352.7	210.62	353
216.62	355	217.12	355	219.83	354.22	222.91	354.81	225.42	354.81
236.55	354.69								

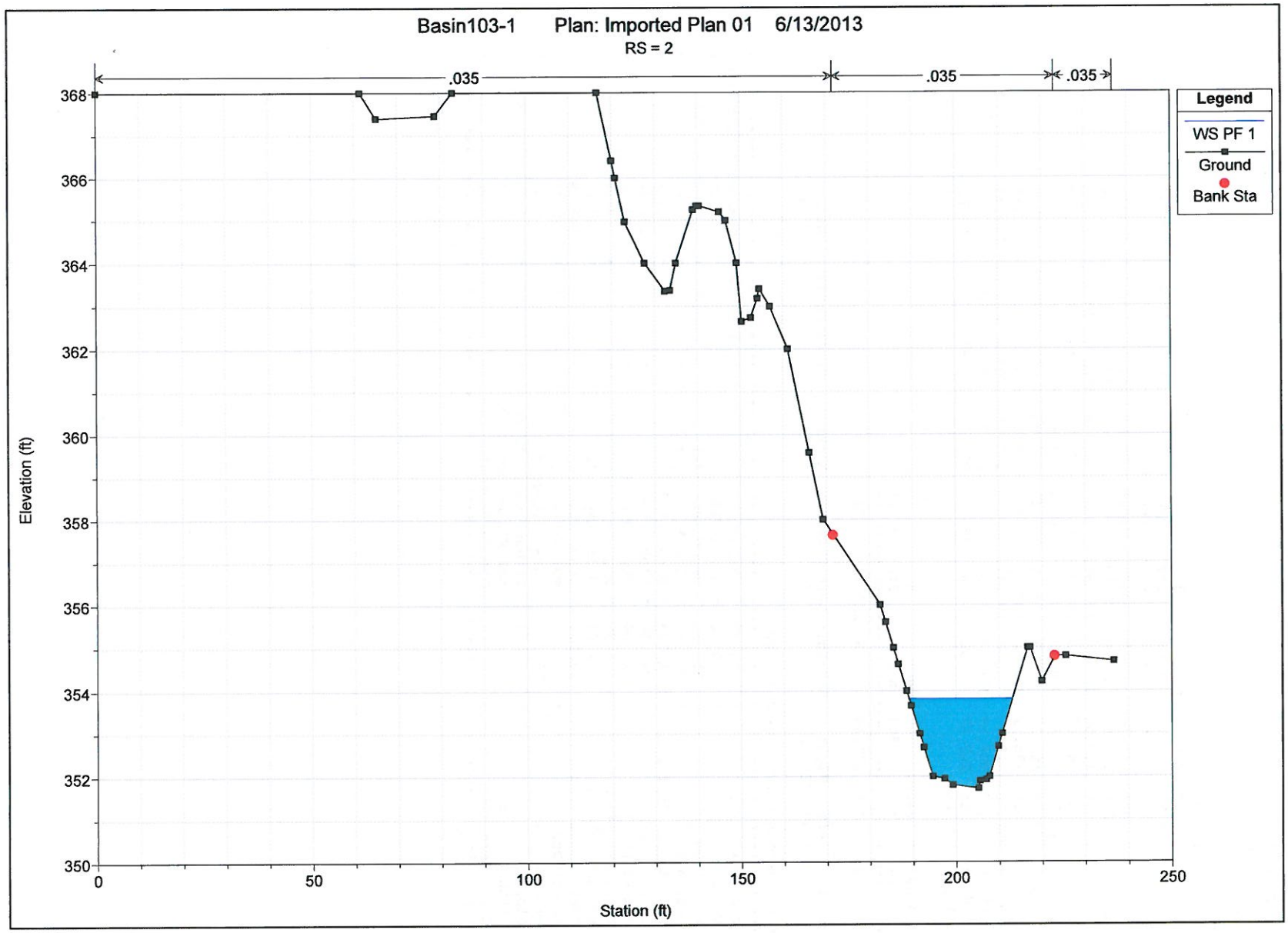
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	171.48	.035	222.91	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.48	222.91	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.75	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.81	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	353.81	Flow Area (sq ft)		35.66	
E.G. Slope (ft/ft)	0.016503	Area (sq ft)		35.66	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	24.08	Top Width (ft)		24.08	
Vel Total (ft/s)	6.96	Avg. Vel. (ft/s)		6.96	
Max Chl Dpth (ft)	2.08	Hydr. Depth (ft)		1.48	
Conv. Total (cfs)	1932.8	Conv. (cfs)		1932.8	
Length Wtd. (ft)		Wetted Per. (ft)		24.72	
Min Ch El (ft)	351.73	Shear (lb/sq ft)		1.49	
Alpha	1.00	Stream Power (lb/ft s)	236.55	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.04	
C & E Loss (ft)		Cum SA (acres)		0.03	


