ZONE A BFE DETERMINATION

FEMA 256

&

QUICK 2 VS HEC-RAS

INTRODUCTION

A ZONE BFE

FEMA 265, JULY 1995

MANAGING FLOODPLAIN DEVELOPMENT in APPROXIMATE ZONE A AREAS

A GUIDE FOR OBTAINING AND DEVELOPING BASE (100-YEAR) FLOOD ELEVATIONS

A ZONE BFE

- THREE ESSENTIAL FACTORS

- Elevation/Topography Data
- Hydrology
- Hydaulics

A ZONE BFE

- ELEVATION/TOPOGRAPHY DATA

- USGS TOPOGRAPHIC MAP (MINIMUM DETAIL)
- LiDAR
- SURVEYED CROSS SECTION

A ZONE BFE

- HYDROLOGY METHODS

- DISCHARGE-DRAINAGE AREA RELATIONSHIP
- REGRESSION EQUATIONS
- NFF PROGRAM (TR-55 URBAN HYDROLOGY FOR SMALL WATERSHEDS)
- RATIONAL METHOD (SMALL AREAS)
- HEC-HMS

A ZONE BFE

- HYDRAULIC METHODS

- NORMAL DEPTH METHOD
  - EQUAL TO OR LESS THAN 50 LOTS OR 5 ACRES
- STEP-BACKWATER METHODS
  - WHEN MORE THAN ONE CROSS SECTION IS NEEDED

QUICK 2

- ADVANTAGES OF QUICK 2

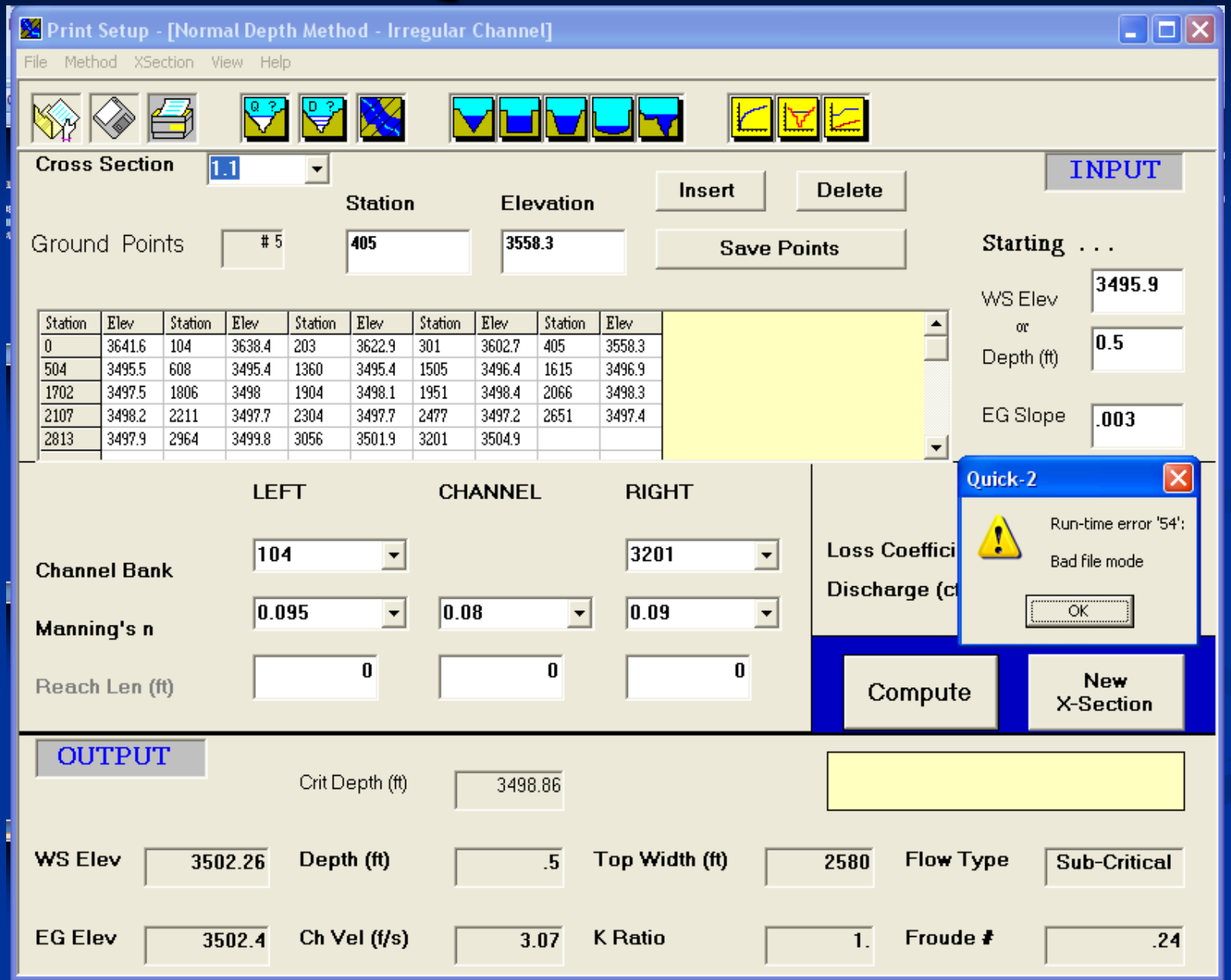
- USER FRIENDLY
- FREE
- SINGLE WINDOW INPUT AND OUTPUT
- NORMAL DEPTH, CRITICAL DEPTH AND STEP BACKWATER COMPUTATION OPTIONS

