Sunnymead MDP Lines F and F-7

City of Moreno Valley, CA

Hydrology and Hydraulics Report

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Prepared On:

December 7th, 2023

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APPENDICES

1.0 EXECUTIVE SUMMARY

This report documents the hydrology and hydraulics methodology, calculations, and results completed for the Sunnymead Master Drainage Plan project.

An introduction and project overview is provided in Section 2.0. Section 3.0 describes the hydrology and hydraulics methodology and calculations. Section 4.0 discusses the key results of the calculations.

Lastly, the appendices contain various maps and exhibits prepared to supplement the report, as well as detailed calculations and modeling output files.

2.0 INTRODUCTION

The upstream end of the proposed improvements includes a 60" RCP storm drain that collects runoff flowing south along Graham Street and west along Hemlock Avenue, via inlets at the intersection of Graham and Hemlock. The 60" RCP continues west under Hemlock until it reaches the Towngate Apartments, where the 60" RCP upsizes to a 72" RCP, turns south and collects flow from an existing 48" RCP storm drain. Alongside that existing 48" RCP is another 48" RCP that will outlet into a proposed 5"x4" RCB, which outlets to an existing culvert north of SR60. The proposed 72" storm drain continues south and collects additional flow via five proposed inlets just north of Sunnymead Boulevard. There is an existing 48" CMP that collects flow north of Sunnymead Boulevard and conveys the flow south to an existing channel south of Sunnymead, however the CMP is undersized and can only convey 102 cfs under Sunnymead Blvd. Once the maximum capacity of the 48" CMP is reached, water will pond and flow into these five proposed inlets, which flow into the proposed system. That remainder flow enters the proposed SMART basin, which is a basin that allows lesser storm flows pass through the basin but will detain flows up to the 100-year storm, until the storm subsides. After the peak flowrate is reduced in the SMART basin, runoff continues to flow south through a proposed 60" RCP storm drain for approximately 1,400 feet, at which point upsizes to a 72" RCP. The existing natural channel and the 72" RCP storm drain both discharge at a confluence area near the south end of the project area. The confluence area also confluences flow from an existing storm drain pipe which conveys flows from an adjacent neighborhood to the east of the project site. At the end of the project area, flows are discharged to the existing trapezoidal channel.

The objective of the proposed project is to reduce the flows into the existing trapezoidal channel known as Line F of the Sunnymead Master Drainage Plan. In addition, flooding will be eliminated in various areas tributary to the existing trapezoidal channel, such as the vegetated areas north of Sunnymead Boulevard and SR-60.

Rational Method calculations were prepared to obtain peak flows throughout the watershed needed to design catch basins and storm drain facilities Upstream of the Towngate Racket Club Apartments on Hemlock Ave. Unit Hydrograph calculations were performed to obtain storage requirements of detention basins needed to reduce peak flow discharges and headwater elevations upstream of proposed culverts. Hydraulic models were prepared to size storm drains, catch basins, and outflow structures throughout the project limits.

3.0 GENERAL INFORMATION

The following information and assumptions were used in the hydrologic and hydraulic calculations:

1. Survey Data within project boundaries, provided by the City of Moreno Valley, along with orthographic topography, provided by RCFC&WCD, were used to estimate flow directions, slopes, ponding depths, and elevations for the entire area studied.

2. The various hydrologic soil groups were determined using RCFC&WCD Plates C-1.16 and C-1.17, as reflected in the hydrologic calculations. Plates C-1.16 and C-1.17 have been attached to Appendix A.

3. The various land use classifications input in the CIVILDESIGN Riverside County Rational Hydrology Program were chosen based on the closest representation of the land use in each given subarea. Subarea land use was determined through Google Earth imagery.

4. Rainfall intensities were provided by the CIVILDESIGN Riverside County Rational Hydrology Program, which base intensities on the RCFC&WCD Plate D-4.1. The "Sunnymead-Moreno" area option was used as input for the rainfall intensities.

5. Using Bentley Flowmaster, it has been determined that the existing 48" CMP which coveys flows under Sunnymead Blvd into the natural channel has a maximum capacity of 102 cfs. The model output file is shown in Appendix J.

4.0 METHODOLOGY

4.1 HYDROLOGY

Rational Method calculations were used to calculate separate flowrates into the various inlets at the upstream end of the system, and unit hydrograph/hydrograph routing calculations were completed for the entire system.

4.1.1 RATIONAL METHOD HYDROLOGY

The Riverside County Rational Hydrology Program, developed by CIVILDESIGN, was used to obtain hydrologic flows for the 100-year, 1-hour storm on Hemlock Avenue. The survey data stated above in Section 3.0 was used to determine low points, tributary areas, slopes, and flow path lengths. This information, along with soil classification and land use information, is summarized in the proposed rational method hydrology exhibit, shown in Appendix B. Table 1 below summarizes the results from the rational method hydrologic models. The full model output files can be found in Appendix D.

Table 1: Rational Method Hydrology Results

US Node	DS Node	Operation	100-Year, 1-Hour Peak Flowrate (CFS)
Basin A1			
0	6	Initial Area	6.131
6	30	Streetflow	45.445
15	30	Flow Addition	47.316
30	35	Pipeflow	47.316
10	20	Initial Area	13.021
20	35	Streetflow	24.097
25	35	Flow Addition	39.339
35	50	Pipeflow	79.834
40	45	Initial Area	15.198
45	50	Streetflow	32.209
46	50	Flow Addition	32.464
50	80	Pipeflow	102.696
Basin A2			
60	65	Initial Area	22.401
65	66	Streetflow	58.550
66	70	Pipeflow	58.550
61	62	Initial Area	22.625
62	63	Natural Channel	94.625
63	64	Streetflow	167.418
64	70	Pipeflow	167.418
70	75	Pipeflow	223.449
67	75	Flow Addition	281.473
75	91	Pipeflow	281.473
90	91	Flow Addition	366.047
91	93	Pipeflow	366.047
92	93	Flow Addition	412.411
93	94	Pipeflow	412.411
81	94	Flow Addition	440.728
75	94	Flow Addition	470.139
Basin A3			
100	105	Initial Area	14.578
105	110	Improved Channel	32.758
Basin B			
120	125	Initial Area	15.205

4.1.2 UNIT HYDROGRAPH AND HYDROGRAPH ROUTING HYDROLOGY

The Riverside County Unit Hydrograph Hydrology Program, developed by CIVILDESIGN, was used to develop unit hydrographs for the 100-year, 3-hour storm for the full study area. Unit hydrograph models were used to create hydrographs for the Basins A, B, C, and D and respective sub-basins. An additional Basin E, which outlets into the existing trapezoidal channel downstream of the proposed improvements, was also modeled to analyze how possible backflow will impact the proposed improvements. The survey data stated above in Section 3.0 was used to determine low points, tributary areas, slopes, and flow path lengths. This information, along with soil classification and land use information, is summarized in the proposed synthetic unit hydrograph routing exhibit, shown in Appendix C. Table 2 below summarizes the results from the individual unit hydrograph models. The full unit hydrograph model output files can be found in Appendix E.

Table 2: Unit Hydrograph Results

Basin Area	100-Year, 3-Hour Peak Flowrate (CFS)
A1	110.882
A2	316.002
A3	26.951
B	12.008
C	82.429
D	72.080
E	47.555

These Unit Hydrographs were then routed together using the Flood Hydrograph Routing Program, developed by CIVILDESIGN, to analyze the efficiency of each storage area, including the proposed SMART basin and determine the peak flowrates in different segments of the proposed storm drain. The stage storage of each storage area was calculated using Surface models in Autodesk Civil3D. An exhibit of each stage storage analysis is shown in Appendix F. The Discharge rating curve of each storage area was developed using Bentley Culvertmaster; the output files can be found in Appendix F. The tables and figures below summarize the relationship between stage storage and discharge of each storage area. Table 5 below summarizes the results from the Hydrograph routing model. The full model output file can be found in Appendix G.

Table 3: Stage Storage Discharge Data for the Ponding Area north of SR-60

Basin Depth (ft)	Storage (Ac. Ft.)	Discharge (cfs)
0	0.000	0.000
0.27	0.001	2.430
0.77	0.002	11.590
1.27	0.003	24.550
1.77	0.005	40.390
2.27	0.012	58.660
2.77	0.031	79.070
3.27	0.108	101.420
3.77	0.347	125.550
4.27	0.792	151.330
4.77	1.441	178.680
5.12	2.006	198.700

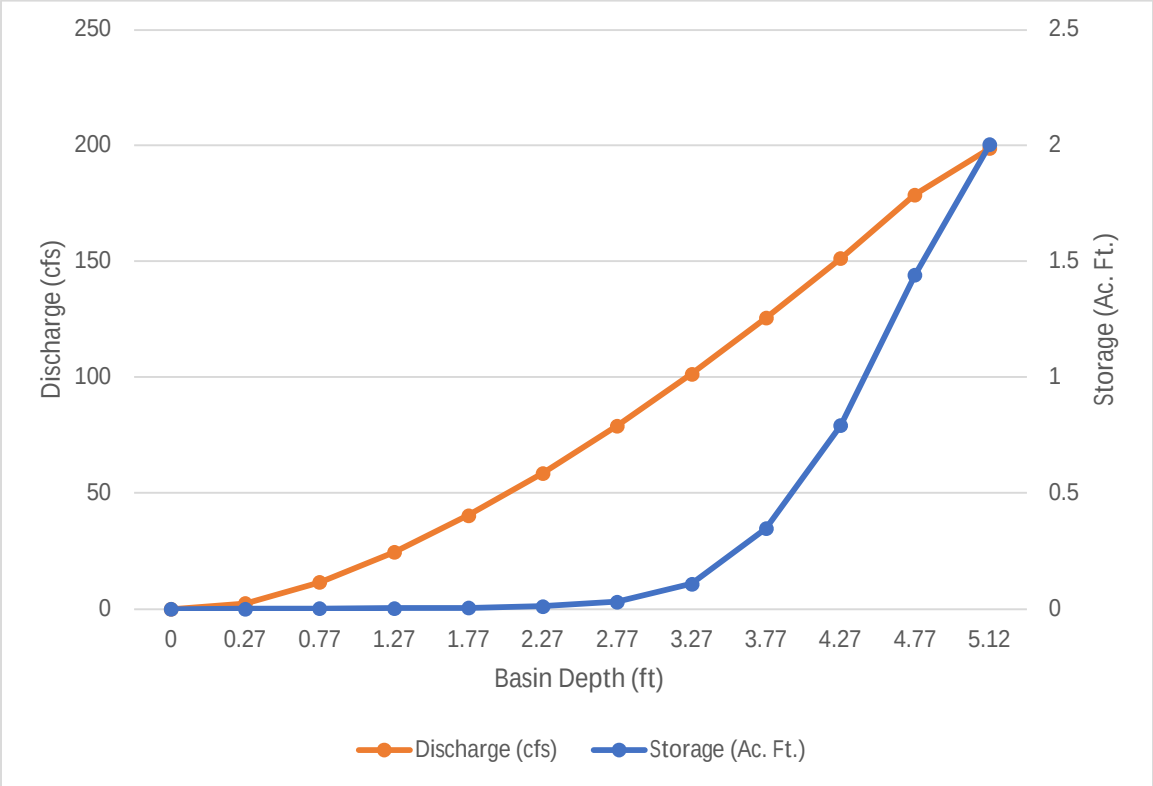


Figure 1: Stage Storage Discharge Curves for the Ponding Area North of SR-60

Table 4: Stage Storage Discharge Data for the SMART Basin

Basin Depth (ft)	Storage (Ac. Ft.)	Discharge (cfs)
0	0.000	0.000
0.5	0.040	1.550
1.5	0.119	13.060
2.5	0.198	34.260
3.5	0.278	63.600
4.5	0.357	98.990
5.5	0.436	136.460
6.5	0.516	169.690
7.5	0.595	191.400
8.5	0.674	210.130
9.5	0.763	228.060
10.0	0.925	236.700
10.5	1.108	245.140
11.5	1.514	261.430
12.5	1.978	276.980
13.0	2.232	284.500
13.5	2.501	291.850
14.5	3.086	306.110
15.5	3.734	319.800
15.62	3.817	321.410

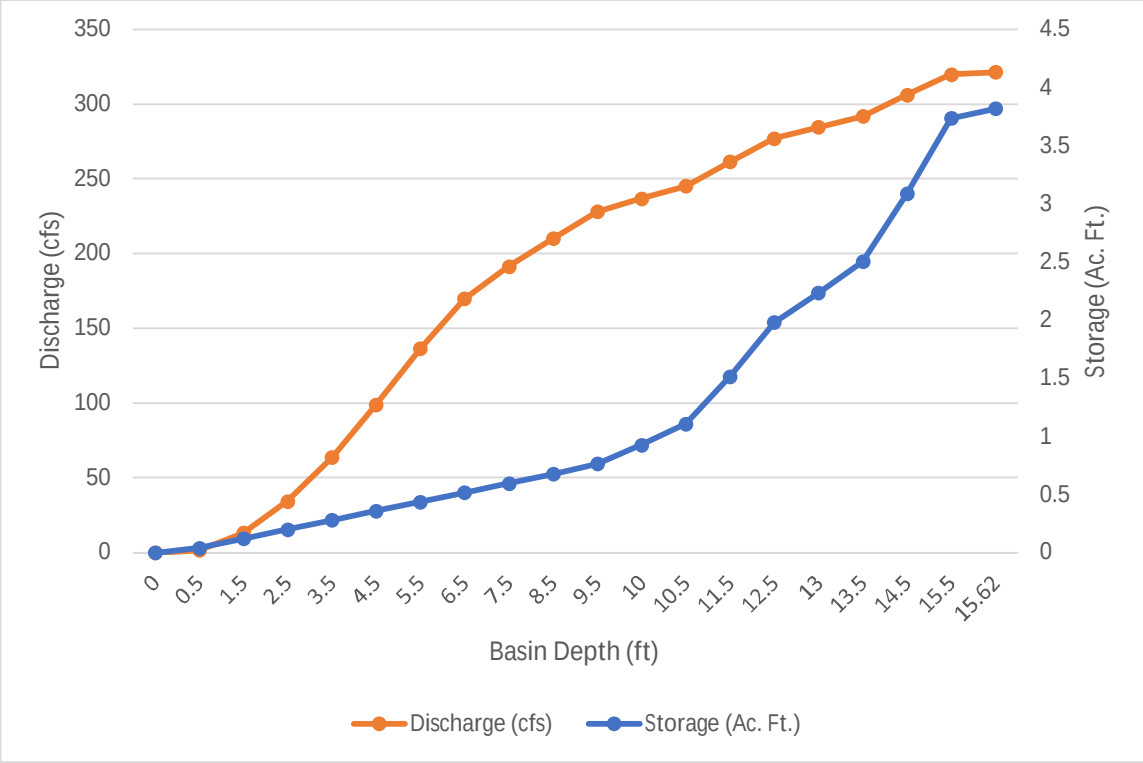


Figure 2: Stage Storage Discharge Curves for the SMART Basin

Table 5: Flood Hydrograph Routing Results

Node	Inflow	Outflow	Description
0 to 5		110.882	Add Basin A1 SUH
0 to 5			Store Hydrograph "**route0to5**"
13 to 6		316.002	Add Basin A2 SUH
6 to 5	316.002	158.001	Split Hydrograph 50/50, 50% to Node 5, 50% to "**Stream 1**"
5 to 5		268.883	Combine "**route0to5**"
5 to 5		268.883	Print Hydrograph
5 to 16	268.883	260.191	Pipe flow - program calculates pipe size
5 to 16			Store Hydrograph "**route5to16**"
1 to 2		26.951	Add Basin A3 SUH
5 to 2		184.953	Combine "**Stream 1"**
2 to 14	184.953	155.337	Retarding Basin Routing - Towngate Apartments basin
14 to 15	155.337	155.290	Improved Channel Flow
14 to 15			Store Hydrograph "**route14to15**"
10 to 11		12.008	Add Basin B SUH
11 to 12	12.008	11.929	Pipe flow - program calculates pipe size
12 to 15	11.929	10.460	Improved Channel Flow
15 to 15		164.147	Combine "**route14to15**"
15 to 15		164.147	Print Hydrograph
15 to 7	164.147	163.489	Irregular Channel Flow
1 to 7		224.797	Add Basin C SUH
7 to 18	224.797	102.000	Split Hydrograph, 102 cfs goes to Node 18, excess goes to "**Stream 2"**
18 to 19	102.000	102.000	Improved Channel Flow
18 to 19			Store Hydrograph "**route18to19**"
5 to 16		260.191	Combine "**route5to16**"
16 to 16		382.988	Combine "**Stream 2**"
16 to 17	382.988	295.344	Retarding Basin Routing - SMART Basin
17 to 19	295.344	292.992	Pipe flow - program calculates pipe size
17 to 19			Store Hydrograph "**route17to19**"
25 to 19		72.080	Add Basin D SUH
25 to 19			Store Hydrograph "**route25to19**"
18 to 19		102.000	Combine "**route18to19**"
25 to 19		174.080	Combine "**route25to19**"
17 to 19		438.617	Combine "**route17to19**"
30 to 19		482.193	Add Basin E SUH
19 to 19		482.193	Print Hydrograph

4.2 HYDRAULICS

4.2.1 CATCH BASIN HYDRAULICS

Bentley Flowmaster was used to calculate the interception/bypass flowrates at each catch basin. The "discharge" value represents the flowrate that reaches the inlet Discharge values were obtained from the Rational Method calculations described in Section 4.1 above. For flow-by condition inlets, the "bypass" value represents the flowrate that bypasses the inlet, and the "intercepted" value represents the flowrate that enters the inlet. Full calculation reports can be found in Appendix J. Table 6 below summarizes the rational flows received, bypass flows received, intercepted flow, bypass flow, and bypass destination for each catch basin.