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 2
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
368
366
364
362
360
358
356
354
352
350
0
50
100
150
200
250
Station (ft)

CROSS SECTION
REACH: Reach-1 RS: 1

INPUT
Description: 85
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	368	54.19	368	62	368.4	63.63	368.6	68.37	368.6
77.1	368.62	91.39	368.62	130.38	368.21	133.66	368	137.84	366
140.09	364.93	142.03	364	144.25	362.94	146.21	362	153.25	362
156.3	360.99	162.68	360	165.61	358.12	168.29	358	175.57	357.24
177.91	356.91	179.63	356	181.92	355.24	182.63	355	184.92	354.24
185.63	354	191.63	352	194.59	351.85	196.86	351.79	198.99	351.74
199.78	351.73	200.76	351.66	203.79	351.62	203.96	351.7	204.74	351.72
205.31	351.77	206.45	351.9	207.13	351.98	207.31	352	212.55	353.75
213.31	354	215.57	354.75	216.31	355	216.81	355		

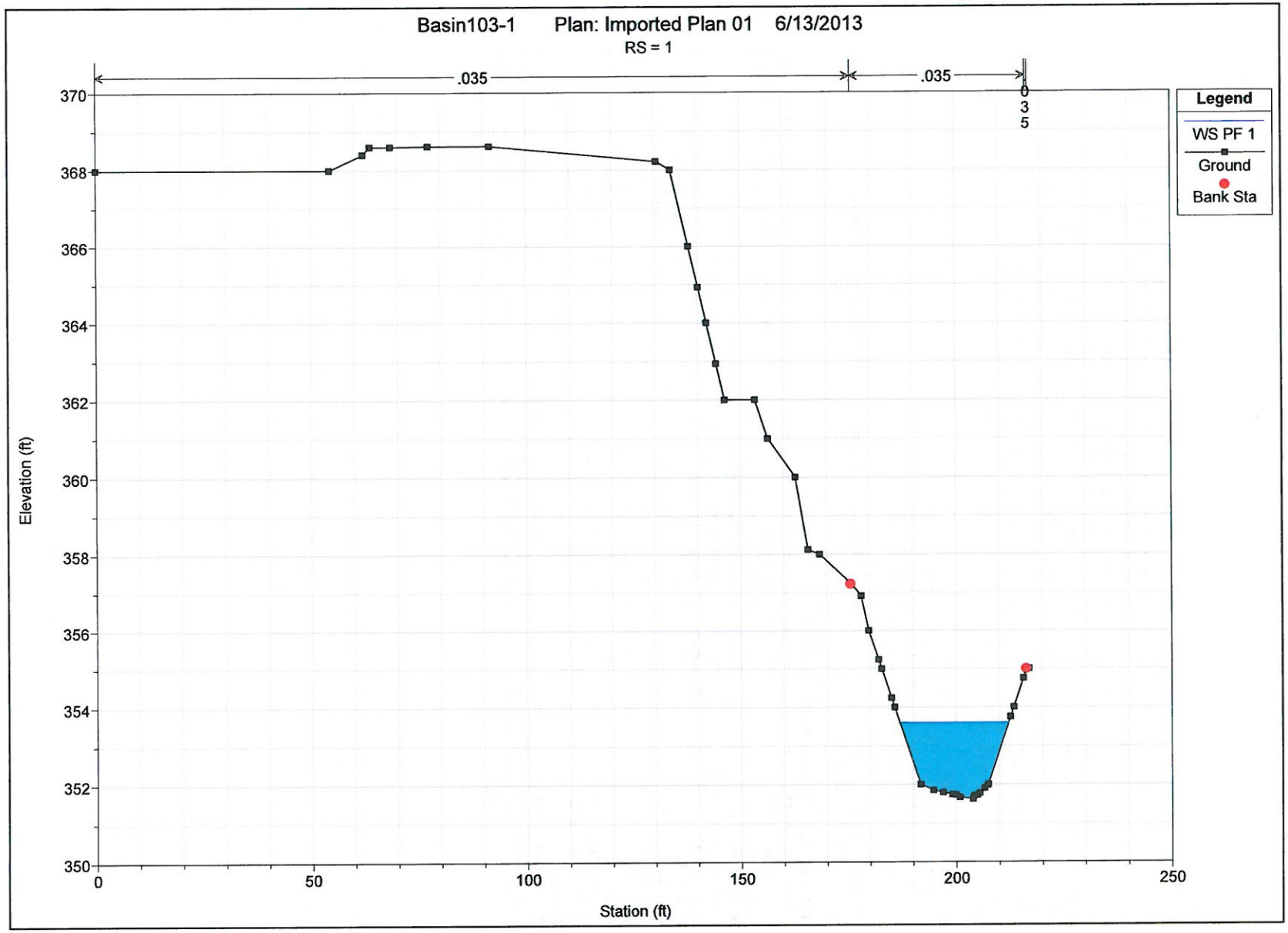
Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	175.57	.035	216.31	.035