QUICK 2

- DISADVANTAGES OF QUICK 2

- OLDER PROGRAM VERSION 2 DATED AUGUST 1997
- NO LONGER SUPPORTED
- COMPATABILITY WITH WINDOWS 7 AND 32 BIT PROCESSORS MAY BE AN ISSUE
- DOES NOT MODEL OBSTRUCTIONS

QUICK 2


Print Setup - [Normal Depth Method - Irregular Channel]
File Method XSection View Help
Cross Section 1.1
INPUT
Insert
Delete
Station
Elevation
Ground Points # 5
405
3558.3
Save Points
Starting . . .
WS Elev 3495.9
or
Depth (ft) 0.5
EG Slope .003
Station Elev Station Elev Station Elev Station Elev Station Elev
0 3641.6 104 3638.4 203 3622.9 301 3602.7 405 3558.3
504 3495.5 608 3495.4 1360 3495.4 1505 3496.4 1615 3496.9
1702 3497.5 1806 3498 1904 3498.1 1951 3498.4 2066 3498.3
2107 3498.2 2211 3497.7 2304 3497.7 2477 3497.2 2651 3497.4
2813 3497.9 2964 3499.8 3056 3501.9 3201 3504.9
LEFT
CHANNEL
RIGHT
Channel Bank 104 3201
Manning's n 0.095 0.08 0.09
Reach Len (ft) 0 0 0
Loss Coeffici
Discharge (c
Quick-2
Run-time error '54':
Bad file mode
OK
Compute
New X-Section
OUTPUT
Crit Depth (ft) 3498.86
WS Elev 3502.26
Depth (ft) .5
Top Width (ft) 2580
Flow Type Sub-Critical
EG Elev 3502.4
Ch Vel (f/s) 3.07
K Ratio 1.
Froude # .24

QUICK 2

Cross Section Plot - [Normal Depth Method - Irregular Channel]

File Method XSection View Help

Cross Section 1.1

INPUT

Insert Delete

Station Elevation

Ground Points # 5 405 3558.3

Save Points

Starting . . .

WS Elev 3495.9

or

Depth (ft) 0.5

EG Slope .003

Station	Elev	Station	Elev	Station	Elev	Station	Elev	Station	Elev
0	3641.6	104	3638.4	203	3622.9	301	3602.7	405	3558.3
504	3495.5	608	3495.4	1360	3495.4	1505	3496.4	1615	3496.9
1702	3497.5	1806	3498	1904	3498.1	1951	3498.4	2066	3498.3
2107	3498.2	2211	3497.7	2304	3497.7	2477	3497.2	2651	3497.4
2813	3497.9	2964	3499.8	3056	3501.9	3201	3504.9		

	LEFT	CHANNEL	RIGHT
Channel Bank	104		3201
Manning's n	0.095	0.08	0.09
Reach Len (ft)	0	0	0

	Contr.	Exp.
Loss Coefficients	0.1	0.3
Discharge (cfs)	41538	

Compute New X-Section

OUTPUT

Crit Depth (ft) 3498.86

WS Elev	3502.26	Depth (ft)	.5	Top Width (ft)	2580	Flow Type	Sub-Critical
EG Elev	3502.4	Ch Vel (f/s)	3.07	K Ratio	1.	Froude #	.24