Table 6: Inlet Calculation Results

Catch Basin	Rational Flows Received (cfs)	Rational Node (from Rational Method calculations)	Bypass Flows Received (cfs)	Intercepted Flow (cfs)	Bypass Flow (cfs)	Bypass Destination
7-1	0.25	46 to 50	0	0.25	0	NA
7-2	32.21	40 to 50	0	32.21	0	NA
7-3	0.00	NA	8.46	8.46	0	NA
7-5	1.87	15 to 30	0	1.87	0	NA
7-6	45.45	0 to 30	0	41.12	4.33	CB 7-3
7-7	24.10	10 to 35	0	21.38	2.72	CB 7-3
7-8	15.24	25 to 35	0	13.83	1.41	CB 7-3
F-1A*	NA	NA	0	73.68	0	NA
F-2A*	NA	NA	0	49.12	0	NA

*The flows entering catch basins F-1A and F-2A were calculated using the flows from the hydrograph routing models (Node 16 to 16, Stream 2. See Table 5 in section 4.1.2 above) rather than the rational method models. The flowrate through these inlets was calculated to be 122 cfs. As there are 5 inlets at F-1A and F-2A, the flowrate into each inlet was calculated to be 24.56 cfs.

The following items help correlate the catch basins described above to the catch basins shows on the plan and profile sheets, submitted separately.

1. Flowmaster calculations for CB 7-1 correspond to the catch basin connected to Lateral F7-1 shown on Sheet 12 of the plan and profile sheets.
2. Flowmaster calculations for CB 7-2 correspond to the catch basin at Station 51+82 shown on Sheet 12 of the plan and profile sheets.
3. Flowmaster calculations for CB 7-3 correspond to the catch basin at Station 55+20 shown on Sheet 13 of the plan and profile sheets.
4. Flowmaster calculations for CB 7-5 correspond to the catch basin connected to Lateral F7-5 shown on Sheet 13 of the plan and profile sheets.
5. Flowmaster calculations for CB 7-6 correspond to the catch basin at Station 56+78 shown on Sheet 13 of the plan and profile sheets.
6. Flowmaster calculations for CB 7-7 and 7-8 correspond to the two catch basins connected to Laterals F7-7 and F7-8 shown on Sheet 13 of the plan and profile sheets.

7. Flowmaster calculations for CB F-1A and F-2A correspond to the two series of catch basins connected to Laterals F-1A and F-2A shown on Sheet 7 of the plan and profile sheets.

4.2.2 WSEL AT DOWNSTREAM END OF PROJECT

Due to the complex confluence hydraulics at the downstream end of the site, a HEC RAS model was prepared to determine the water surface elevations (WSELs) at the downstream end of the site and into the existing trapezoidal channel.

The HEC RAS geometry was prepared using the storm drain plan set, submitted separately. Manning's n-values of 0.013 were used for concrete portions of the model, and 0.042 were used for the natural unlined channel portion. These values are consistent with values listed in the Natural Resources Conservation Service document titled "Determining Manning's Coefficient of Roughness, "n".

The steady flow data was prepared using the flowrates resulting from the flood hydrograph routing modeling mentioned in section 4.1.2. According to the routing model results, this peak flowrate is 482 cfs. The flowrate at other points within the HEC RAS model (such as the natural channel, discharge from the 72" pipe, and discharge from the South Basin) were determined from the same flood hydrograph routing model.

The model starts near the upstream end of the natural channel, just south of the SMART basin, and continues south through the end of the proposed project and into the existing trapezoidal channel to the Eucalyptus crossing. Appendix H includes a compilation of cross sections developed by HEC RAS and a HEC RAS results summary table.

The hydraulic results of this model are shown on the storm drain plan set, submitted separately. It should be noted that the plan set uses WSPG results upstream of the 72" pipe's discharge at Station 8+85, and uses HEC RAS results downstream of this point.

As can be seen on the HEC RAS cross section results in Appendix H (see Station 8+10 to 7+25), there is overtopping on the existing trapezoidal channel for less than 100 feet downstream of the project site. There is approximately 0.5 feet of overtopping.

4.2.3 MAIN STORM DRAIN NORTH AND SOUTH REACH HYDRAULICS

WSP prepared hydraulic calculations for the north and south reaches using WSPG. The south reach model calculates the HGL through the 60" pipe, which upsized to a 72" pipe, that conveys discharge from the SMART basin to the outlet downstream. The downstream water surface elevation of the south reach model is the resulting water surface elevation in the HEC-RAS model mentioned in section 4.2.2 above, at the discharge point of the 72" pipe (Station 8+85). The north reach calculates the HGL through the main channel from the upstream end of the SMART basin to the system headworks of the project near the Hemlock and Graham intersection. The downstream water surface elevation of the model equals the peak water surface elevation in the SMART basin, calculated using the flood hydrograph routing model mentioned in section 4.1.2 above. Detailed modeling results of the main line hydraulics calculations can be found in Appendix I. As can be seen, the HGL's throughout the project and their laterals are contained below the existing or proposed ground.

4.2.4 CATCH BASIN LATERAL HYDRAULICS

WSP prepared hydraulic calculations for the catch basin laterals using WSPG. The flowrates were taken using the intercepted flow results from the catch basin hydraulic calculations described in Table 6, in Section 4.2.1 above. The downstream starting water surface elevations for each lateral equals the resulting water surface elevation of the north reach hydraulic WSPG calculations described in Section 4.2.2, at the station of confluence for each respective lateral. All water surface elevations within the lateral are contained below existing ground. Detailed modeling results can be found in Appendix I.

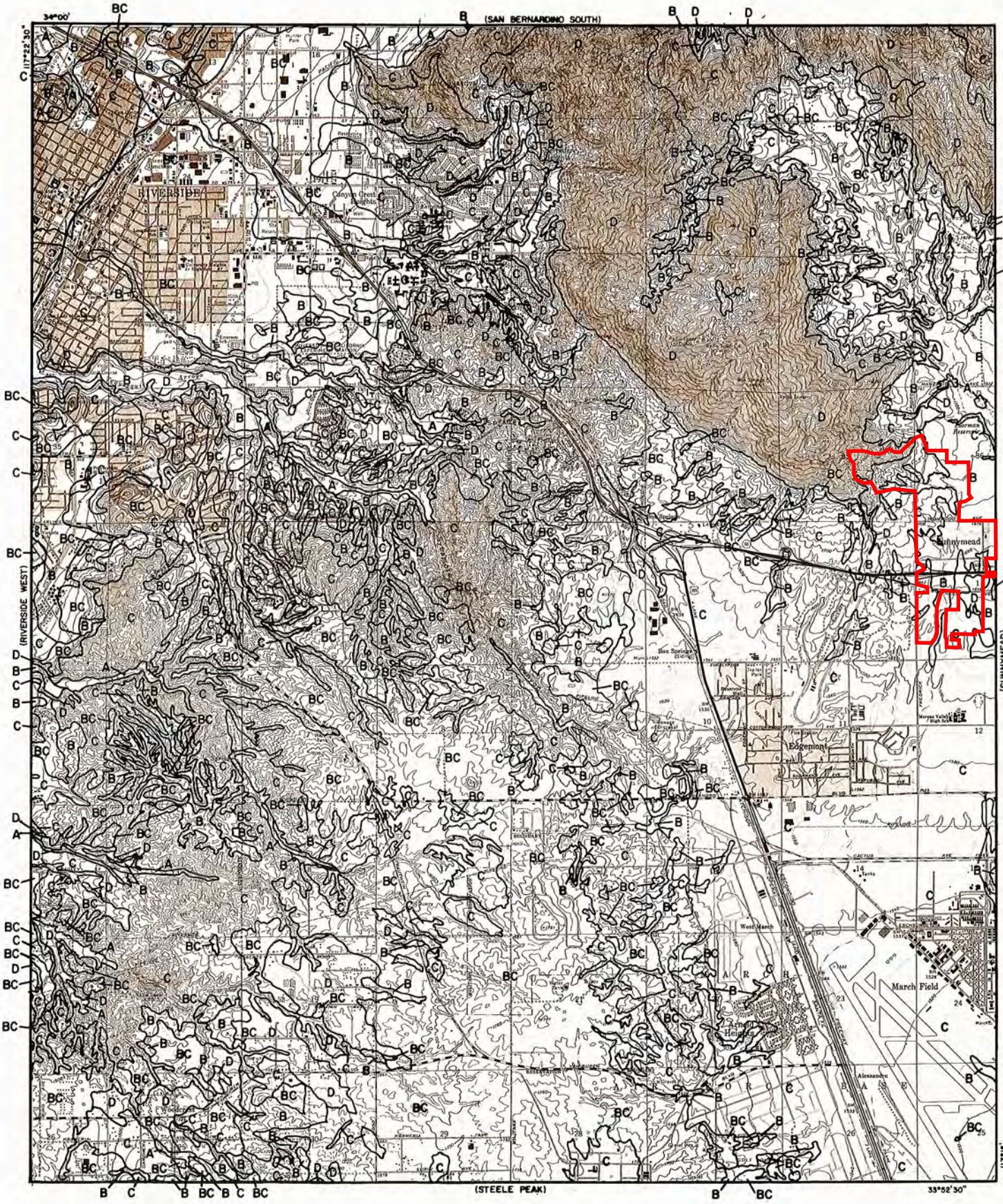
5.0 RESULTS

RCFC&WCD Drawing No. 4-359 contains the as-built drawings of the existing trapezoidal channel downstream of the project site. These drawings show that the channel was designed in 1984 to convey a 100-year peak flowrate of 335 cfs. This peak flowrate is significantly less than the proposed 482 cfs peak flowrate calculated as part of this report, as well as the existing conditions peak flowrate of 733 cfs (calculated as part of a recent report by TKE). These as-built drawings do not refer to any hydrology calculations, however, it can be assumed that there have been significant changes to the tributary area since 1984 such as land development. These changes to the tributary area may have decreased the time of concentration and permeable surface area of the various drainage areas and sub-areas tributary to the existing trapezoidal channel, thus increasing the 100-year peak flowrate that reaches the existing trapezoidal channel.

Given the information above, it can be said that the existing channel is designed for a 100-year peak flowrate of 335 cfs. Under existing conditions, the channel will receive a peak flowrate of 733 cfs. Under proposed conditions (as part of this project), the channel will receive a 100-year peak flowrate 482 cfs, or a 251 cfs decrease from existing conditions.