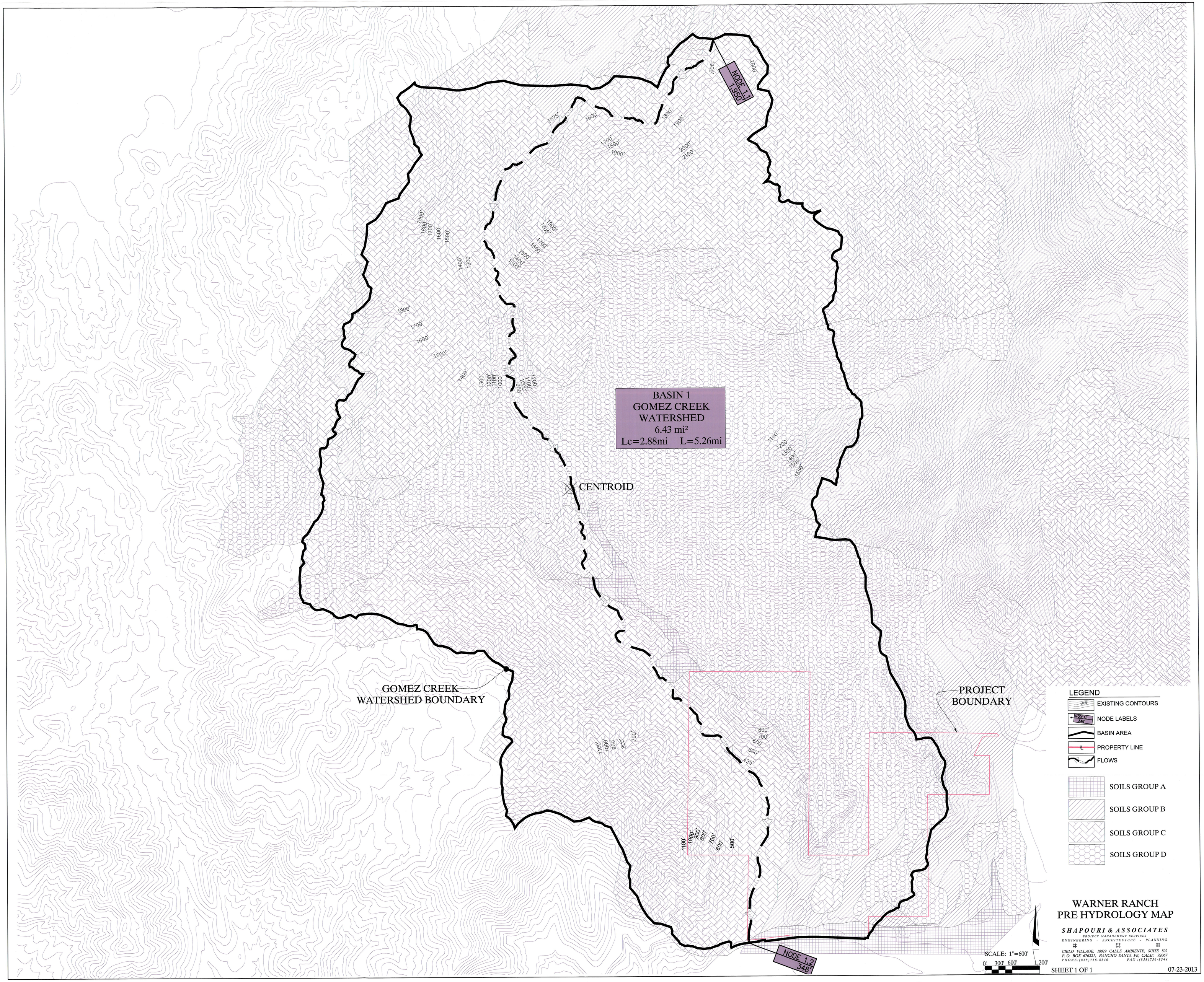
Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.57	216.31	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	354.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.		0.035	
W.S. Elev (ft)	353.60	Reach Len. (ft)			
Crit W.S. (ft)	353.60	Flow Area (sq ft)		36.27	
E.G. Slope (ft/ft)	0.016562	Area (sq ft)		36.27	
Q Total (cfs)	248.30	Flow (cfs)		248.30	
Top Width (ft)	25.30	Top Width (ft)		25.30	
Vel Total (ft/s)	6.85	Avg. Vel. (ft/s)		6.85	
Max Chl Dpth (ft)	1.98	Hydr. Depth (ft)		1.43	
Conv. Total (cfs)	1929.4	Conv. (cfs)		1929.4	
Length Wtd. (ft)		Wetted Per. (ft)		25.86	
Min Ch El (ft)	351.62	Shear (lb/sq ft)		1.45	
Alpha	1.00	Stream Power (lb/ft s)	216.81	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			