QUICK 2

FlowMaster

- ADVANTAGES OF FLOWMASTER

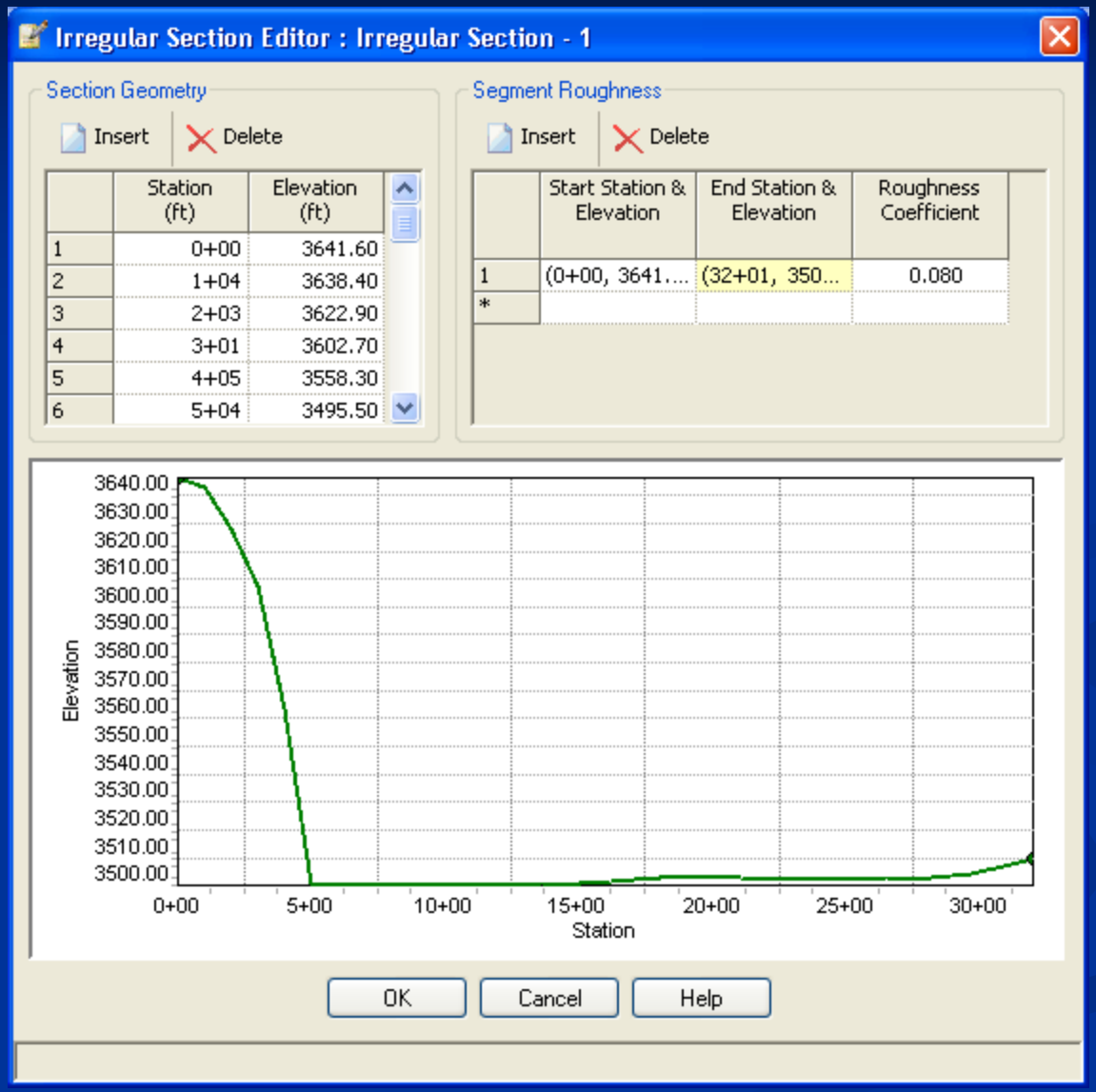
- USED BY MANY
- SINGLE WINDOW INPUT AND OUTPUT
- NORMAL DEPTH AND CRITICAL DEPTH COMPUTATION
- USED FOR MANY OTHER TYPES OH HYDRAULIC CALCULATIONS