APPENDIX A

SOILS MAP



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

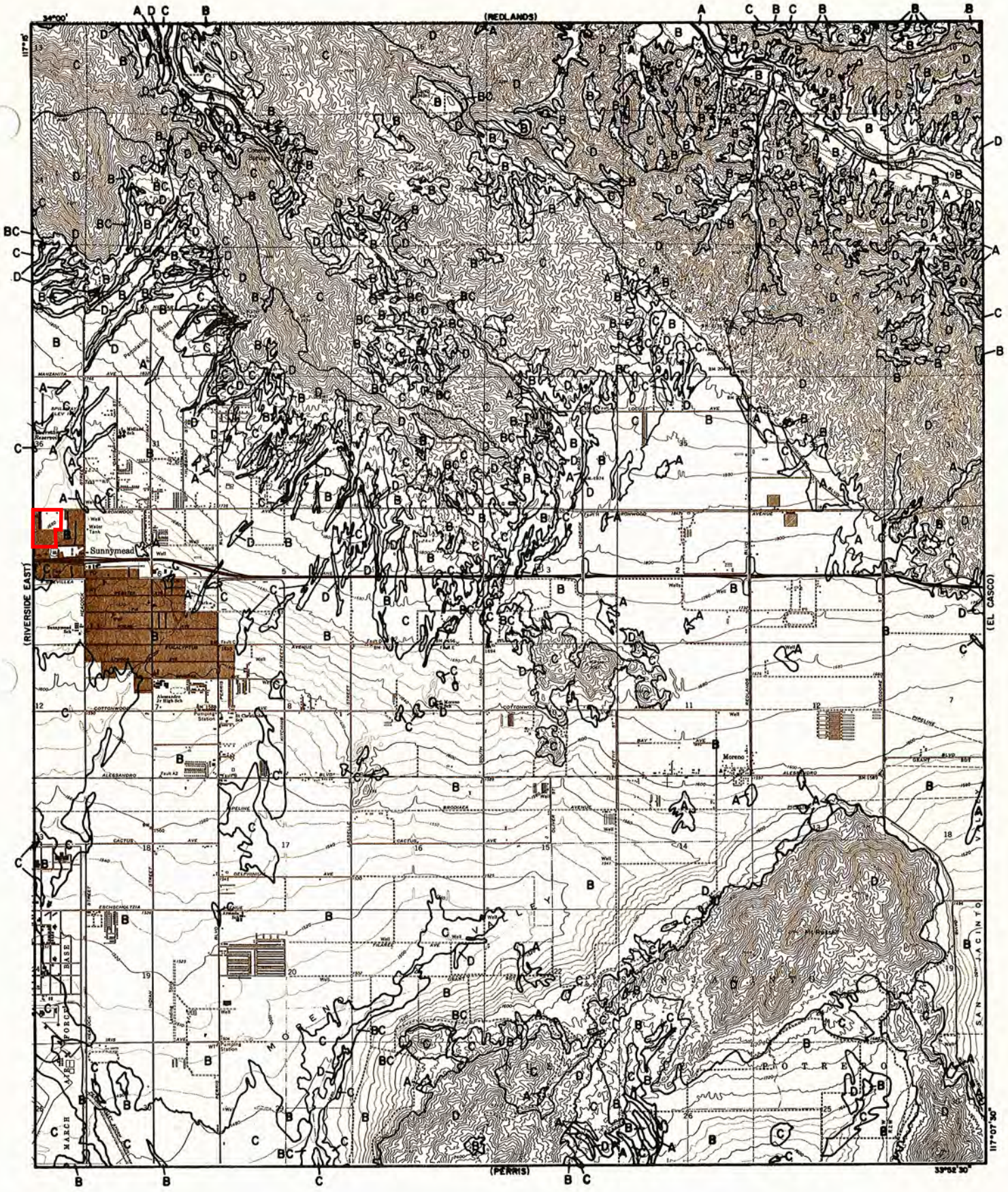
HYDROLOGY MANUAL

N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR RIVERSIDE–EAST

PLATE C–1.16



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

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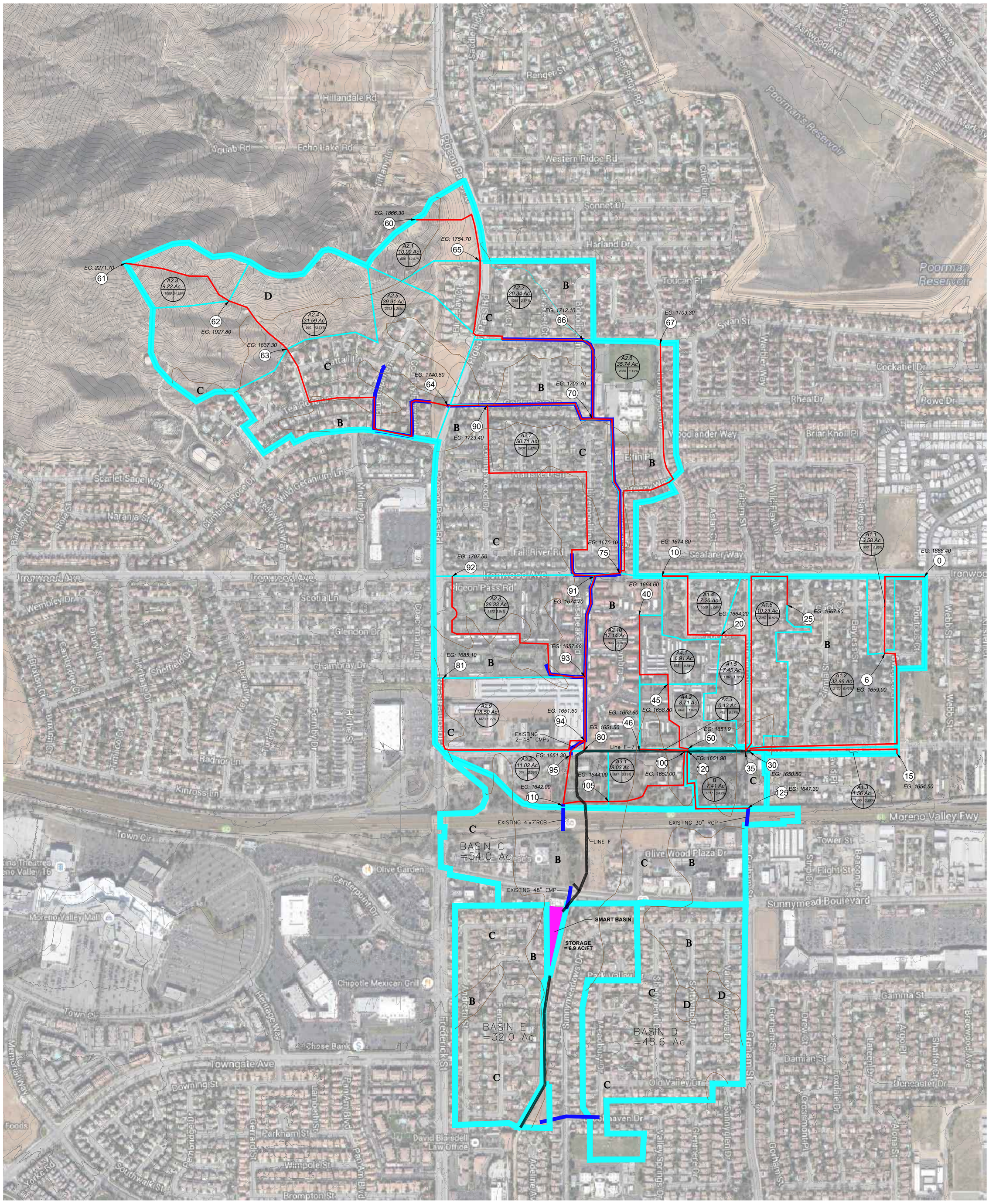
0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR SUNNYMEAD

PLATE C-1.17

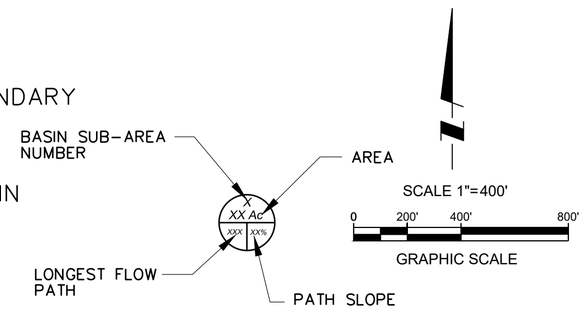
APPENDIX B

RATIONAL METHOD HYDROLOGY EXHIBIT



LEGEND

- BASIN BOUNDARY
- BASIN SUB-AREA BOUNDARY
- LONGEST FLOW PATH
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- SOIL TYPE BOUNDARY
- STORAGE FACILITY
- A, B, C, D — SOIL TYPE



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PROPOSED RATIONAL METHOD HYDROLOGY EXHIBIT

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APPENDIX C

SYNTHETIC UNIT HYDROGRAPH ROUTING EXHIBIT

BASIN A2 = 259.48 Ac

BASIN A3 = 19.05 Ac

BASIN C = 54.0 Ac

BASIN E = 32.0 Ac

BASIN A1 = 78.63 Ac

BASIN B = 7.4 Ac

BASIN D = 48.62 Ac

EXISTING 2-48" CMPs

STORAGE =4.3 AC/FT

EXISTING 4'X7' RCB

EXISTING 30" RCB

LINE F

LINE F-7

EXISTING 48" CMP

SMART BASIN

STORAGE = 6.9 AC/FT

EXISTING CHANNEL

LEGEND

- BASIN BOUNDARY
- BASIN SUB-AREA BOUNDARY
- LONGEST FLOW PATH
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- SOIL TYPE BOUNDARY
- STORAGE FACILITY
- A, B, C, D SOIL TYPE

SCALE 1"=400'

0 200' 400' 800'

GRAPHIC SCALE

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PROPOSED SYNTHETIC UNIT HYDROGRAPH ROUTING EXHIBIT

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APPENDIX D

RATIONAL METHOD HYDROLOGY OUTPUT FILES

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 08/29/23 File:basina1rational.out

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12804 Sunnymead MDP Line F and F-7
Basin A1
100-year, 1-hour Rational Method
WSP USA

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6485

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 0.000 to Point/Station 6.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 998.000(Ft.)
Top (of initial area) elevation = 1666.400(Ft.)
Bottom (of initial area) elevation = 1659.900(Ft.)
Difference in elevation = 6.500(Ft.)
Slope = 0.00651 s(percent)= 0.65
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.903 min.
Rainfall intensity = 2.261(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.758
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
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 6.131(CFS)
Total initial stream area = 3.580(Ac.)
Pervious area fraction = 0.500

++
Process from Point/Station 6.000 to Point/Station 30.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

```
Top of street segment elevation =  1659.900(Ft.)
End of street segment elevation =  1650.800(Ft.)
Length of street segment  =  2120.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.000
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0160
Estimated mean flow rate at midpoint of street =     25.870(CFS)
Depth of flow =   0.565(Ft.), Average velocity =   2.377(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.36(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   2.38(Ft/s)
Travel time =   14.87 min.     TC =   31.77  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.725
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.995
Decimal fraction soil group C = 0.005
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.06
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.649(In/Hr) for a   100.0 year storm
Subarea runoff =     39.314(CFS) for     32.860(Ac.)
Total runoff =     45.445(CFS)        Total area =      36.440(Ac.)
Street flow at end of street =     45.445(CFS)
Half street flow at end of street =     22.723(CFS)
Depth of flow =   0.676(Ft.), Average velocity =   2.741(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   11.71(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       30.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.727
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.962
Decimal fraction soil group C = 0.038
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.49
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    31.77 min.
Rainfall intensity =      1.649(In/Hr) for a   100.0 year storm
Subarea runoff =      1.871(CFS) for      1.560(Ac.)
Total runoff =     47.316(CFS)        Total area =      38.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       35.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1636.050(Ft.)
Downstream point/station elevation =  1635.700(Ft.)
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```
Pipe length  =    94.89(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    47.316(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    47.316(CFS)
Normal flow depth in pipe =   30.14(In.)
Flow top width inside pipe =   32.68(In.)
Critical Depth =   26.33(In.)
Pipe flow velocity =      6.87(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    32.00 min.


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Process from Point/Station       35.000 to Point/Station       35.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     38.000(Ac.)
Runoff from this stream =     47.316(CFS)
Time of concentration =   32.00 min.
Rainfall intensity =     1.643(In/Hr)
Summary of stream data:

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


1       47.316     32.00                 1.643
Largest stream flow has longer time of concentration
Qp =     47.316 + sum of
Qp =     47.316

Total of 1 streams to confluence:
Flow rates before confluence point:
      47.316
Area of streams before confluence:
       38.000
Results of confluence:
Total flow rate =     47.316(CFS)
Time of concentration =    31.998 min.
Effective stream area after confluence =     38.000(Ac.)


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Process from Point/Station       10.000 to Point/Station       20.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1674.800(Ft.)
Bottom (of initial area) elevation =  1664.200(Ft.)
Difference in elevation =    10.600(Ft.)
Slope =    0.01060  s(percent)=       1.06
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.346 min.
Rainfall intensity =      2.373(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.762
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
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     13.021(CFS)
Total initial stream area =        7.200(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station       20.000 to Point/Station       35.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
```

```
Top of street segment elevation =  1664.200(Ft.)
End of street segment elevation =  1650.800(Ft.)
Length of street segment  =  1197.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.000
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0160
Estimated mean flow rate at midpoint of street =     18.637(CFS)
Depth of flow =   0.440(Ft.), Average velocity =   3.061(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.243(Ft.)
Flow velocity =   3.06(Ft/s)
Travel time =    6.52 min.     TC =   21.86  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.748
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.940
Decimal fraction soil group C = 0.060
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.78
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.988(In/Hr) for a   100.0 year storm
Subarea runoff =     11.076(CFS) for      7.450(Ac.)
Total runoff =     24.097(CFS)        Total area =      14.650(Ac.)
Street flow at end of street =     24.097(CFS)
Half street flow at end of street =     12.049(CFS)
Depth of flow =   0.472(Ft.), Average velocity =   3.333(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       25.000 to Point/Station       35.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.750
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.910
Decimal fraction soil group C = 0.090
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  57.17
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    21.86 min.
Rainfall intensity =      1.988(In/Hr) for a   100.0 year storm
Subarea runoff =     15.242(CFS) for     10.230(Ac.)
Total runoff =     39.339(CFS)        Total area =      24.880(Ac.)


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Process from Point/Station       35.000 to Point/Station       35.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.880(Ac.)
Runoff from this stream =     39.339(CFS)
Time of concentration =   21.86 min.
Rainfall intensity =     1.988(In/Hr)
Summary of stream data:
```

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


1       47.316     32.00                1.643
2       39.339     21.86                1.988
Largest stream flow has longer time of concentration
Qp =     47.316 + sum of
          Qb         Ia/Ib
          39.339 *    0.827 =     32.518
Qp =     79.834

Total of 2 streams to confluence:
Flow rates before confluence point:
      47.316      39.339
Area of streams before confluence:
       38.000       24.880
Results of confluence:
Total flow rate =     79.834(CFS)
Time of concentration =    31.998 min.
Effective stream area after confluence =     62.880(Ac.)


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Process from Point/Station       35.000 to Point/Station       50.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1635.700(Ft.)
Downstream point/station elevation =  1633.380(Ft.)
Pipe length  =   418.15(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    79.834(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    79.834(CFS)
Normal flow depth in pipe =   37.80(In.)
Flow top width inside pipe =   25.20(In.)
Critical Depth =   33.50(In.)
Pipe flow velocity =      8.76(Ft/s)
Travel time through pipe =    0.80 min.
Time of concentration (TC) =    32.79 min.


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Process from Point/Station       50.000 to Point/Station       50.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     62.880(Ac.)
Runoff from this stream =     79.834(CFS)
Time of concentration =   32.79 min.
Rainfall intensity =     1.623(In/Hr)
Summary of stream data:

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


1       79.834     32.79                1.623
Largest stream flow has longer time of concentration
Qp =     79.834 + sum of
Qp =     79.834

Total of 1 streams to confluence:
Flow rates before confluence point:
      79.834
Area of streams before confluence:
       62.880
Results of confluence:
Total flow rate =     79.834(CFS)
Time of concentration =    32.794 min.
Effective stream area after confluence =     62.880(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       45.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   833.000(Ft.)
Top (of initial area) elevation =  1664.600(Ft.)
Bottom (of initial area) elevation =  1658.800(Ft.)
Difference in elevation =     5.800(Ft.)
Slope =    0.00696  s(percent)=       0.70
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.850 min.
Rainfall intensity =      2.593(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.848
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
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =     15.198(CFS)
Total initial stream area =        6.910(Ac.)
Pervious area fraction = 0.200


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Process from Point/Station       45.000 to Point/Station       50.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1658.800(Ft.)
End of street segment elevation =  1651.900(Ft.)
Length of street segment  =   664.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.000
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0160
Estimated mean flow rate at midpoint of street =     23.774(CFS)
Depth of flow =   0.475(Ft.), Average velocity =   3.242(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   3.24(Ft/s)
Travel time =    3.41 min.     TC =   16.26  min.
 Adding area flow to street
APARTMENT subarea type
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.820
Decimal fraction soil group C = 0.180
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  58.34
Pervious area fraction =  0.200; Impervious fraction =  0.800
Rainfall intensity =      2.305(In/Hr) for a   100.0 year storm
Subarea runoff =     17.011(CFS) for      8.710(Ac.)
Total runoff =     32.209(CFS)        Total area =      15.620(Ac.)
Street flow at end of street =     32.209(CFS)
Half street flow at end of street =     16.105(CFS)
Depth of flow =   0.522(Ft.), Average velocity =   3.559(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    1.44(Ft.)
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Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       46.000 to Point/Station       50.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
APARTMENT subarea type
Runoff Coefficient = 0.849
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.750
Decimal fraction soil group C = 0.250
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  59.25
Pervious area fraction =  0.200; Impervious fraction =  0.800
Time of concentration =    16.26 min.
Rainfall intensity =      2.305(In/Hr) for a   100.0 year storm
Subarea runoff =      0.254(CFS) for      0.130(Ac.)
Total runoff =     32.464(CFS)        Total area =      15.750(Ac.)


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Process from Point/Station       50.000 to Point/Station       50.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     15.750(Ac.)
Runoff from this stream =     32.464(CFS)
Time of concentration =   16.26 min.
Rainfall intensity =     2.305(In/Hr)
Summary of stream data:

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


1       79.834     32.79                 1.623
2       32.464     16.26                 2.305
Largest stream flow has longer time of concentration
Qp =     79.834 + sum of
          Qb         Ia/Ib
          32.464 *    0.704 =     22.862
Qp =    102.696

Total of 2 streams to confluence:
Flow rates before confluence point:
      79.834      32.464
Area of streams before confluence:
       62.880       15.750
Results of confluence:
Total flow rate =    102.696(CFS)
Time of concentration =    32.794 min.
Effective stream area after confluence =     78.630(Ac.)