Basin103-1 Plan: Imported Plan 01 6/13/2013
RS = 1
.035
.035
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
370
368
366
364
362
360
358
356
354
352
350
0
50
100
150
200
250
Station (ft)

Pre Hydrology Map



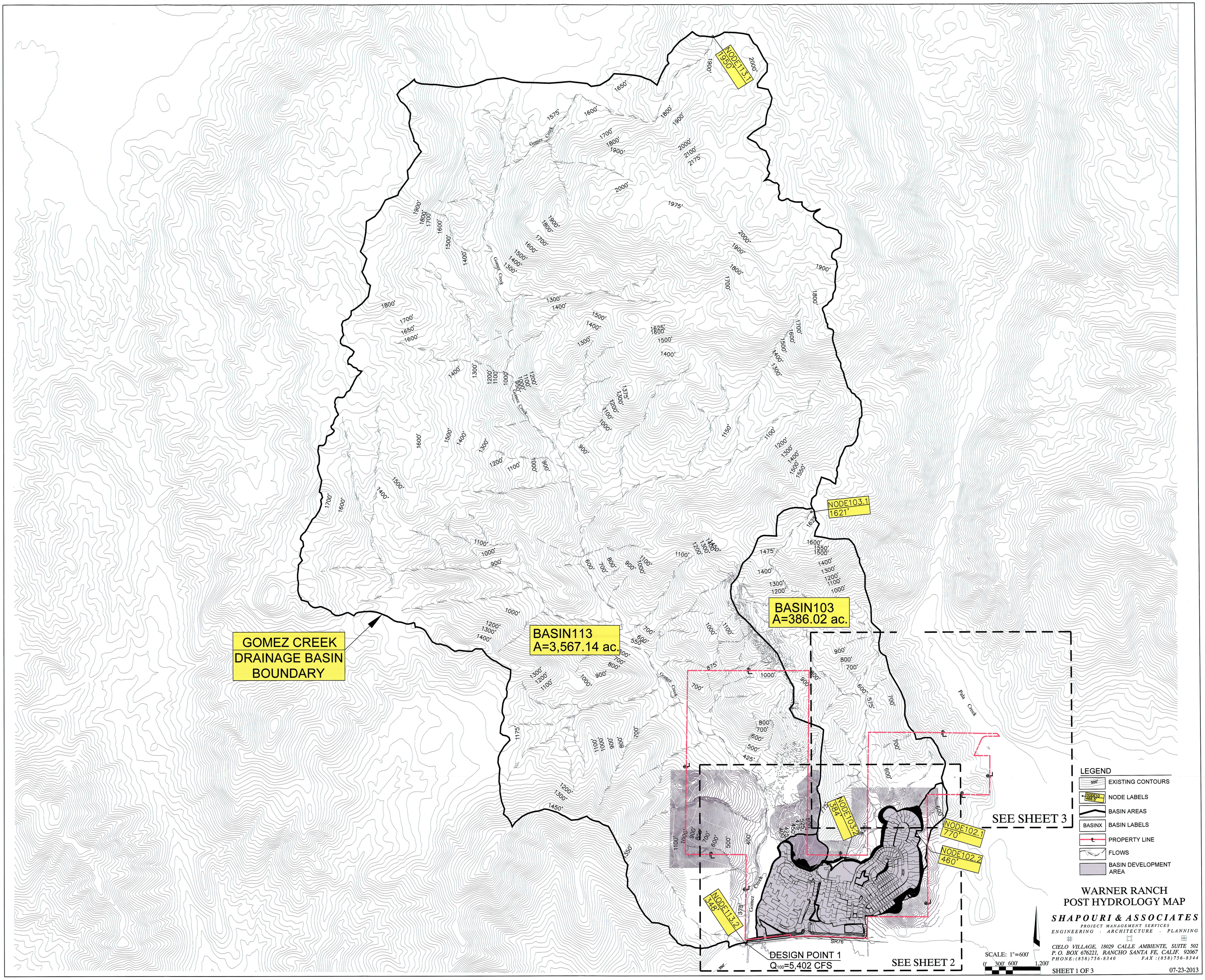
WARNER RANCH
PRE HYDROLOGY MAP

SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING - ARCHITECTURE - PLANNING
CIELO VILLAGE, 18029 CALLE AMBIENTE, SUITE 502
P.O. BOX 676221, RANCHO SANTA FE, CALIF. 92067
PHONE:(858)756-8340 FAX :(858)756-8344