FlowMaster

- DISADVANTAGES OF FLOWMASTER

- NOT FREE
- CANNOT PERFORM STEP BACKWATER COMPUTATIONS
- NOT LISTED AS APPROVED SOFTWARE IN FEMA 256

FlowMaster


Irregular Section Editor : Irregular Section - 1
Section Geometry
Insert
Delete
Station (ft)
Elevation (ft)
1 0+00 3641.60
2 1+04 3638.40
3 2+03 3622.90
4 3+01 3602.70
5 4+05 3558.30
6 5+04 3495.50
Segment Roughness
Insert
Delete
Start Station & Elevation
End Station & Elevation
Roughness Coefficient
1 (0+00, 3641.... (32+01, 350... 0.080
*
Elevation
3640.00
3630.00
3620.00
3610.00
3600.00
3590.00
3580.00
3570.00
3560.00
3550.00
3540.00
3530.00
3520.00
3510.00
3500.00
0+00
5+00
10+00
15+00
20+00
25+00
30+00
Station
OK
Cancel
Help

FlowMaster

Bentley FlowMaster V8i (SELECTseries 1)

File Edit Analysis View Tools Window Help

Tabular Reports | Detailed Report | Rating Table | Rating Curve | Cross Section | GVF Profile | GVF Profile Table

Project Explorer

- graff_FM.fm8
  - Irregular Section - 1

Worksheet : Irregular Section - 1

Uniform Flow | Gradually Varied Flow | Messages

Solve For: Normal Depth

Friction Method: Manning Formula

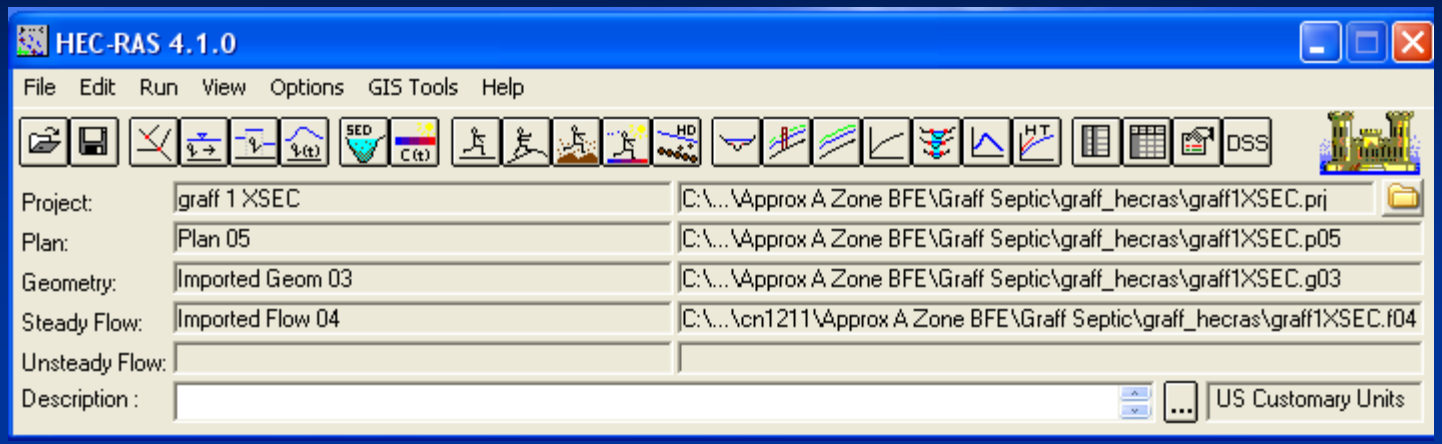
Roughness Coefficient:	0.080	
Channel Slope:	0.00300	ft/ft
Elevation:	3502.26	ft
Elevation Range:	3495.40 to 3641.60 ft	
Discharge:	41538.00	ft³/s