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Process from Point/Station       50.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1633.380(Ft.)
Downstream point/station elevation =  1625.500(Ft.)
Pipe length  =  1083.40(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   102.696(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =   102.696(CFS)
Normal flow depth in pipe =   36.70(In.)
Flow top width inside pipe =   34.90(In.)
Critical Depth =   37.20(In.)
Pipe flow velocity =     10.65(Ft/s)
Travel time through pipe =    1.70 min.
Time of concentration (TC) =    34.49 min.
```

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Process from Point/Station       80.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     78.630(Ac.)
Runoff from this stream =    102.696(CFS)
Time of concentration =   34.49 min.
Rainfall intensity =     1.583(In/Hr)
Summary of stream data:

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


1      102.696     34.49                 1.583
Largest stream flow has longer time of concentration
Qp =    102.696 + sum of
Qp =    102.696

Total of 1 streams to confluence:
Flow rates before confluence point:
     102.696
Area of streams before confluence:
       78.630
Results of confluence:
Total flow rate =    102.696(CFS)
Time of concentration =    34.490 min.
Effective stream area after confluence =     78.630(Ac.)
End of computations, total study area =           78.63 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.440
Area averaged RI index number =  56.5
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 08/29/23 File:basina2rational.out

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12804 Sunnymead MDP Line F and F-7
Basin A2
100-year, 1-hour Rational Method
WSP USA

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6485

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++

Process from Point/Station 60.000 to Point/Station 65.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 888.000(Ft.)
Top (of initial area) elevation = 1866.300(Ft.)
Bottom (of initial area) elevation = 1754.700(Ft.)
Difference in elevation = 111.600(Ft.)
Slope = 0.12568 s(percent)= 12.57
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.128 min.
Rainfall intensity = 2.669(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.550
Decimal fraction soil group D = 0.450
RI index for soil(AMC 2) = 87.35
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 22.401(CFS)
Total initial stream area = 10.000(Ac.)
Pervious area fraction = 1.000

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Process from Point/Station 65.000 to Point/Station 66.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

```
Top of street segment elevation =  1754.700(Ft.)
End of street segment elevation =  1712.100(Ft.)
Length of street segment  =  1598.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.000
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0160
Estimated mean flow rate at midpoint of street =     40.560(CFS)
Depth of flow =   0.483(Ft.), Average velocity =   5.324(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   5.32(Ft/s)
Travel time =    5.00 min.     TC =   17.13  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.791
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
RI index for soil(AMC 2)  =  65.10
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.246(In/Hr) for a   100.0 year storm
Subarea runoff =     36.149(CFS) for     20.340(Ac.)
Total runoff =     58.550(CFS)        Total area =      30.340(Ac.)
Street flow at end of street =     58.550(CFS)
Half street flow at end of street =     29.275(CFS)
Depth of flow =   0.546(Ft.), Average velocity =   5.822(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.09(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       66.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1712.100(Ft.)
Downstream point/station elevation =  1703.700(Ft.)
Pipe length  =   710.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    58.550(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    58.550(CFS)
Normal flow depth in pipe =   27.61(In.)
Flow top width inside pipe =   24.40(In.)
Critical Depth =   29.62(In.)
Pipe flow velocity =     11.03(Ft/s)
Travel time through pipe =    1.07 min.
Time of concentration (TC) =    18.20 min.


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Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     30.340(Ac.)
Runoff from this stream =     58.550(CFS)
Time of concentration =   18.20 min.
```

```
Rainfall intensity =     2.179(In/Hr)
Summary of stream data:

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


1       58.550     18.20                 2.179
Largest stream flow has longer time of concentration
Qp =     58.550 + sum of
Qp =     58.550

Total of 1 streams to confluence:
Flow rates before confluence point:
      58.550
Area of streams before confluence:
       30.340
Results of confluence:
Total flow rate =     58.550(CFS)
Time of concentration =    18.203 min.
Effective stream area after confluence =     30.340(Ac.)


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Process from Point/Station       61.000 to Point/Station       62.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  2271.700(Ft.)
Bottom (of initial area) elevation =  1927.800(Ft.)
Difference in elevation =   343.900(Ft.)
Slope =    0.34390  s(percent)=      34.39
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.399 min.
Rainfall intensity =      2.882(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.851
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
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     22.625(CFS)
Total initial stream area =        9.220(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station       62.000 to Point/Station       63.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1927.800(Ft.)
End of natural channel elevation =   1837.300(Ft.)
Length of natural channel  =   660.000(Ft.)
Estimated mean flow rate at midpoint of channel =     61.385(CFS)

Natural mountain channel type used
L.A. County flood control district formula for channel velocity:
 Velocity = 5.48(q^.33)(slope^.492)
Velocity using mean channel flow =   7.69(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1371
Corrected/adjusted channel slope =  0.1260
Travel time =    1.43 min.     TC =   11.83  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
```

```
Runoff Coefficient = 0.843
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.330
Decimal fraction soil group D = 0.670
RI index for soil(AMC 2)  =  88.01
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.703(In/Hr) for a   100.0 year storm
Subarea runoff =     72.000(CFS) for     31.590(Ac.)
Total runoff =     94.625(CFS)        Total area =      40.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       64.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1837.300(Ft.)
End of street segment elevation =  1740.800(Ft.)
Length of street segment  =  2253.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.000
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0160
Estimated mean flow rate at midpoint of street =    131.107(CFS)
Depth of flow =   0.660(Ft.), Average velocity =   8.351(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   10.66(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   8.35(Ft/s)
Travel time =    4.50 min.     TC =   16.33  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.793
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.320
Decimal fraction soil group C = 0.660
Decimal fraction soil group D = 0.020
RI index for soil(AMC 2)  =  64.96
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.301(In/Hr) for a   100.0 year storm
Subarea runoff =     72.793(CFS) for     39.910(Ac.)
Total runoff =    167.418(CFS)        Total area =      80.720(Ac.)
Street flow at end of street =    167.418(CFS)
Half street flow at end of street =     83.709(CFS)
Depth of flow =   0.704(Ft.), Average velocity =   9.209(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   13.62(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1740.800(Ft.)
Downstream point/station elevation =  1703.700(Ft.)
Pipe length  =  1328.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   167.418(CFS)
Nearest computed pipe diameter  =     42.00(In.)
```

```
Calculated individual pipe flow  =   167.418(CFS)
Normal flow depth in pipe =   34.27(In.)
Flow top width inside pipe =   32.56(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.93(Ft/s)
Travel time through pipe =    1.11 min.
Time of concentration (TC) =    17.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     80.720(Ac.)
Runoff from this stream =    167.418(CFS)
Time of concentration =   17.44 min.
Rainfall intensity =     2.226(In/Hr)
Summary of stream data:

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


1       58.550     18.20                2.179
2      167.418     17.44                2.226
Largest stream flow has longer or shorter time of concentration
Qp =    167.418 + sum of
          Qa          Tb/Ta
          58.550 *    0.958 =     56.081
Qp =    223.499

Total of 2 streams to confluence:
Flow rates before confluence point:
      58.550     167.418
Area of streams before confluence:
       30.340       80.720
Results of confluence:
Total flow rate =    223.499(CFS)
Time of concentration =    17.436 min.
Effective stream area after confluence =    111.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       75.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1703.700(Ft.)
Downstream point/station elevation =  1675.100(Ft.)
Pipe length  =  1497.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   223.499(CFS)
Nearest computed pipe diameter  =     51.00(In.)
Calculated individual pipe flow  =   223.499(CFS)
Normal flow depth in pipe =   39.98(In.)
Flow top width inside pipe =   41.97(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.73(Ft/s)
Travel time through pipe =    1.33 min.
Time of concentration (TC) =    18.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.000 to Point/Station       75.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.756
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.930
Decimal fraction soil group C = 0.070
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 2)  =  56.91
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    18.77 min.
Rainfall intensity =      2.146(In/Hr) for a   100.0 year storm
Subarea runoff =     57.974(CFS) for     35.740(Ac.)
Total runoff =    281.473(CFS)        Total area =     146.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       91.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1675.100(Ft.)
Downstream point/station elevation =  1674.700(Ft.)
Pipe length  =   218.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   281.473(CFS)
Nearest computed pipe diameter  =     84.00(In.)
Calculated individual pipe flow  =   281.473(CFS)
Normal flow depth in pipe =   71.25(In.)
Flow top width inside pipe =   60.28(In.)
Critical Depth =   52.89(In.)
Pipe flow velocity =      8.09(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =    19.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.000 to Point/Station       91.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.787
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
RI index for soil(AMC 2)  =  65.10
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    19.22 min.
Rainfall intensity =      2.120(In/Hr) for a   100.0 year storm
Subarea runoff =     84.573(CFS) for     50.710(Ac.)
Total runoff =    366.047(CFS)        Total area =     197.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       91.000 to Point/Station       93.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1674.700(Ft.)
Downstream point/station elevation =  1657.500(Ft.)
Pipe length  =  1076.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   366.047(CFS)
Nearest computed pipe diameter  =     63.00(In.)
Calculated individual pipe flow  =   366.047(CFS)
Normal flow depth in pipe =   50.34(In.)
Flow top width inside pipe =   50.48(In.)
Critical Depth =   59.80(In.)
Pipe flow velocity =     19.74(Ft/s)
Travel time through pipe =    0.91 min.
Time of concentration (TC) =    20.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       92.000 to Point/Station       93.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
APARTMENT subarea type
Runoff Coefficient = 0.850
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
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.200; Impervious fraction =  0.800
Time of concentration =    20.13 min.
Rainfall intensity =      2.072(In/Hr) for a   100.0 year storm
Subarea runoff =     46.364(CFS) for     26.330(Ac.)
Total runoff =    412.411(CFS)        Total area =     223.840(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       93.000 to Point/Station       94.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1657.500(Ft.)
Downstream point/station elevation =  1651.600(Ft.)
Pipe length  =   566.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   412.411(CFS)
Nearest computed pipe diameter  =     72.00(In.)
Calculated individual pipe flow  =   412.411(CFS)
Normal flow depth in pipe =   56.25(In.)
Flow top width inside pipe =   59.53(In.)
Critical Depth =   64.63(In.)
Pipe flow velocity =     17.41(Ft/s)
Travel time through pipe =    0.54 min.
Time of concentration (TC) =    20.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       81.000 to Point/Station       94.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.749
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.980
Decimal fraction soil group C = 0.020
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.26
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    20.67 min.
Rainfall intensity =      2.045(In/Hr) for a   100.0 year storm
Subarea runoff =     28.317(CFS) for     18.500(Ac.)
Total runoff =    440.728(CFS)        Total area =     242.340(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       94.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
APARTMENT subarea type
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.990
Decimal fraction soil group C = 0.010
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.13
Pervious area fraction =  0.200; Impervious fraction =  0.800
Time of concentration =    20.67 min.
Rainfall intensity =      2.045(In/Hr) for a   100.0 year storm
Subarea runoff =     29.411(CFS) for     17.140(Ac.)
Total runoff =    470.139(CFS)        Total area =     259.480(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       94.000 to Point/Station       94.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    259.480(Ac.)
Runoff from this stream =    470.139(CFS)
Time of concentration =   20.67 min.
```

```
Rainfall intensity =     2.045(In/Hr)
Summary of stream data:

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


1      470.139     20.67                 2.045
Largest stream flow has longer time of concentration
Qp =    470.139 + sum of
Qp =    470.139

Total of 1 streams to confluence:
Flow rates before confluence point:
     470.139
Area of streams before confluence:
      259.480
Results of confluence:
Total flow rate =    470.139(CFS)
Time of concentration =    20.667 min.
Effective stream area after confluence =    259.480(Ac.)
End of computations, total study area =          259.48 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.548
Area averaged RI index number =  67.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 08/29/23 File:basina3rational.out

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12804 Sunnymead MDP Line F and F-7
Basin A3
100-year, 1-hour Rational Method
WSP USA

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6485

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 100.000 to Point/Station 105.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 991.000(Ft.)
Top (of initial area) elevation = 1652.000(Ft.)
Bottom (of initial area) elevation = 1644.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.00807 s(percent)= 0.81
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.147 min.
Rainfall intensity = 2.313(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.785
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.490
Decimal fraction soil group C = 0.510
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 62.63
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 14.578(CFS)
Total initial stream area = 8.030(Ac.)
Pervious area fraction = 0.500