SHEET 1 OF 1

07-23-2013

Post Hydrology Map Sheet 1

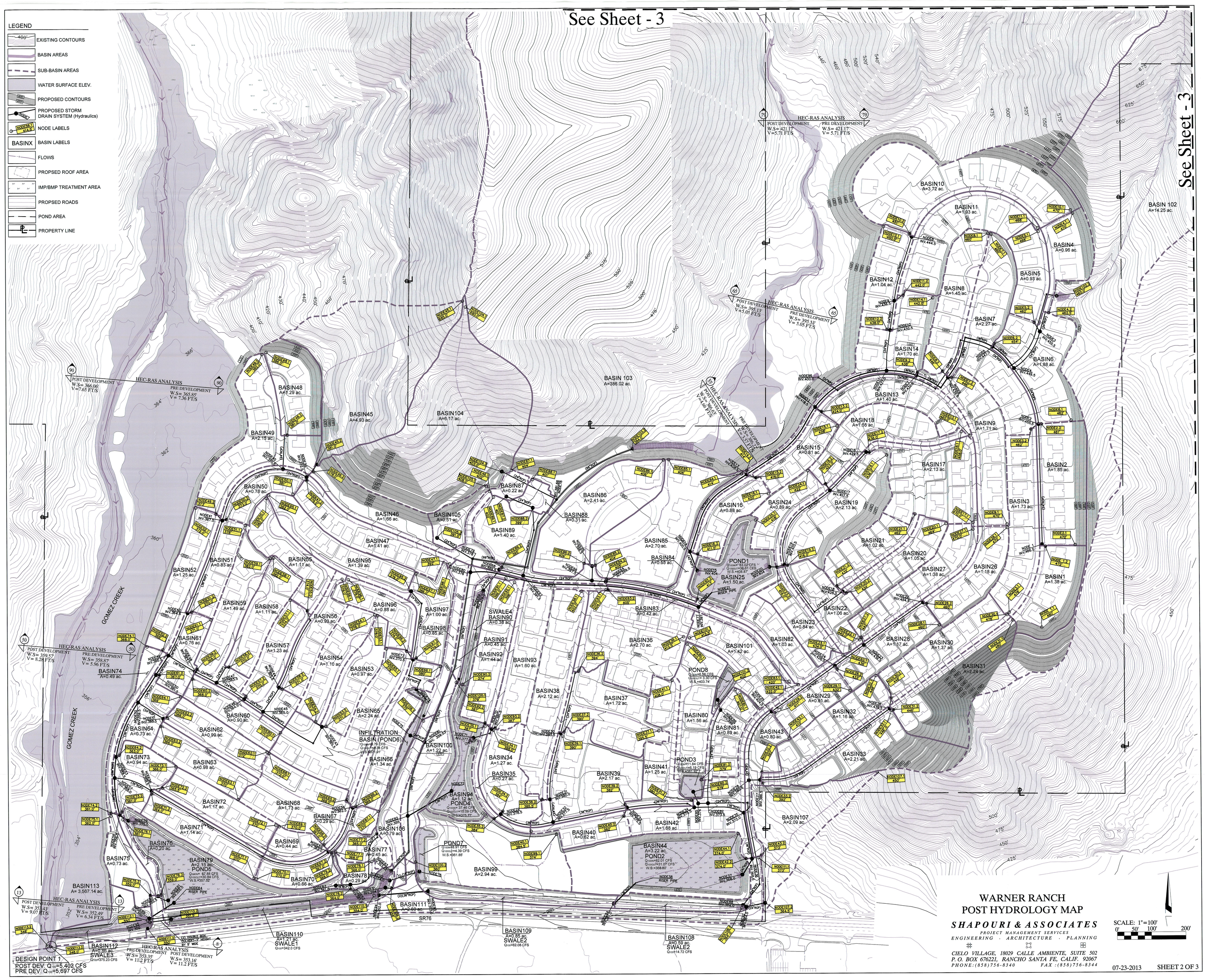


WARNER RANCH
POST HYDROLOGY MAP

SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING · ARCHITECTURE · PLANNING
CIELO VILLAGE, 18029 CALLE AMBIENTE, SUITE 502
P.O. BOX 676221, RANCHO SANTA FE, CALIF. 92067
PHONE:(858)756-8340 FAX :(858)756-8344