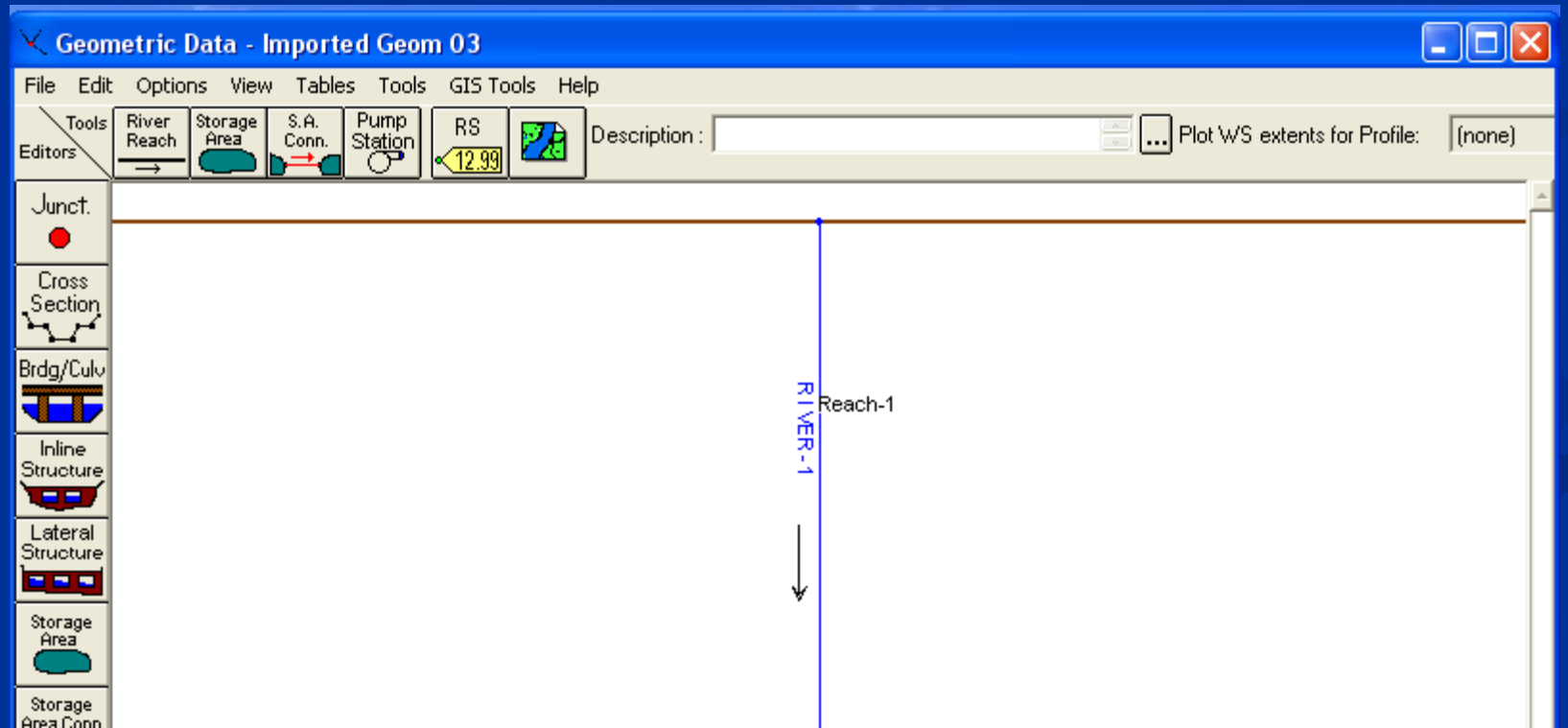
Flow Area:	13532.61	ft²
Wetted Perimeter:	2582.15	ft
Hydraulic Radius:	5.24	ft
Top Width:	2580.13	ft
Normal Depth:	6.86	ft
Critical Depth:	3.46	ft
Critical Slope:	0.07276	ft/ft
Velocity:	3.07	ft/s
Velocity Head:	0.15	ft
Specific Energy:	7.01	ft
Froude Number:	0.24	
Flow Type:	Subcritical	