++
Process from Point/Station 105.000 to Point/Station 110.000
**** IMPROVED CHANNEL TRAVEL TIME ****

```
Upstream point elevation =  1644.000(Ft.)
Downstream point elevation =  1642.000(Ft.)
Channel length thru subarea  =   389.000(Ft.)
Channel base width     =    0.000(Ft.)
Slope or 'Z' of left channel bank =   6.000
Slope or 'Z' of right channel bank =   6.000
Estimated mean flow rate at midpoint of channel =     23.698(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     23.698(CFS)
Depth of flow =   1.524(Ft.), Average velocity =   3.101(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =    6.000(Ft.)
Flow Velocity =    3.10(Ft/s)
Travel time  =    2.09 min.
Time of concentration =   18.24 min.

Sub-Channel No. 1 Critical depth =      1.031(Ft.)
  '     '       '     Critical flow top width =      6.000(Ft.)
  '     '       '     Critical flow velocity=    5.056(Ft/s)
  '     '       '     Critical flow area =      4.688(Sq.Ft)

ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.758
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.920
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  57.04
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.177(In/Hr) for a   100.0 year storm
Subarea runoff =     18.180(CFS) for     11.020(Ac.)
Total runoff =     32.758(CFS)        Total area =      19.050(Ac.)
Depth of flow =   1.797(Ft.), Average velocity =   3.530(Ft/s)
!!Warning: Water is above left or right bank elevations
ERROR - Channel depth exceeds maximum allowable depth

Sub-Channel No. 1 Critical depth =      1.219(Ft.)
  '     '       '     Critical flow top width =      6.000(Ft.)
  '     '       '     Critical flow velocity=    5.636(Ft/s)
  '     '       '     Critical flow area =      5.813(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     19.050(Ac.)
Runoff from this stream =     32.758(CFS)
Time of concentration =   18.24 min.
Rainfall intensity =     2.177(In/Hr)
Summary of stream data:

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


1       32.758     18.24                 2.177
Largest stream flow has longer time of concentration
Qp =     32.758 + sum of
Qp =     32.758

Total of 1 streams to confluence:
Flow rates before confluence point:
      32.758
Area of streams before confluence:
```

```
       19.050
Results of confluence:
Total flow rate =     32.758(CFS)
Time of concentration =    18.237 min.
Effective stream area after confluence =     19.050(Ac.)
End of computations, total study area =           19.05 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged RI index number =  59.4
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 08/29/23 File:basinbrational.out

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12804 Sunnymead MDP Line F and F-7
Basin B
100-year, 1-hour Rational Method
WSP USA

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6485

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++

Process from Point/Station 120.000 to Point/Station 125.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1651.900(Ft.)
Bottom (of initial area) elevation = 1647.300(Ft.)
Difference in elevation = 4.600(Ft.)
Slope = 0.00460 s(percent)= 0.46
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 15.019 min.
Rainfall intensity = 2.398(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.470
Decimal fraction soil group C = 0.530
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 62.89
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 15.205(CFS)
Total initial stream area = 7.410(Ac.)
Pervious area fraction = 0.200
End of computations, total study area = 7.41 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.200

Area averaged RI index number = 62.9

APPENDIX E

UNIT HYDROGRAPH HYDROLOGY OUTPUT FILES

U n i t H y d r o g r a p h A n a l y s i s

Study date 08/29/23 File: a13100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6485

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

12804 Sunnymead MDP Line F and F-7
Basin A1
100-year, 3-hour Unit Hydrograph
WSP USA

Drainage Area = 78.63(Ac.) = 0.123 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 78.63(Ac.) = 0.123 Sq. Mi.
Length along longest watercourse = 3968.00(Ft.)
Length along longest watercourse measured to centroid = 1252.00(Ft.)
Length along longest watercourse = 0.752 Mi.
Length along longest watercourse measured to centroid = 0.237 Mi.
Difference in elevation = 13.80(Ft.)
Slope along watercourse = 18.3629 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.108 Hr.
Lag time = 6.45 Min.
25% of lag time = 1.61 Min.
40% of lag time = 2.58 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
78.63	1.00	78.63

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
78.63	1.90	149.40

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.97 %
Adjusted average point rain = 1.899(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.580	56.00	0.500
32.860	56.06	0.500

1.560	56.49	0.500
7.200	56.00	0.500
7.450	56.78	0.500
10.230	57.17	0.500
6.910	56.00	0.800
8.710	58.34	0.800
0.130	59.25	0.800

Total Area Entered = 78.63(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.046	0.013
56.1	56.1	0.510	0.500	0.281	0.418	0.117
56.5	56.5	0.506	0.500	0.278	0.020	0.006
56.0	56.0	0.511	0.500	0.281	0.092	0.026
56.8	56.8	0.503	0.500	0.277	0.095	0.026
57.2	57.2	0.499	0.500	0.274	0.130	0.036
56.0	56.0	0.511	0.800	0.143	0.088	0.013
58.3	58.3	0.487	0.800	0.136	0.111	0.015
59.3	59.3	0.478	0.800	0.134	0.002	0.000
					Sum (F) =	0.251

Area averaged mean soil loss (F) (In/Hr) = 0.251
Minimum soil loss rate ((In/Hr)) = 0.126
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.451

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	77.503	8.514	6.747
2	0.167	155.007	46.775	37.066
3	0.250	232.510	25.547	20.245
4	0.333	310.013	10.021	7.941
5	0.417	387.516	5.176	4.102
6	0.500	465.020	2.163	1.714
7	0.583	542.523	0.795	0.630
8	0.667	620.026	0.550	0.435
9	0.750	697.529	0.365	0.290
10	0.833	775.033	0.094	0.075
			Sum = 100.000	Sum= 79.244

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max		Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.251)	0.134	0.163
2	0.17	1.30	0.296	(0.251)	0.134	0.163
3	0.25	1.10	0.251	(0.251)	0.113	0.138
4	0.33	1.50	0.342	(0.251)	0.154	0.188
5	0.42	1.50	0.342	(0.251)	0.154	0.188
6	0.50	1.80	0.410	(0.251)	0.185	0.225
7	0.58	1.50	0.342	(0.251)	0.154	0.188
8	0.67	1.80	0.410	(0.251)	0.185	0.225
9	0.75	1.80	0.410	(0.251)	0.185	0.225
10	0.83	1.50	0.342	(0.251)	0.154	0.188
11	0.92	1.60	0.365	(0.251)	0.165	0.200
12	1.00	1.80	0.410	(0.251)	0.185	0.225
13	1.08	2.20	0.501	(0.251)	0.226	0.275
14	1.17	2.20	0.501	(0.251)	0.226	0.275
15	1.25	2.20	0.501	(0.251)	0.226	0.275
16	1.33	2.00	0.456	(0.251)	0.206	0.250

17	1.42	2.60	0.593	0.251	(0.267)		0.342
18	1.50	2.70	0.615	0.251	(0.278)		0.364
19	1.58	2.40	0.547	(0.251)		0.247	0.300
20	1.67	2.70	0.615	0.251	(0.278)		0.364
21	1.75	3.30	0.752	0.251	(0.339)		0.501
22	1.83	3.10	0.707	0.251	(0.319)		0.455
23	1.92	2.90	0.661	0.251	(0.298)		0.410
24	2.00	3.00	0.684	0.251	(0.309)		0.433
25	2.08	3.10	0.707	0.251	(0.319)		0.455
26	2.17	4.20	0.957	0.251	(0.432)		0.706
27	2.25	5.00	1.140	0.251	(0.514)		0.889
28	2.33	3.50	0.798	0.251	(0.360)		0.547
29	2.42	6.80	1.550	0.251	(0.699)		1.299
30	2.50	7.30	1.664	0.251	(0.751)		1.413
31	2.58	8.20	1.869	0.251	(0.843)		1.618
32	2.67	5.90	1.345	0.251	(0.607)		1.094
33	2.75	2.00	0.456	(0.251)		0.206	0.250
34	2.83	1.80	0.410	(0.251)		0.185	0.225
35	2.92	1.80	0.410	(0.251)		0.185	0.225
36	3.00	0.60	0.137	(0.251)		0.062	0.075

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.4

Flood volume = Effective rainfall 1.28(In)
times area 78.6(Ac.)/[(In)/(Ft.)] = 8.4(Ac.Ft)
Total soil loss = 0.62(In)
Total soil loss = 4.061(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 365213.3 Cubic Feet
Total soil loss = 176911.2 Cubic Feet

Peak flow rate of this hydrograph = 110.882(CFS)

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3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	50.0	100.0	150.0	200.0
0+ 5	0.0076	1.10	Q				
0+10	0.0567	7.13	VQ				
0+15	0.1273	10.25	V Q				
0+20	0.2027	10.95	V Q				
0+25	0.2920	12.97	|VQ				
0+30	0.3906	14.32	|VQ				
0+35	0.4998	15.85	| VQ				
0+40	0.6080	15.71	| VQ				
0+45	0.7234	16.76	| Q				
0+50	0.8415	17.15	| QV				
0+55	0.9522	16.07	| QV				
1+ 0	1.0628	16.07	| Q V				
1+ 5	1.1823	17.35	| Q V				
1+10	1.3178	19.67	| Q V				
1+15	1.4616	20.88	| Q V				
1+20	1.6077	21.22	| Q V				
1+25	1.7533	21.15	| Q V				
1+30	1.9206	24.28	| Q V|				
1+35	2.1023	26.39	| Q V				
1+40	2.2783	25.56	| Q V				
1+45	2.4717	28.09	| Q |V				
1+50	2.7050	33.88	| Q | V				
1+55	2.9460	34.98	| Q | V				
2+ 0	3.1788	33.81	| Q | V				
2+ 5	3.4143	34.19	| Q | V				
2+10	3.6684	36.90	| Q | V				
2+15	3.9983	47.90	| Q| V|				
2+20	4.3955	57.68	| |Q V				
2+25	4.7804	55.89	| |Q | V				
2+30	5.3323	80.13	| | Q | V				

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    2+35       6.0172     99.45  |         |         Q|       V |         |
    2+40       6.7808    110.88  |         |          | Q       | V       |
    2+45       7.4251     93.54  |         |        Q |         |    V    |
    2+50       7.8025     54.80  |         Q          |         |      V  |
    2+55       8.0370     34.06  |     Q   |          |         |       V |
    3+ 0       8.2047     24.35  |   Q     |          |         |        V|
    3+ 5       8.3017     14.09  | Q       |          |         |        V|
    3+10       8.3469      6.56  |Q        |          |         |        V|
    3+15       8.3683      3.11  Q         |          |         |        V|
    3+20       8.3779      1.38  Q         |          |         |        V|
    3+25       8.3815      0.52  Q         |          |         |        V|
    3+30       8.3830      0.23  Q         |          |         |        V|
    3+35       8.3838      0.11  Q         |          |         |        V|
    3+40       8.3841      0.04  Q         |          |         |        V|
    3+45       8.3841      0.01  Q         |          |         |        V|
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U n i t H y d r o g r a p h A n a l y s i s

Study date 08/29/23 File: a23100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6485

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

12804 Sunnymead MDP Line F and F-7
Basin A2
100-year, 3-hour Unit Hydrograph
WSP USA

Drainage Area = 259.48(Ac.) = 0.405 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 259.48(Ac.) = 0.405 Sq. Mi.
Length along longest watercourse = 8598.00(Ft.)
Length along longest watercourse measured to centroid = 5154.00(Ft.)
Length along longest watercourse = 1.628 Mi.
Length along longest watercourse measured to centroid = 0.976 Mi.
Difference in elevation = 620.10(Ft.)
Slope along watercourse = 380.8011 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.185 Hr.
Lag time = 11.11 Min.
25% of lag time = 2.78 Min.
40% of lag time = 4.44 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
259.48	1.00	259.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
259.48	1.90	493.01

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.89 %
Adjusted average point rain = 1.898(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.000	87.35	0.000
20.340	65.10	0.500

9.220	89.00	0.000
31.590	88.01	0.000
39.910	64.96	0.500
35.740	56.91	0.500
50.710	65.10	0.500
26.330	62.50	0.800
18.500	56.26	0.500
17.140	56.13	0.800

Total Area Entered = 259.48(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
87.3	87.3	0.160	0.000	0.160	0.039	0.006
65.1	65.1	0.415	0.500	0.228	0.078	0.018
89.0	89.0	0.141	0.000	0.141	0.036	0.005
88.0	88.0	0.153	0.000	0.153	0.122	0.019
65.0	65.0	0.416	0.500	0.229	0.154	0.035
56.9	56.9	0.502	0.500	0.276	0.138	0.038
65.1	65.1	0.415	0.500	0.228	0.195	0.045
62.5	62.5	0.443	0.800	0.124	0.101	0.013
56.3	56.3	0.508	0.500	0.279	0.071	0.020
56.1	56.1	0.509	0.800	0.143	0.066	0.009
					Sum (F) =	0.207

Area averaged mean soil loss (F) (In/Hr) = 0.207
Minimum soil loss rate ((In/Hr)) = 0.104
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.538

U n i t H y d r o g r a p h

Combination of 'S' Curves:
VALLEY 'S' Curve Percentage = 0.00
FOOTHILL 'S' Curve Percentage = 65.00
MOUNTAIN 'S' Curve Percentage = 35.00
DESERT 'S' Curve Percentage = 0.00

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	45.022	4.718	12.339
2	0.167	90.044	19.258	50.362
3	0.250	135.066	31.110	81.355
4	0.333	180.089	14.721	38.496
5	0.417	225.111	8.186	21.407
6	0.500	270.133	5.669	14.825
7	0.583	315.155	4.068	10.639
8	0.667	360.177	2.902	7.589
9	0.750	405.199	2.029	5.306
10	0.833	450.221	1.277	3.339
11	0.917	495.243	0.968	2.530
12	1.000	540.266	0.826	2.159
13	1.083	585.288	0.689	1.803