07-23-2013

Post Hydrology Map Sheet 2



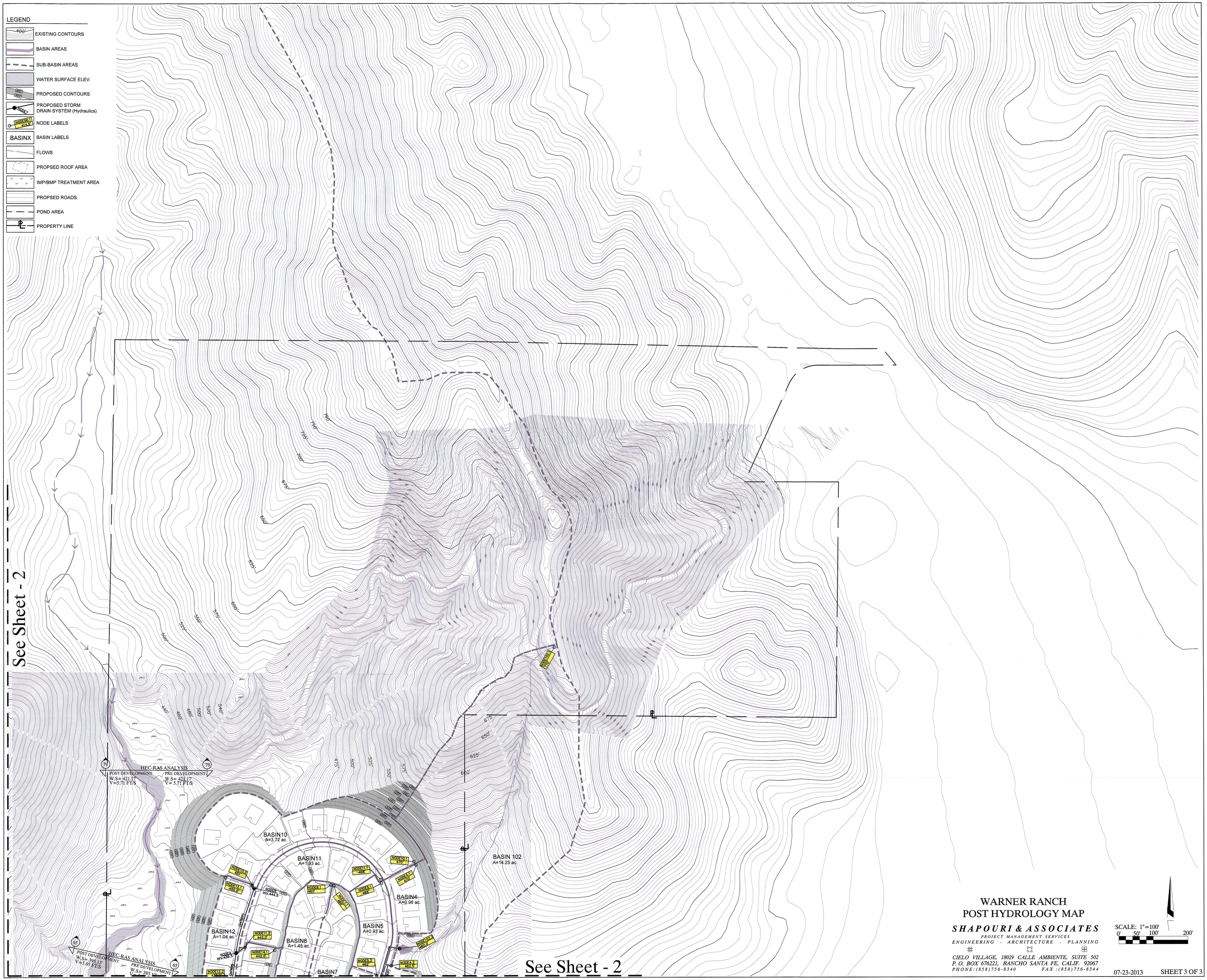
WARNER RANCH
POST HYDROLOGY MAP

SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING · ARCHITECTURE · PLANNING
CIELO VILLAGE, 18029 CALLE AMBIENTE, SUITE 502
P. O. BOX 676221, RANCHO SANTA FE, CALIF. 92067
PHONE:(858)756-8340 FAX :(858)756-8344

SCALE: 1"=100' 0' 50' 100' 200'

07-23-2013

Post Hydrology Map Sheet 3


LEGEND
EXISTING CONTOURS
BASIN AREAS
SUB-BASIN AREAS
WATER SURFACE ELEV.
PROPOSED CONTOURS
PROPOSED STORM DRAIN SYSTEM (Hydraulics)
NODE LABELS
BASINX
BASIN LABELS
FLOWS
PROPSED ROOF AREA
IMP/BMP TREATMENT AREA
PROPSED ROADS
POND AREA
PROPERTY LINE
See Sheet - 2
See Sheet - 2
HEC-RAS ANALYSIS
POST DEVELOPMENT
W.S= 421.17
V=5.71 FT/S
PRE DEVELOPMENT
W.S= 421.17
V= 5.71 FT/S
HEC-RAS ANALYSIS
POST DEVELOPMENT
W.S= 395.13
V=5.05 FT/S
PRE DEVELOPMENT
BASIN10
A=3.72 ac.
BASIN11
A=1.93 ac.
BASIN12
A=1.04 ac.
BASIN8
A=1.45 ac.
BASIN7
BASIN5
A=0.93 ac.
BASIN4
A=0.96 ac.
BASIN 102
A=14.25 ac.
WARNER RANCH
POST HYDROLOGY MAP
SHAPOURI & ASSOCIATES
PROJECT MANAGEMENT SERVICES
ENGINEERING · ARCHITECTURE · PLANNING
CIELO VILLAGE, 18029 CALLE AMBIENTE, SUITE 502
P. O. BOX 676221, RANCHO SANTA FE, CALIF. 92067
PHONE:(858)756-8340 FAX :(858)756-8344
SCALE: 1"=100'
0' 50' 100' 200'
07-23-2013
SHEET 3 OF 3