Edit Section | Options

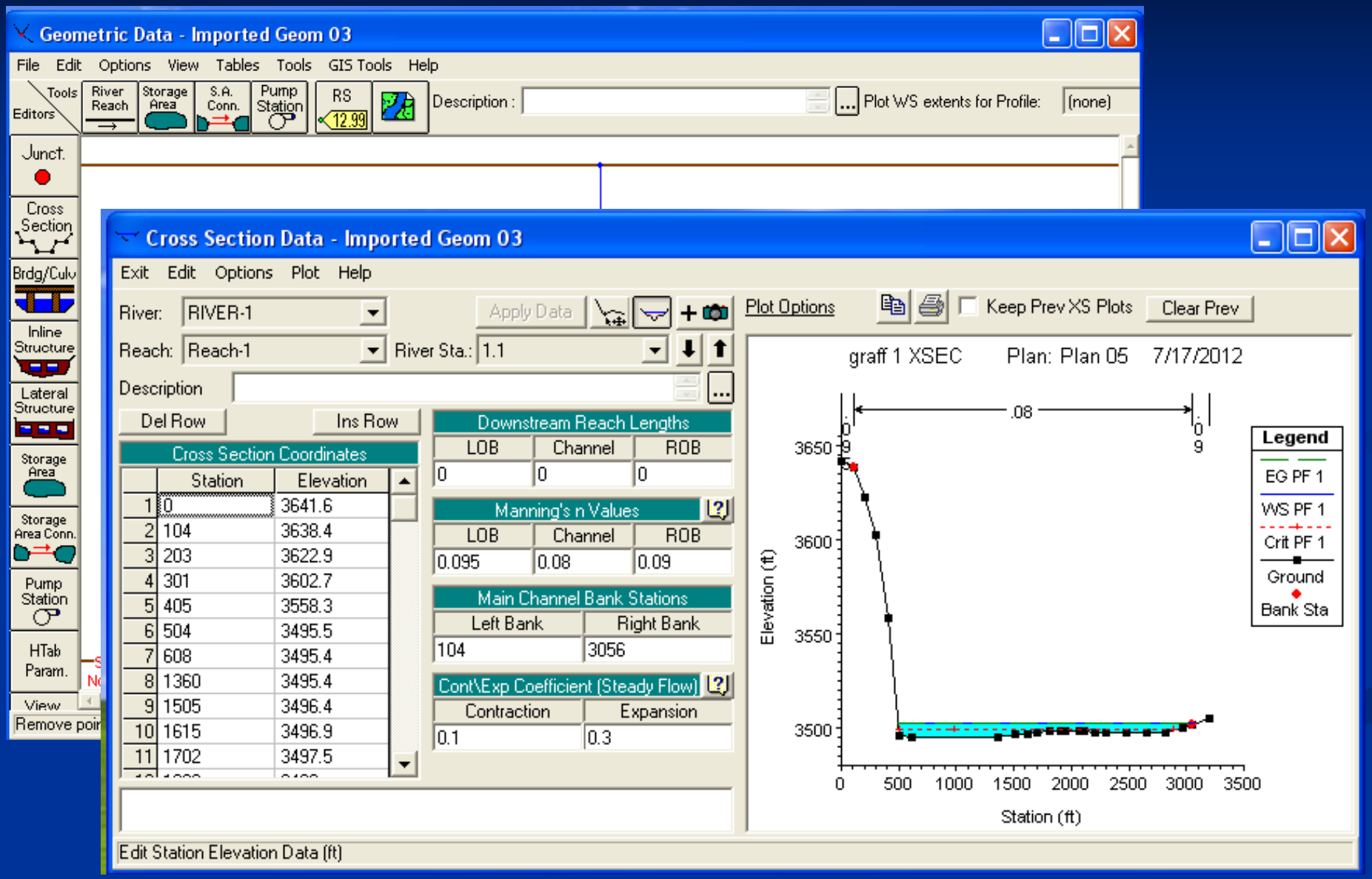
Calculation Successful.