14	1.167	630.310	0.665	1.740
15	1.250	675.332	0.522	1.365
16	1.333	720.354	0.442	1.155
17	1.417	765.376	0.323	0.844
18	1.500	810.398	0.290	0.760
19	1.583	855.421	0.284	0.742
20	1.667	900.443	0.284	0.742
21	1.750	945.465	0.284	0.742
22	1.833	990.487	0.284	0.742
23	1.917	1035.509	0.202	0.528
			Sum = 100.000	Sum= 261.507

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.207)	0.159	0.137
2	0.17	1.30	0.296	(0.207)	0.159	0.137
3	0.25	1.10	0.251	(0.207)	0.135	0.116
4	0.33	1.50	0.342	(0.207)	0.184	0.158
5	0.42	1.50	0.342	(0.207)	0.184	0.158
6	0.50	1.80	0.410	0.207	(0.221)	0.203
7	0.58	1.50	0.342	(0.207)	0.184	0.158
8	0.67	1.80	0.410	0.207	(0.221)	0.203
9	0.75	1.80	0.410	0.207	(0.221)	0.203
10	0.83	1.50	0.342	(0.207)	0.184	0.158
11	0.92	1.60	0.364	(0.207)	0.196	0.168
12	1.00	1.80	0.410	0.207	(0.221)	0.203
13	1.08	2.20	0.501	0.207	(0.270)	0.294
14	1.17	2.20	0.501	0.207	(0.270)	0.294
15	1.25	2.20	0.501	0.207	(0.270)	0.294
16	1.33	2.00	0.455	0.207	(0.245)	0.248
17	1.42	2.60	0.592	0.207	(0.319)	0.385
18	1.50	2.70	0.615	0.207	(0.331)	0.407
19	1.58	2.40	0.547	0.207	(0.294)	0.339
20	1.67	2.70	0.615	0.207	(0.331)	0.407
21	1.75	3.30	0.752	0.207	(0.405)	0.544
22	1.83	3.10	0.706	0.207	(0.380)	0.499
23	1.92	2.90	0.660	0.207	(0.356)	0.453
24	2.00	3.00	0.683	0.207	(0.368)	0.476
25	2.08	3.10	0.706	0.207	(0.380)	0.499
26	2.17	4.20	0.957	0.207	(0.515)	0.749
27	2.25	5.00	1.139	0.207	(0.613)	0.931
28	2.33	3.50	0.797	0.207	(0.429)	0.590
29	2.42	6.80	1.549	0.207	(0.834)	1.341
30	2.50	7.30	1.663	0.207	(0.895)	1.455
31	2.58	8.20	1.867	0.207	(1.005)	1.660
32	2.67	5.90	1.344	0.207	(0.723)	1.136
33	2.75	2.00	0.455	0.207	(0.245)	0.248
34	2.83	1.80	0.410	0.207	(0.221)	0.203
35	2.92	1.80	0.410	0.207	(0.221)	0.203
36	3.00	0.60	0.137	(0.207)	0.074	0.063
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	15.7

Flood volume = Effective rainfall 1.31(In)
times area 259.5(Ac.)/[(In)/(Ft.)] = 28.3(Ac.Ft)
Total soil loss = 0.59(In)
Total soil loss = 12.721(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 1233464.5 Cubic Feet
Total soil loss = 554137.4 Cubic Feet

Peak flow rate of this hydrograph = 316.002(CFS)

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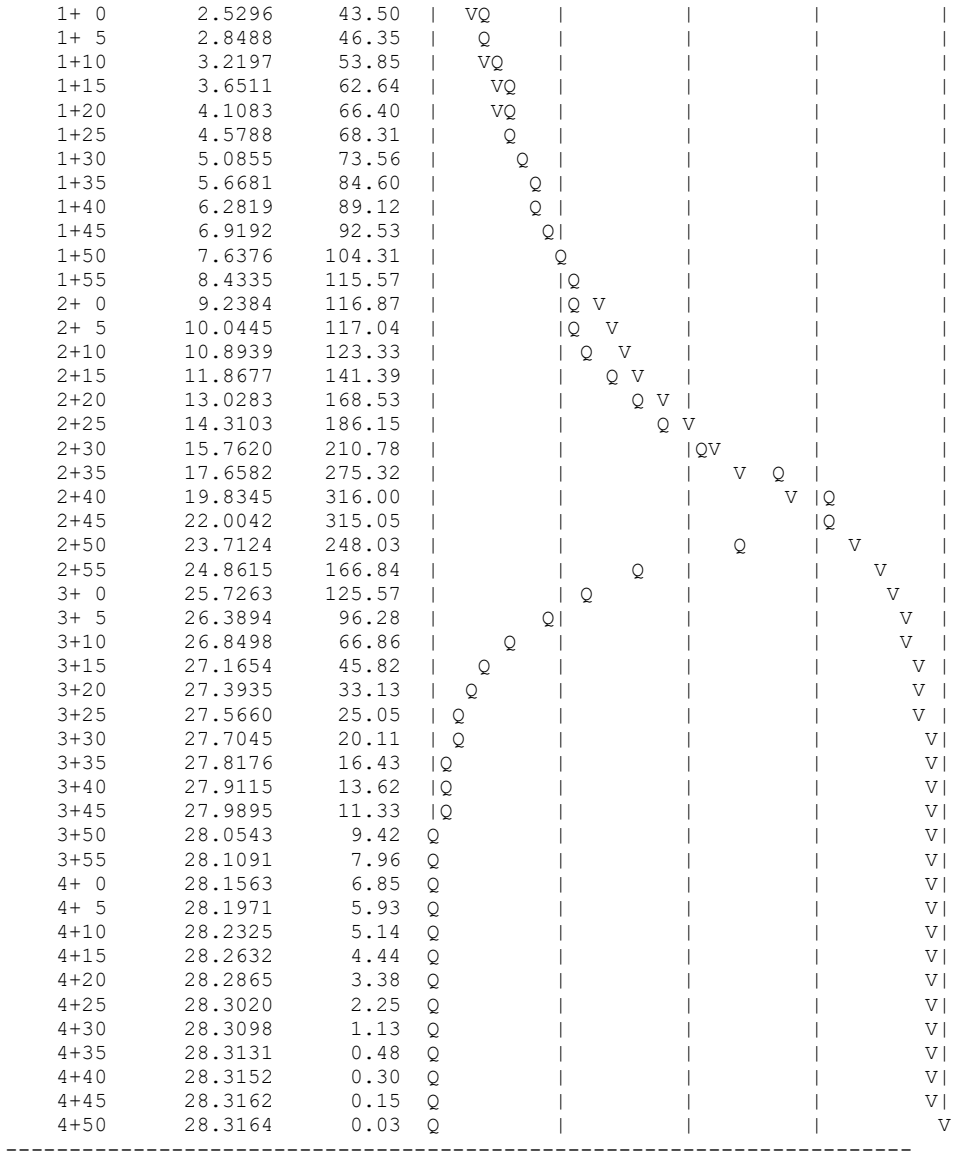
3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	100.0	200.0	300.0	400.0
0+ 5	0.0116	1.69	Q	|	|	|	|
0+10	0.0707	8.57	Q	|	|	|	|
0+15	0.2045	19.44	VQ	|	|	|	|
0+20	0.3709	24.16	V Q	|	|	|	|
0+25	0.5603	27.50	V Q	|	|	|	|
0+30	0.7854	32.69	|V Q	|	|	|	|
0+35	1.0404	37.02	|V Q	|	|	|	|
0+40	1.3199	40.59	|V Q	|	|	|	|
0+45	1.6095	42.05	| V Q	|	|	|	|
0+50	1.9202	45.12	| V Q	|	|	|	|
0+55	2.2300	44.98	| VQ	|	|	|	|



U n i t H y d r o g r a p h A n a l y s i s

Study date 08/29/23 File: a33100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6485

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

12804 Sunnymead MDP Line F and F-7
Basin A3
100-year, 3-hour Unit Hydrograph
WSP USA

Drainage Area = 19.05(Ac.) = 0.030 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.05(Ac.) = 0.030 Sq. Mi.
Length along longest watercourse = 1380.00(Ft.)
Length along longest watercourse measured to centroid = 1153.00(Ft.)
Length along longest watercourse = 0.261 Mi.
Length along longest watercourse measured to centroid = 0.218 Mi.
Difference in elevation = 10.00(Ft.)
Slope along watercourse = 38.2609 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.101 Hr.
Lag time = 6.07 Min.
25% of lag time = 1.52 Min.
40% of lag time = 2.43 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.05	1.00	19.05

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.05	1.90	36.20

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
8.030	62.63	0.500
11.020	57.04	0.500

Total Area Entered = 19.05(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
62.6	62.6	0.442	0.500	0.243	0.422	0.102
57.0	57.0	0.500	0.500	0.275	0.578	0.159
					Sum (F) =	0.262

Area averaged mean soil loss (F) (In/Hr) = 0.262
Minimum soil loss rate ((In/Hr)) = 0.131
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	82.403	9.513	1.826
2	0.167	164.806	49.812	9.563
3	0.250	247.209	23.535	4.518
4	0.333	329.612	9.450	1.814
5	0.417	412.015	4.589	0.881
6	0.500	494.419	1.616	0.310
7	0.583	576.822	0.707	0.136
8	0.667	659.225	0.536	0.103
9	0.750	741.628	0.242	0.046
		Sum = 100.000	Sum=	19.199

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max		Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.262)		0.148	0.148
2	0.17	1.30	0.296	(0.262)		0.148	0.148
3	0.25	1.10	0.251	(0.262)		0.125	0.125
4	0.33	1.50	0.342	(0.262)		0.171	0.171
5	0.42	1.50	0.342	(0.262)		0.171	0.171
6	0.50	1.80	0.410	(0.262)		0.205	0.205
7	0.58	1.50	0.342	(0.262)		0.171	0.171
8	0.67	1.80	0.410	(0.262)		0.205	0.205
9	0.75	1.80	0.410	(0.262)		0.205	0.205
10	0.83	1.50	0.342	(0.262)		0.171	0.171
11	0.92	1.60	0.365	(0.262)		0.182	0.182
12	1.00	1.80	0.410	(0.262)		0.205	0.205
13	1.08	2.20	0.502	(0.262)		0.251	0.251
14	1.17	2.20	0.502	(0.262)		0.251	0.251
15	1.25	2.20	0.502	(0.262)		0.251	0.251
16	1.33	2.00	0.456	(0.262)		0.228	0.228
17	1.42	2.60	0.593	0.262	(	0.296)	0.331
18	1.50	2.70	0.616	0.262	(	0.308)	0.354
19	1.58	2.40	0.547	0.262	(	0.274)	0.286
20	1.67	2.70	0.616	0.262	(	0.308)	0.354
21	1.75	3.30	0.752	0.262	(	0.376)	0.491
22	1.83	3.10	0.707	0.262	(	0.353)	0.445
23	1.92	2.90	0.661	0.262	(	0.331)	0.400
24	2.00	3.00	0.684	0.262	(	0.342)	0.422
25	2.08	3.10	0.707	0.262	(	0.353)	0.445
26	2.17	4.20	0.958	0.262	(	0.479)	0.696
27	2.25	5.00	1.140	0.262	(	0.570)	0.878
28	2.33	3.50	0.798	0.262	(	0.399)	0.536
29	2.42	6.80	1.550	0.262	(	0.775)	1.289
30	2.50	7.30	1.664	0.262	(	0.832)	1.403
31	2.58	8.20	1.869	0.262	(	0.935)	1.608

32	2.67	5.90	1.345	0.262	(0.673)	1.084
33	2.75	2.00	0.456	(0.262)	0.228	0.228
34	2.83	1.80	0.410	(0.262)	0.205	0.205
35	2.92	1.80	0.410	(0.262)	0.205	0.205
36	3.00	0.60	0.137	(0.262)	0.068	0.068

(Loss Rate Not Used)

Sum = 100.0 Sum = 14.8

Flood volume = Effective rainfall 1.23(In)
times area 19.1(Ac.)/[(In)/(Ft.)] = 2.0(Ac.Ft)
Total soil loss = 0.67(In)
Total soil loss = 1.056(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 85389.9 Cubic Feet
Total soil loss = 45987.0 Cubic Feet

Peak flow rate of this hydrograph = 26.951(CFS)

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3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 7.5 15.0 22.5 30.0
0+ 5	0.0019	0.27	Q
0+10	0.0135	1.69	V Q
0+15	0.0295	2.32	V Q
0+20	0.0463	2.45	V Q
0+25	0.0664	2.91	V Q
0+30	0.0884	3.19	V Q
0+35	0.1127	3.54	V Q
0+40	0.1366	3.47	V Q
0+45	0.1623	3.73	VQ
0+50	0.1884	3.79	V Q
0+55	0.2127	3.53	Q
1+ 0	0.2372	3.55	Q
1+ 5	0.2637	3.85	Q
1+10	0.2939	4.39	Q
1+15	0.3259	4.63	Q
1+20	0.3582	4.70	QV
1+25	0.3907	4.71	QV
1+30	0.4296	5.66	QV
1+35	0.4722	6.18	QV
1+40	0.5130	5.93	Q V
1+45	0.5588	6.65	Q V
1+50	0.6147	8.11	Q V
1+55	0.6718	8.29	Q V
2+ 0	0.7269	7.99	Q V
2+ 5	0.7827	8.10	Q V
2+10	0.8433	8.81	Q V
2+15	0.9236	11.65	Q V
2+20	1.0197	13.96	Q V
2+25	1.1118	13.37	Q V
2+30	1.2481	19.78	VQ
2+35	1.4152	24.27	V Q
2+40	1.6008	26.95	V Q
2+45	1.7531	22.11	Q V
2+50	1.8372	12.21	Q V
2+55	1.8886	7.46	Q V
3+ 0	1.9246	5.23	Q V
3+ 5	1.9447	2.91	Q V
3+10	1.9537	1.31	Q V
3+15	1.9578	0.59	Q V
3+20	1.9593	0.23	Q V
3+25	1.9599	0.08	Q V
3+30	1.9601	0.04	Q V
3+35	1.9603	0.02	Q V
3+40	1.9603	0.00	Q V

U n i t H y d r o g r a p h A n a l y s i s

Study date 08/29/23 File: b3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6485

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

12804 Sunnymead MDP Line F and F-7
Basin B
100-year, 3-hour Unit Hydrograph
WSP USA

Drainage Area = 7.41(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.41(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1000.00(Ft.)
Length along longest watercourse measured to centroid = 509.00(Ft.)
Length along longest watercourse = 0.189 Mi.
Length along longest watercourse measured to centroid = 0.096 Mi.
Difference in elevation = 4.60(Ft.)
Slope along watercourse = 24.2880 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.043 Hr.
Lag time = 2.57 Min.
25% of lag time = 0.64 Min.
40% of lag time = 1.03 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.41	1.00	7.41

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.41	1.90	14.08

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.410	62.89	0.800

Total Area Entered = 7.41(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
62.9	62.9	0.439	0.800	0.123	1.000	0.123
					Sum (F) =	0.123

Area averaged mean soil loss (F) (In/Hr) = 0.123
Minimum soil loss rate ((In/Hr)) = 0.061
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.260

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	194.263	41.109	3.070
2	0.167	388.526	50.555	3.775
3	0.250	582.788	7.102	0.530
4	0.333	777.051	1.233	0.092
			Sum = 100.000	Sum= 7.468

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.123)	0.077	0.219
2	0.17	1.30	0.296	(0.123)	0.077	0.219
3	0.25	1.10	0.251	(0.123)	0.065	0.186
4	0.33	1.50	0.342	(0.123)	0.089	0.253
5	0.42	1.50	0.342	(0.123)	0.089	0.253
6	0.50	1.80	0.410	(0.123)	0.107	0.304
7	0.58	1.50	0.342	(0.123)	0.089	0.253
8	0.67	1.80	0.410	(0.123)	0.107	0.304
9	0.75	1.80	0.410	(0.123)	0.107	0.304
10	0.83	1.50	0.342	(0.123)	0.089	0.253
11	0.92	1.60	0.365	(0.123)	0.095	0.270
12	1.00	1.80	0.410	(0.123)	0.107	0.304
13	1.08	2.20	0.502	0.123	(0.130)	0.379
14	1.17	2.20	0.502	0.123	(0.130)	0.379
15	1.25	2.20	0.502	0.123	(0.130)	0.379
16	1.33	2.00	0.456	(0.123)	0.119	0.337
17	1.42	2.60	0.593	0.123	(0.154)	0.470
18	1.50	2.70	0.616	0.123	(0.160)	0.493
19	1.58	2.40	0.547	0.123	(0.142)	0.424
20	1.67	2.70	0.616	0.123	(0.160)	0.493
21	1.75	3.30	0.752	0.123	(0.196)	0.630
22	1.83	3.10	0.707	0.123	(0.184)	0.584
23	1.92	2.90	0.661	0.123	(0.172)	0.538
24	2.00	3.00	0.684	0.123	(0.178)	0.561
25	2.08	3.10	0.707	0.123	(0.184)	0.584
26	2.17	4.20	0.958	0.123	(0.249)	0.835
27	2.25	5.00	1.140	0.123	(0.296)	1.017
28	2.33	3.50	0.798	0.123	(0.207)	0.675
29	2.42	6.80	1.550	0.123	(0.403)	1.427
30	2.50	7.30	1.664	0.123	(0.433)	1.541
31	2.58	8.20	1.870	0.123	(0.486)	1.747
32	2.67	5.90	1.345	0.123	(0.350)	1.222
33	2.75	2.00	0.456	(0.123)	0.119	0.337
34	2.83	1.80	0.410	(0.123)	0.107	0.304
35	2.92	1.80	0.410	(0.123)	0.107	0.304
36	3.00	0.60	0.137	(0.123)	0.036	0.101
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	18.9

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      Flood volume = Effective rainfall      1.57(In)
       times area       7.4(Ac.)/[(In)/(Ft.)] =       1.0(Ac.Ft)
      Total soil loss =      0.33(In)
      Total soil loss =     0.202(Ac.Ft)
      Total rainfall =      1.90(In)
      Flood volume =       42324.9 Cubic Feet
      Total soil loss =        8780.2 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     12.008(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
      ---------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
 ------------------------------------------------------------------------
   0+ 5       0.0046      0.67  VQ        |         |         |         |
   0+10       0.0150      1.50  V  Q      |         |         |         |
   0+15       0.0254      1.51  |V Q      |         |         |         |
   0+20       0.0365      1.61  |V Q      |         |         |         |
   0+25       0.0493      1.85  | VQ      |         |         |         |
   0+30       0.0633      2.04  | V Q     |         |         |         |
   0+35       0.0777      2.08  |  VQ     |         |         |         |
   0+40       0.0920      2.07  |  VQ     |         |         |         |
   0+45       0.1074      2.24  |   Q     |         |         |         |
   0+50       0.1219      2.11  |   QV    |         |         |         |
   0+55       0.1355      1.97  |  Q V    |         |         |         |
   1+ 0       0.1501      2.11  |   Q V   |         |         |         |
   1+ 5       0.1672      2.48  |   Q V   |         |         |         |
   1+10       0.1863      2.78  |    Q V  |         |         |         |
   1+15       0.2057      2.82  |    Q  V |         |         |         |
   1+20       0.2244      2.70  |    Q   V|         |         |         |
   1+25       0.2447      2.95  |    Q    V         |         |         |
   1+30       0.2688      3.50  |      Q  |V        |         |         |
   1+35       0.2925      3.44  |     Q   | V       |         |         |
   1+40       0.3161      3.42  |     Q   |  V      |         |         |
   1+45       0.3441      4.07  |       Q |   V     |         |         |
   1+50       0.3749      4.47  |       Q |    V    |         |         |
   1+55       0.4041      4.24  |       Q |     V   |         |         |
   2+ 0       0.4325      4.12  |       Q |      V  |         |         |
   2+ 5       0.4618      4.25  |       Q |        V|         |         |
   2+10       0.4970      5.12  |         Q         V         |         |
   2+15       0.5427      6.64  |          |  Q      | V       |         |
   2+20       0.5869      6.41  |          | Q       |   V     |         |
   2+25       0.6389      7.55  |          |    Q    |     V   |         |
   2+30       0.7118     10.58  |          |         |Q       V|         |
   2+35       0.7945     12.01  |          |         |   Q     | V       |
   2+40       0.8723     11.30  |          |         | Q       |    V    |
   2+45       0.9186      6.72  |          |  Q      |         |      V  |
   2+50       0.9394      3.02  |     Q    |         |         |       V |
   2+55       0.9557      2.37  |   Q      |         |         |        V|
   3+ 0       0.9671      1.65  |  Q       |         |         |        V|
   3+ 5       0.9710      0.57  |Q         |         |         |        V|
   3+10       0.9716      0.08  Q          |         |         |        V|
   3+15       0.9716      0.01  Q          |         |         |         V
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U n i t H y d r o g r a p h A n a l y s i s

Study date 08/29/23 File: c3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6485

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

12804 Sunnymead MDP Line F and F-7
Basin C
100-year, 3-hour Unit Hydrograph
WSP USA

Drainage Area = 54.00(Ac.) = 0.084 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 54.00(Ac.) = 0.084 Sq. Mi.
Length along longest watercourse = 1995.00(Ft.)
Length along longest watercourse measured to centroid = 345.00(Ft.)
Length along longest watercourse = 0.378 Mi.
Length along longest watercourse measured to centroid = 0.065 Mi.
Difference in elevation = 20.70(Ft.)
Slope along watercourse = 54.7850 Ft./Mi.
Average Manning's 'N' = 0.017
Lag time = 0.047 Hr.
Lag time = 2.80 Min.
25% of lag time = 0.70 Min.
40% of lag time = 1.12 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
54.00	1.00	54.00

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
54.00	1.90	102.60

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
14.060	56.00	0.900
8.770	59.00	0.670

	6.360	78.00	0.000
	1.730	86.00	0.000
	1.340	87.00	0.100
	2.060	79.00	0.100
	3.800	56.00	0.670
	15.880	56.00	0.500

Total Area Entered = 54.00(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.900	0.097	0.260	0.025
59.0	59.0	0.480	0.670	0.191	0.162	0.031
78.0	78.0	0.268	0.000	0.268	0.118	0.032
86.0	86.0	0.176	0.000	0.176	0.032	0.006
87.0	87.0	0.164	0.100	0.149	0.025	0.004
79.0	79.0	0.256	0.100	0.233	0.038	0.009
56.0	56.0	0.511	0.670	0.203	0.070	0.014
56.0	56.0	0.511	0.500	0.281	0.294	0.083
					Sum (F) =	0.203

Area averaged mean soil loss (F) (In/Hr) = 0.203
Minimum soil loss rate ((In/Hr)) = 0.101
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.388

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	178.384	37.658	20.494
2	0.167	356.768	51.995	28.297
3	0.250	535.153	8.649	4.707
4	0.333	713.537	1.698	0.924
			Sum = 100.000	Sum= 54.422

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max		Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.203)		0.115	0.181
2	0.17	1.30	0.296	(0.203)		0.115	0.181
3	0.25	1.10	0.251	(0.203)		0.097	0.153
4	0.33	1.50	0.342	(0.203)		0.133	0.209
5	0.42	1.50	0.342	(0.203)		0.133	0.209
6	0.50	1.80	0.410	(0.203)		0.159	0.251
7	0.58	1.50	0.342	(0.203)		0.133	0.209
8	0.67	1.80	0.410	(0.203)		0.159	0.251
9	0.75	1.80	0.410	(0.203)		0.159	0.251
10	0.83	1.50	0.342	(0.203)		0.133	0.209
11	0.92	1.60	0.365	(0.203)		0.142	0.223
12	1.00	1.80	0.410	(0.203)		0.159	0.251
13	1.08	2.20	0.501	(0.203)		0.195	0.307
14	1.17	2.20	0.501	(0.203)		0.195	0.307
15	1.25	2.20	0.501	(0.203)		0.195	0.307
16	1.33	2.00	0.456	(0.203)		0.177	0.279
17	1.42	2.60	0.593	0.203	(	0.230)	0.390
18	1.50	2.70	0.615	0.203	(	0.239)	0.413
19	1.58	2.40	0.547	0.203	(	0.212)	0.344
20	1.67	2.70	0.615	0.203	(	0.239)	0.413
21	1.75	3.30	0.752	0.203	(	0.292)	0.549
22	1.83	3.10	0.707	0.203	(	0.274)	0.504
23	1.92	2.90	0.661	0.203	(	0.256)	0.458
24	2.00	3.00	0.684	0.203	(	0.265)	0.481

25	2.08	3.10	0.707	0.203	(0.274)	0.504	
26	2.17	4.20	0.957	0.203	(0.371)	0.755	
27	2.25	5.00	1.140	0.203	(0.442)	0.937	
28	2.33	3.50	0.798	0.203	(0.310)	0.595	
29	2.42	6.80	1.550	0.203	(0.601)	1.347	
30	2.50	7.30	1.664	0.203	(0.646)	1.461	
31	2.58	8.20	1.869	0.203	(0.725)	1.666	
32	2.67	5.90	1.345	0.203	(0.522)	1.142	
33	2.75	2.00	0.456	(0.203)	0.177	0.279	
34	2.83	1.80	0.410	(0.203)	0.159	0.251	
35	2.92	1.80	0.410	(0.203)	0.159	0.251	
36	3.00	0.60	0.137	(0.203)	0.053	0.084	

(Loss Rate Not Used)

Sum = 100.0 Sum = 16.6

Flood volume = Effective rainfall 1.38(In)
times area 54.0(Ac.)/[(In)/(Ft.)] = 6.2(Ac.Ft)
Total soil loss = 0.52(In)
Total soil loss = 2.322(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 271224.3 Cubic Feet
Total soil loss = 101125.7 Cubic Feet

Peak flow rate of this hydrograph = 82.429(CFS)

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3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	22.5	45.0	67.5	90.0
0+ 5	0.0256	3.72	VQ				
0+10	0.0866	8.85	V Q				
0+15	0.1495	9.13	V Q				
0+20	0.2160	9.66	V Q				
0+25	0.2925	11.11	V Q				
0+30	0.3765	12.20	V Q				
0+35	0.4631	12.58	V Q				
0+40	0.5489	12.45	V Q				
0+45	0.6417	13.48	VQ				
0+50	0.7297	12.78	VQ				
0+55	0.8117	11.92	Q				
1+ 0	0.8991	12.69	Q				
1+ 5	1.0000	14.65	Q				
1+10	1.1127	16.37	Q				
1+15	1.2275	16.66	Q				
1+20	1.3386	16.14	QV				
1+25	1.4600	17.62	Q V				
1+30	1.6052	21.09	QV				
1+35	1.7487	20.83	Q V				
1+40	1.8900	20.51	Q V				
1+45	2.0618	24.95	Q V				
1+50	2.2556	28.14	Q V				
1+55	2.4390	26.63	Q V				
2+ 0	2.6161	25.72	Q V				
2+ 5	2.7991	26.57	Q V				
2+10	3.0224	32.42	Q V				
2+15	3.3212	43.39	Q V				
2+20	3.6156	42.74	Q V				
2+25	3.9570	49.58	Q V				
2+30	4.4513	71.77	V Q				
2+35	5.0190	82.43	V Q				
2+40	5.5612	78.72	QV				
2+45	5.8866	47.25	Q V				
2+50	6.0241	19.97	Q V				
2+55	6.1248	14.63	Q V				
3+ 0	6.1955	10.27	Q V				
3+ 5	6.2216	3.78	Q V				
3+10	6.2259	0.63	Q V				

3+15	6.2265	0.08	Q	|	|	|	V

U n i t H y d r o g r a p h A n a l y s i s

Study date 08/29/23 File: d3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6485

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

12804 Sunnymead Line F and F-7
Basin D
100-year, 3-hour Unit Hydrograph
WSP USA

Drainage Area = 48.62(Ac.) = 0.076 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 48.62(Ac.) = 0.076 Sq. Mi.
Length along longest watercourse = 3366.00(Ft.)
Length along longest watercourse measured to centroid = 1016.00(Ft.)
Length along longest watercourse = 0.637 Mi.
Length along longest watercourse measured to centroid = 0.192 Mi.
Difference in elevation = 21.00(Ft.)
Slope along watercourse = 32.9412 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.083 Hr.
Lag time = 5.01 Min.
25% of lag time = 1.25 Min.
40% of lag time = 2.00 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
48.62	1.00	48.62

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
48.62	1.90	92.38

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
12.420	56.00	0.500
33.950	69.00	0.500

2.250	75.00	0.500

Total Area Entered = 48.62(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.255	0.072
69.0	69.0	0.373	0.500	0.205	0.698	0.143
75.0	75.0	0.303	0.500	0.167	0.046	0.008
					Sum (F) =	0.223

Area averaged mean soil loss (F) (In/Hr) = 0.223
Minimum soil loss rate ((In/Hr)) = 0.111
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	99.808	14.349	7.031
2	0.167	199.616	55.705	27.295
3	0.250	299.424	18.469	9.050
4	0.333	399.232	7.459	3.655
5	0.417	499.040	2.483	1.216
6	0.500	598.848	0.852	0.418
7	0.583	698.656	0.554	0.271
8	0.667	798.464	0.129	0.063
			Sum = 100.000	Sum= 49.000

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max		Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.223)	0.148	0.148
2	0.17	1.30	0.296	(0.223)	0.148	0.148
3	0.25	1.10	0.251	(0.223)	0.125	0.125
4	0.33	1.50	0.342	(0.223)	0.171	0.171
5	0.42	1.50	0.342	(0.223)	0.171	0.171
6	0.50	1.80	0.410	(0.223)	0.205	0.205
7	0.58	1.50	0.342	(0.223)	0.171	0.171
8	0.67	1.80	0.410	(0.223)	0.205	0.205
9	0.75	1.80	0.410	(0.223)	0.205	0.205
10	0.83	1.50	0.342	(0.223)	0.171	0.171
11	0.92	1.60	0.365	(0.223)	0.182	0.182
12	1.00	1.80	0.410	(0.223)	0.205	0.205
13	1.08	2.20	0.501	0.223	(0.251)	0.279
14	1.17	2.20	0.501	0.223	(0.251)	0.279
15	1.25	2.20	0.501	0.223	(0.251)	0.279
16	1.33	2.00	0.456	0.223	(0.228)	0.233
17	1.42	2.60	0.593	0.223	(0.296)	0.370
18	1.50	2.70	0.615	0.223	(0.308)	0.393
19	1.58	2.40	0.547	0.223	(0.274)	0.324
20	1.67	2.70	0.615	0.223	(0.308)	0.393
21	1.75	3.30	0.752	0.223	(0.376)	0.530
22	1.83	3.10	0.707	0.223	(0.353)	0.484
23	1.92	2.90	0.661	0.223	(0.331)	0.438
24	2.00	3.00	0.684	0.223	(0.342)	0.461
25	2.08	3.10	0.707	0.223	(0.353)	0.484
26	2.17	4.20	0.957	0.223	(0.479)	0.735
27	2.25	5.00	1.140	0.223	(0.570)	0.917
28	2.33	3.50	0.798	0.223	(0.399)	0.575
29	2.42	6.80	1.550	0.223	(0.775)	1.327
30	2.50	7.30	1.664	0.223	(0.832)	1.441

31	2.58	8.20	1.869	0.223	(0.935)	1.647	
32	2.67	5.90	1.345	0.223	(0.672)	1.122	
33	2.75	2.00	0.456	0.223	(0.228)	0.233	
34	2.83	1.80	0.410	(0.223)	0.205	0.205	
35	2.92	1.80	0.410	(0.223)	0.205	0.205	
36	3.00	0.60	0.137	(0.223)	0.068	0.068	

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.5

Flood volume = Effective rainfall 1.29(In)
times area 48.6(Ac.)/[(In)/(Ft.)] = 5.2(Ac.Ft)
Total soil loss = 0.61(In)
Total soil loss = 2.452(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 228440.7 Cubic Feet
Total soil loss = 106820.1 Cubic Feet

Peak flow rate of this hydrograph = 72.080(CFS)

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3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 20.0 40.0 60.0 80.0
0+ 5	0.0072	1.04	Q
0+10	0.0422	5.09	V Q
0+15	0.0854	6.27	V Q
0+20	0.1302	6.51	V Q
0+25	0.1835	7.73	|V Q
0+30	0.2411	8.36	|V Q
0+35	0.3046	9.23	| V Q
0+40	0.3660	8.90	| V Q
0+45	0.4325	9.67	| VQ
0+50	0.4991	9.66	| VQ
0+55	0.5605	8.91	| Q
1+ 0	0.6232	9.11	| Q
1+ 5	0.6937	10.24	| Q
1+10	0.7795	12.46	| VQ
1+15	0.8705	13.21	| Q
1+20	0.9613	13.19	| QV
1+25	1.0509	13.00	| Q V
1+30	1.1647	16.52	| Q
1+35	1.2870	17.76	| QV|
1+40	1.4042	17.03	| Q V
1+45	1.5383	19.47	| Q|V
1+50	1.6990	23.32	| |QV
1+55	1.8588	23.21	| |Q V
2+ 0	2.0122	22.28	| |Q V
2+ 5	2.1683	22.66	| |Q V
2+10	2.3412	25.10	| | Q V
2+15	2.5718	33.49	| | Q V|
2+20	2.8365	38.42	| | Q|V
2+25	3.0911	36.97	| | Q | V
2+30	3.4781	56.20	| | | V Q |
2+35	3.9372	66.65	| | | V Q
2+40	4.4336	72.08	| | | | V Q
2+45	4.8098	54.62	| | Q | V
2+50	4.9924	26.52	| | Q | V
2+55	5.1044	16.26	| Q | V
3+ 0	5.1824	11.32	| Q | V|
3+ 5	5.2221	5.77	| Q | V|
3+10	5.2368	2.13	|Q | V|
3+15	5.2417	0.72	Q | V|
3+20	5.2434	0.24	Q | V|
3+25	5.2440	0.10	Q | V|
3+30	5.2442	0.03	Q | V|
3+35	5.2443	0.00	Q | V|

U n i t H y d r o g r a p h A n a l y s i s

Study date 08/29/23 File: e3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6485

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

12804 Sunnymead Line F and F-7
Basin E
100-year, 3-hour Unit Hydrograph
WSP USA

Drainage Area = 32.00(Ac.) = 0.050 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 32.00(Ac.) = 0.050 Sq. Mi.
Length along longest watercourse = 2099.00(Ft.)
Length along longest watercourse measured to centroid = 1050.00(Ft.)
Length along longest watercourse = 0.398 Mi.
Length along longest watercourse measured to centroid = 0.199 Mi.
Difference in elevation = 17.50(Ft.)
Slope along watercourse = 44.0210 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.067 Hr.
Lag time = 4.01 Min.
25% of lag time = 1.00 Min.
40% of lag time = 1.60 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
32.00	1.00	32.00

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
32.00	1.90	60.80

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.690	56.00	0.500
28.310	69.00	0.500

Total Area Entered = 32.00(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.115	0.032
69.0	69.0	0.373	0.500	0.205	0.885	0.181
					Sum (F) =	0.214

Area averaged mean soil loss (F) (In/Hr) = 0.214
Minimum soil loss rate ((In/Hr)) = 0.107
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	124.623	22.929	7.395
2	0.167	249.245	55.898	18.027
3	0.250	373.868	14.933	4.816
4	0.333	498.490	4.511	1.455
5	0.417	623.113	1.128	0.364
6	0.500	747.735	0.601	0.194
			Sum = 100.000	Sum= 32.250

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max		Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.214)		0.148	0.148
2	0.17	1.30	0.296	(0.214)		0.148	0.148
3	0.25	1.10	0.251	(0.214)		0.125	0.125
4	0.33	1.50	0.342	(0.214)		0.171	0.171
5	0.42	1.50	0.342	(0.214)		0.171	0.171
6	0.50	1.80	0.410	(0.214)		0.205	0.205
7	0.58	1.50	0.342	(0.214)		0.171	0.171
8	0.67	1.80	0.410	(0.214)		0.205	0.205