HEC-RAS

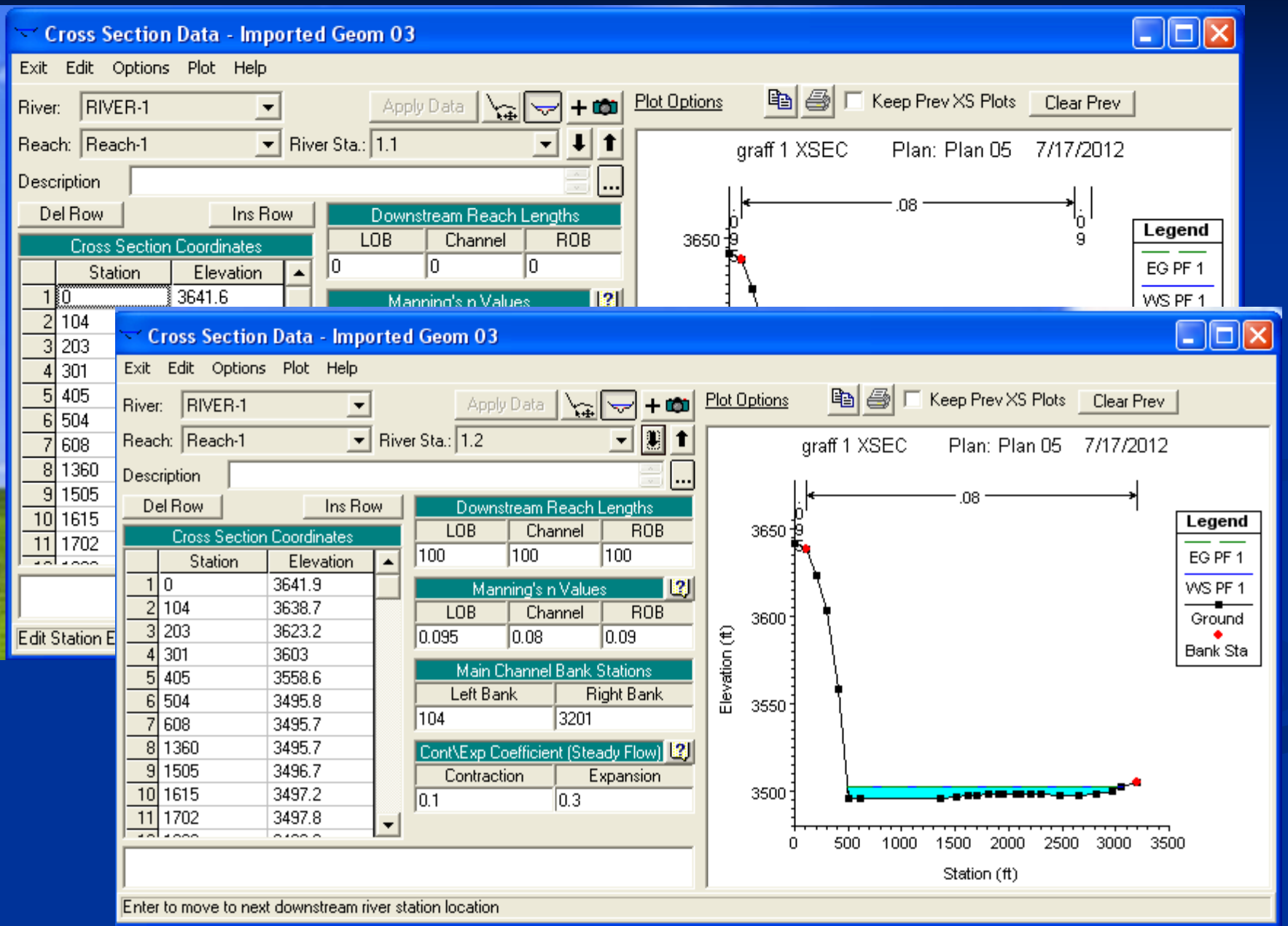

HEC-RAS 4.1.0
File Edit Run View Options GIS Tools Help
Project: graff 1 XSEC C:\...\Approx A Zone BFE\Graff Septic\graff_hecras\graff1XSEC.prj
Plan: Plan 05 C:\...\Approx A Zone BFE\Graff Septic\graff_hecras\graff1XSEC.p05
Geometry: Imported Geom 03 C:\...\Approx A Zone BFE\Graff Septic\graff_hecras\graff1XSEC.g03
Steady Flow: Imported Flow 04 C:\...\cn1211\Approx A Zone BFE\Graff Septic\graff_hecras\graff1XSEC.f04
Unsteady Flow:
Description :
US Customary Units


Geometric Data - Imported Geom 03
File Edit Options View Tables Tools GIS Tools Help
Tools
Editors
River Reach
Storage Area
S.A. Conn.
Pump Station
RS
12.99
Description :
Plot WS extents for Profile:
(none)
Junct.
Cross Section
Brdg/Culv
Inline Structure
Lateral Structure
Storage Area
Storage Area Conn
RIVER-1
Reach-1

HEC-RAS


Geometric Data - Imported Geom 03
File Edit Options View Tables Tools GIS Tools Help
Tools
Editors
River Reach
Storage Area
S.A. Conn.
Pump Station
RS
12.99
Description :
Plot WS extents for Profile:
(none)
Junct.
Cross Section
Brdg/Culv
Inline Structure
Lateral Structure
Storage Area
Storage Area Conn.
Pump Station
HTab Param.
View
Remove poi
Cross Section Data - Imported Geom 03
Exit Edit Options Plot Help
River: RIVER-1
Apply Data
Plot Options
Keep Prev XS Plots
Clear Prev
Reach: Reach-1
River Sta.: 1.1
Description
Del Row
Ins Row
Cross Section Coordinates
Station Elevation
1 0 3641.6
2 104 3638.4
3 203 3622.9
4 301 3602.7
5 405 3558.3
6 504 3495.5
7 608 3495.4
8 1360 3495.4
9 1505 3496.4
10 1615 3496.9
11 1702 3497.5
Downstream Reach Lengths
LOB Channel ROB
0 0 0
Manning's n Values
LOB Channel ROB
0.095 0.08 0.09
Main Channel Bank Stations
Left Bank Right Bank
104 3056
Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
0.1 0.3
graff 1 XSEC Plan: Plan 05 7/17/2012
.08
Elevation (ft)
3650
3600
3550
3500
0 500 1000 1500 2000 2500 3000 3500
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Edit Station Elevation Data (ft)

HEC-RAS


Cross Section Data - Imported Geom 03
Exit Edit Options Plot Help
River: RIVER-1
Reach: Reach-1
River Sta.: 1.2
Description
Apply Data
Plot Options
Keep Prev XS Plots
Clear Prev
Del Row
Ins Row
Cross Section Coordinates
Station Elevation
1 0 3641.9
2 104 3638.7
3 203 3623.2
4 301 3603
5 405 3558.6
6 504 3495.8
7 608 3495.7
8 1360 3495.7
9 1505 3496.7
10 1615 3497.2
11 1702 3497.8
Downstream Reach Lengths
LOB Channel ROB
100 100 100
Manning's n Values
LOB Channel ROB
0.095 0.08 0.09
Main Channel Bank Stations
Left Bank Right Bank
104 3201
Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
0.1 0.3
graff 1 XSEC Plan: Plan 05 7/17/2012
.08
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Enter to move to next downstream river station location

HEC-RAS

Cross Section Data - Imported Geom 03

Exit Edit Options Plot Help

River: RIVER-1

Reach: Reach-1

Description

Del Row | Ins Rc

Cross Section Coordinates

	Station	Elevation
1	0	3641.6
2	104	3638.4
3	203	3622.9
4	301	3602.7
5	405	3558.3
6	504	3495.5
7	608	3495.4
8	1360	3495.4
9	1505	3496.4
10	1615	3496.9
11	1702	3497.5

Edit Station Elevation Data (ft)

Cross Section Output

File Type Options Help

River: RIVER-1 Profile: PF 1

Reach Reach-1 RS: 1.1 Plan: Plan 05

Plan: Plan 05 RIVER-1 Reach-1 RS: 1.1 Profile: PF 1

E.G. Elev (ft)	3502.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.080	0.090
W.S. Elev (ft)	3502.25	Reach Len. (ft)			
Crit W.S. (ft)	3498.86	Flow Area (sq ft)		13491.99	2.91
E.G. Slope (ft/ft)	0.003003	Area (sq ft)		13491.99	2.91
Q Total (cfs)	41538.00	Flow (cfs)		41537.18	0.82
Top Width (ft)	2579.40	Top Width (ft)		2562.64	16.77
Vel Total (ft/s)	3.08	Avg. Vel. (ft/s)		3.08	0.28
Max Chl Dpth (ft)	6.85	Hydr. Depth (ft)		5.26	0.17
Conv. Total (cfs)	758034.8	Conv. (cfs)		758019.9	14.9
Length Wtd. (ft)		Wetted Per. (ft)		2564.64	16.77
Min Ch El (ft)	3495.40	Shear (lb/sq ft)		0.99	0.03
Alpha	1.00	Stream Power (lb/ft s)	3201.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

File Options Std. Tables Locations Help

HEC-RAS Plan: Plan 05 River: RIVER-1 Reach: Reach-1 Profile: PF 1 | Reload Data

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	1.2	PF 1	41538.00	3495.70	3502.55		3502.70	0.003024	3.08	13498.70	2579.48	0.24
Reach-1	1.1	PF 1	41538.00	3495.40	3502.25	3498.86	3502.39	0.003003	3.08	13494.90	2579.40	0.24

Total flow in cross section.

HEC-RAS

- ADVANTAGES OF HEC-RAS

- FREE
- SOFTWARE IS SUPPORTED
- NORMAL DEPTH, CRITICAL DEPTH AND STEP BACKWATER COMPUTATION OPTIONS
- RELATIVELY EASY TO EDIT

COMPARISON OF RESULTS

SOFTWARE	NORMAL DEPTH	NORMAL ELEV.	CRITICAL ELEV.	FROUDE NUMBER
QUICK-2	? "0.5 ft."	3502.26 ft.	3498.86	0.24
FLOWMASTER	6.86 ft.	3502.26 ft.	3498.86 ft.	0.24
HEC-RAS	6.85 ft.	3502.25 ft.	3498.86 ft.	0.24

Questions?

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