9	0.75	1.80	0.410	(0.214)		0.205	0.205
10	0.83	1.50	0.342	(0.214)		0.171	0.171
11	0.92	1.60	0.365	(0.214)		0.182	0.182
12	1.00	1.80	0.410	(0.214)		0.205	0.205
13	1.08	2.20	0.502	0.214	(	0.251)	0.288
14	1.17	2.20	0.502	0.214	(	0.251)	0.288
15	1.25	2.20	0.502	0.214	(	0.251)	0.288
16	1.33	2.00	0.456	0.214	(	0.228)	0.242
17	1.42	2.60	0.593	0.214	(	0.296)	0.379
18	1.50	2.70	0.616	0.214	(	0.308)	0.402
19	1.58	2.40	0.547	0.214	(	0.274)	0.333
20	1.67	2.70	0.616	0.214	(	0.308)	0.402
21	1.75	3.30	0.752	0.214	(	0.376)	0.539
22	1.83	3.10	0.707	0.214	(	0.353)	0.493
23	1.92	2.90	0.661	0.214	(	0.331)	0.447
24	2.00	3.00	0.684	0.214	(	0.342)	0.470
25	2.08	3.10	0.707	0.214	(	0.353)	0.493
26	2.17	4.20	0.957	0.214	(	0.479)	0.744
27	2.25	5.00	1.140	0.214	(	0.570)	0.926
28	2.33	3.50	0.798	0.214	(	0.399)	0.584
29	2.42	6.80	1.550	0.214	(	0.775)	1.336
30	2.50	7.30	1.664	0.214	(	0.832)	1.450
31	2.58	8.20	1.869	0.214	(	0.935)	1.656
32	2.67	5.90	1.345	0.214	(	0.673)	1.131
33	2.75	2.00	0.456	0.214	(	0.228)	0.242
34	2.83	1.80	0.410	(0.214)		0.205	0.205

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35   2.92     1.80      0.410       (  0.214)       0.205        0.205
36   3.00     0.60      0.137       (  0.214)       0.068        0.068
             (Loss Rate Not Used)
   Sum =     100.0                                  Sum =    15.7
      Flood volume = Effective rainfall      1.31(In)
       times area      32.0(Ac.)/[(In)/(Ft.)] =       3.5(Ac.Ft)
      Total soil loss =      0.59(In)
      Total soil loss =     1.573(Ac.Ft)
      Total rainfall =      1.90(In)
      Flood volume =      152167.0 Cubic Feet
      Total soil loss =       68506.1 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     47.555(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0       12.5      25.0      37.5      50.0
 ------------------------------------------------------------------------
   0+ 5       0.0076      1.10  Q         |         |         |         |
   0+10       0.0335      3.77  V  Q      |         |         |         |
   0+15       0.0632      4.31  V  Q      |         |         |         |
   0+20       0.0939      4.46  |V Q      |         |         |         |
   0+25       0.1299      5.22  |V  Q     |         |         |         |
   0+30       0.1691      5.69  |V  Q     |         |         |         |
   0+35       0.2112      6.11  | V Q     |         |         |         |
   0+40       0.2520      5.93  | V Q     |         |         |         |
   0+45       0.2963      6.44  |  V Q    |         |         |         |
   0+50       0.3398      6.31  |  V Q    |         |         |         |
   0+55       0.3799      5.82  |   Q     |         |         |         |
   1+ 0       0.4214      6.04  |   Q     |         |         |         |
   1+ 5       0.4701      7.07  |    Q    |         |         |         |
   1+10       0.5299      8.67  |     Q   |         |         |         |
   1+15       0.5926      9.10  |     VQ  |         |         |         |
   1+20       0.6539      8.90  |      Q  |         |         |         |
   1+25       0.7167      9.12  |      QV |         |         |         |
   1+30       0.7962     11.55  |        Q|         |         |         |
   1+35       0.8792     12.05  |        QV         |         |         |
   1+40       0.9592     11.62  |        QV         |         |         |
   1+45       1.0529     13.61  |         Q V       |         |         |
   1+50       1.1631     16.00  |         | QV      |         |         |
   1+55       1.2704     15.58  |         | Q V     |         |         |
   2+ 0       1.3731     14.92  |         |Q   V    |         |         |
   2+ 5       1.4783     15.27  |         | Q   V   |         |         |
   2+10       1.5995     17.59  |         |   Q   V |         |         |
   2+15       1.7619     23.58  |         |       Q V         |         |
   2+20       1.9381     25.58  |         |         Q V       |         |
   2+25       2.1188     26.24  |         |         Q   V     |         |
   2+30       2.3899     39.36  |         |         |      V  |Q        |
   2+35       2.7079     46.18  |         |         |         |V    Q   |
   2+40       3.0354     47.56  |         |         |         |   V   Q |
   2+45       3.2619     32.88  |         |         |     Q   |      V  |
   2+50       3.3620     14.53  |         |Q        |         |       V |
   2+55       3.4234      8.92  |       Q |         |         |        V|
   3+ 0       3.4666      6.28  |    Q    |         |         |        V|
   3+ 5       3.4861      2.83  | Q       |         |         |        V|
   3+10       3.4913      0.75  Q         |         |         |        V|
   3+15       3.4927      0.21  Q         |         |         |        V|
   3+20       3.4932      0.06  Q         |         |         |        V|
   3+25       3.4933      0.01  Q         |         |         |         V
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APPENDIX F

BASINS STAGE STORAGE AND FLOW RATING CURVE OUTPUT FILES

BASIN STAGE VOLUMES ABOVE CHANNEL						
Number	Minimum Elevation	Maximum Elevation	Area (sq.ft.)	Color	Volume (cu.ft.)	Volume (cu.yd.)
1	0.00	0.12	339.52		3578.86	132.55
2	0.12	0.62	1407.46		14474.68	536.10
3	0.62	1.12	1393.06		13774.37	510.16
4	1.12	1.62	1375.70		13082.07	484.52
5	1.62	2.12	1354.82		12399.36	459.24
6	2.12	2.62	1334.07		11727.15	434.34
7	2.62	3.12	1313.28		11065.30	409.83
8	3.12	3.62	1292.29		10413.91	385.70
9	3.62	4.12	1253.85		9776.26	362.08
10	4.12	4.62	1226.02		9157.39	339.16
11	4.62	5.12	1204.84		8549.68	316.65
12	5.12	5.62	1183.73		7952.54	294.54
13	5.62	6.12	4532.74		7040.39	260.76
14	6.12	6.62	8542.81		2991.48	110.80
15	6.62	6.98	2239.42		299.45	11.09

Stage-Storage Volume Analysis SMART Basin								
Minimum Contour	Maximum Contour	Depth (ft)	2D Area (Sq. Ft.)	Volume (Cu. Ft.)	Volume (Cu. Yd.)	Cumulative Volume (Cu. Ft.)	Cumulative Volume (Cu. Yd.)	Cumulative Volume (Ac. Ft)
1614.38	1614.88	0.5	3456.2592	1728.1296	64.00	1728.1296	64.00	0.0397
1614.88	1615.38	0.5	3456.2592	1728.1296	64.00	3456.2592	128.01	0.0793
1615.38	1615.88	0.5	3456.2592	1728.1296	64.00	5184.3888	192.01	0.1190
1615.88	1616.38	0.5	3456.2592	1728.1296	64.00	6912.5184	256.02	0.1587
1616.38	1616.88	0.5	3456.2592	1728.1296	64.00	8640.648	320.02	0.1984
1616.88	1617.38	0.5	3456.2592	1728.1296	64.00	10368.7776	384.03	0.2380
1617.38	1617.88	0.5	3456.2592	1728.1296	64.00	12096.9072	448.03	0.2777
1617.88	1618.38	0.5	3456.2592	1728.1296	64.00	13825.0368	512.04	0.3174
1618.38	1618.88	0.5	3456.2592	1728.1296	64.00	15553.1664	576.04	0.3571
1618.88	1619.38	0.5	3456.2592	1728.1296	64.00	17281.296	640.05	0.3967
1619.38	1619.88	0.5	3456.2592	1728.1296	64.00	19009.4256	704.05	0.4364
1619.88	1620.38	0.5	3456.2592	1728.1296	64.00	20737.5552	768.06	0.4761
1620.38	1620.88	0.5	3456.2592	1728.1296	64.00	22465.6848	832.06	0.5157
1620.88	1621.38	0.5	3456.2592	1728.1296	64.00	24193.8144	896.07	0.5554
1621.38	1621.88	0.5	3456.2592	1728.1296	64.00	25921.944	960.07	0.5951
1621.88	1622.38	0.5	3456.2592	1728.1296	64.00	27650.0736	1024.08	0.6348
1622.38	1622.88	0.5	3456.2592	1728.1296	64.00	29378.2032	1088.08	0.6744
1622.88	1623.38	0.5	3456.2592	887.014064	32.85	30265.21726	1120.93	0.6948
1623.38	1623.88	0.5	8542.81	2991.48	110.80	33256.69726	1231.73	0.7635
1623.88	1624.38	0.5	4532.74	7040.39	260.76	40297.08726	1492.48	0.9251
1624.38	1624.88	0.5	1183.73	7952.54	294.54	48249.62726	1787.02	1.1077
1624.88	1625.38	0.5	1204.84	8549.68	316.65	56799.30726	2103.68	1.3039
1625.38	1625.88	0.5	1226.02	9157.39	339.16	65956.69726	2442.84	1.5142
1625.88	1626.38	0.5	1253.85	9776.26	362.08	75732.95726	2804.92	1.7386
1626.38	1626.88	0.5	1292.29	10413.91	385.70	86146.86726	3190.62	1.9777
1626.88	1627.38	0.5	1313.28	11065.3	409.83	97212.16726	3600.45	2.2317
1627.38	1627.88	0.5	1334.07	11727.15	434.34	108939.3173	4034.79	2.5009
1627.88	1628.38	0.5	1354.82	12399.36	459.24	121338.6773	4494.03	2.7856
1628.38	1628.88	0.5	1375.7	13082.07	484.52	134420.7473	4978.55	3.0859
1628.88	1629.38	0.5	1393.06	13774.37	510.16	148195.1173	5488.71	3.4021
1629.38	1629.88	0.5	1407.46	14474.68	536.10	162669.7973	6024.81	3.7344
1629.88	1630	0.12	339.52	3578.86	132.55	166248.6573	6157.36	3.8165

Area and Volumes within Channel

SCALE 1"=20'

0 10' 20' 40'

GRAPHIC SCALE

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SAN BERNARDINO, CA 92408
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SMART BASIN STAGE–STORAGE RELATIONSHIP EXHIBIT

Culvert Calculator Report
SMART Basin Rating Curve-60in

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	1,630.00	ft	Headwater Depth/Height	3.12	
Computed Headwater Eleva	1,630.00	ft	Discharge	321.41	cfs
Inlet Control HW Elev.	1,628.39	ft	Tailwater Elevation	1,614.38	ft
Outlet Control HW Elev.	1,630.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	1,614.38	ft	Downstream Invert	1,613.28	ft
Length	365.95	ft	Constructed Slope	0.003006	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	4.74	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	4.74	ft
Velocity Downstream	16.70	ft/s	Critical Slope	0.013183	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

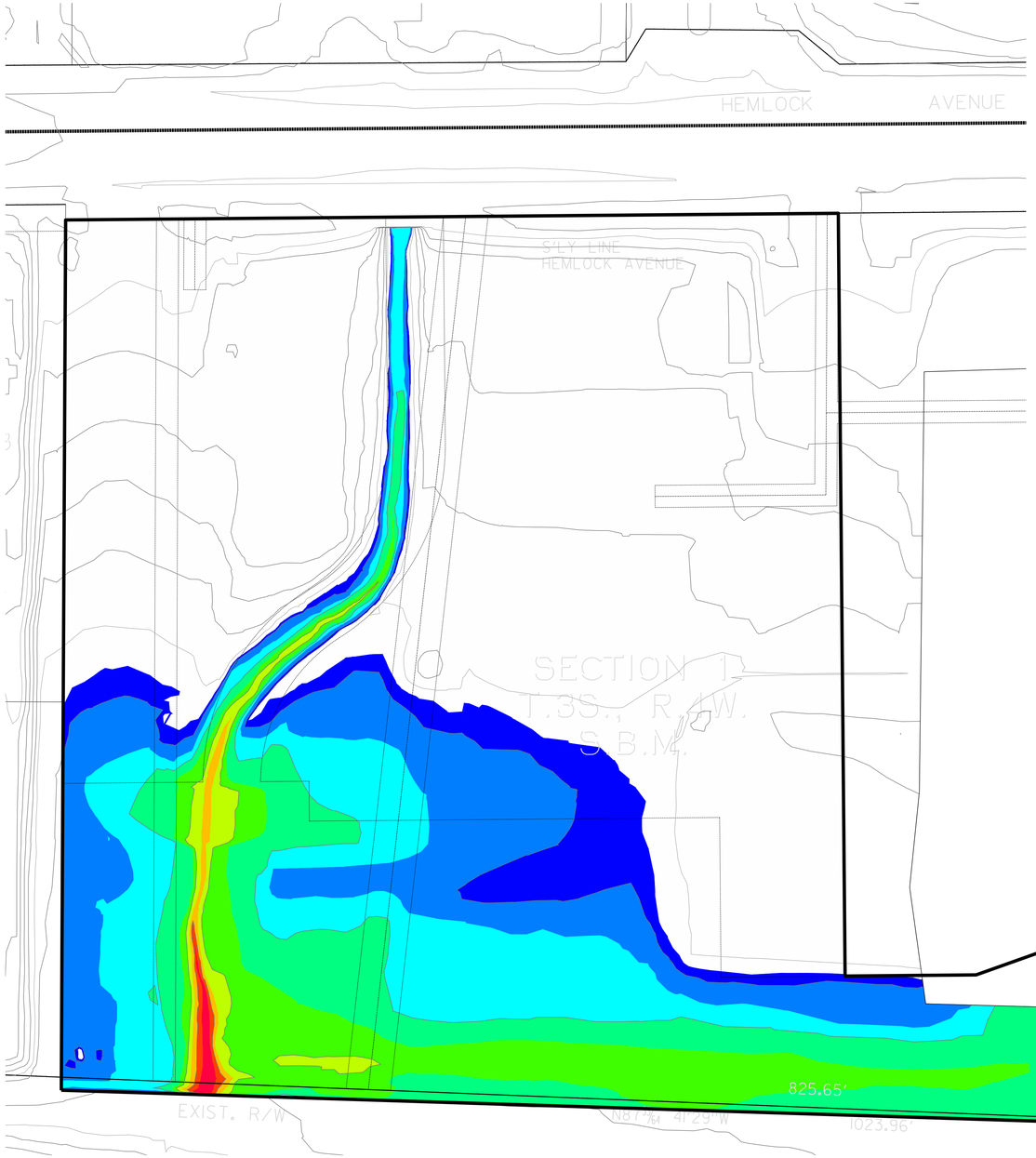
Outlet Control Properties					
Outlet Control HW Elev.	1,630.00	ft	Upstream Velocity Head	4.16	ft
Ke	0.50		Entrance Loss	2.08	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,628.39	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	19.6	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
SMART Basin Rating Curve-60in

Range Data:			
	Minimum	Maximum	Increment
Allowable HW E	1,614.38	1,630.38	0.50 ft

HW Elev. (ft)	Discharge (cfs)
1,614.38	0.00
1,614.88	1.55
1,615.38	5.99
1,615.88	13.06
1,616.38	22.54
1,616.88	34.26
1,617.38	48.02
1,617.88	63.60
1,618.38	80.72
1,618.88	98.99
1,619.38	117.83
1,619.88	136.46
1,620.38	153.96
1,620.88	169.69
1,621.38	181.86
1,621.88	191.40
1,622.38	200.85
1,622.88	210.13
1,623.38	219.20
1,623.88	228.06
1,624.38	236.70
1,624.88	245.14
1,625.38	253.38
1,625.88	261.43
1,626.38	269.29
1,626.88	276.98
1,627.38	284.50
1,627.88	291.85
1,628.38	299.05
1,628.88	306.11
1,629.38	313.02
1,629.88	319.80
1,630.38	326.45



BASIN STAGE VOLUMES						
Number	Minimum Elevation	Maximum Elevation	Area (sq.ft.)	Color	Volume (cu.ft.)	Volume (cu.yd.)
1	-4.33	-4.17	72.22		12.5	0.46
2	-4.17	-4.01	144.45		25	0.93
3	-4.01	-3.85	216.67		51.15	1.89
4	-3.85	-3.35	242.48		165.51	6.13
5	-3.35	-2.85	555.67		322.79	11.96
6	-2.85	-2.35	1619.19		814.45	30.17
7	-2.35	-1.85	9330.57		3370.96	124.85
8	-1.85	-1.35	17683.14		10381.08	384.48
9	-1.35	-0.85	18067.63		19372.96	717.52
10	-0.85	-0.35	17816.73		28311.91	1048.59
11	-0.35	0.00	8610.94		24570.44	910.02

Storage Volume Analysis North of SR-60 (TownGate Appartments).					
Minimum Contour	Maximum Contour	2D Area (Sq. Ft.)	Volume (Cu. Ft.)	Volume (Cu. Ft.)	Cumulative (Ac.Ft)
1639.23	1639.5	54.1	12.5	12.5	0.0003
1639.23	1640	108.21	12.5	25	0.0006
1639.23	1640.5	216.67	26.15	51.15	0.0012
1639.23	1641	242.48	165.51	216.66	0.0050
1639.23	1641.5	555.67	322.79	539.45	0.0124
1639.23	1642	1619.19	814.45	1353.9	0.0311
1639.23	1642.5	9330.57	3370.96	4724.86	0.1085
1639.23	1643	17683.14	10381.08	15105.94	0.3468
1639.23	1643.5	18067.63	19372.96	34478.9	0.7915
1639.23	1644	17816.73	28311.91	62790.81	1.4415
1639.23	1644.35	8610.94	24570.44	87361.25	2.0055

SCALE 1"=30'

0 15' 30' 60'

GRAPHIC SCALE

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TOWNGATE BASIN STAGE-STORAGE RELATIONSHIP EXHIBIT

Culvert Calculator Report
Town Gate Basin

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	1,644.35	ft	Headwater Depth/Height	1.28	
Computed Headwater Elev	1,644.35	ft	Discharge	198.70	cfs
Inlet Control HW Elev.	1,644.02	ft	Tailwater Elevation	1,639.23	ft
Outlet Control HW Elev.	1,644.35	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,639.23	ft	Downstream Invert	1,637.88	ft
Length	259.00	ft	Constructed Slope	0.005212	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.77	ft
Slope Type	Steep		Normal Depth	2.77	ft
Flow Regime	Supercritical		Critical Depth	2.93	ft
Velocity Downstream	10.25	ft/s	Critical Slope	0.004489	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.014	
Section Material	Concrete		Span	7.00	ft
Section Size	7 x 4 ft		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,644.35	ft	Upstream Velocity Head	1.46	ft
Ke	0.50		Entrance Loss	0.73	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,644.02	ft	Flow Control	Transition	
Inlet Type	30 to 75° wingwall flares		Area Full	28.0	ft²
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Rating Table Report
Town Gate Basin

Range Data:			
	Minimum	Maximum	Increment
Allowable HW E	1,639.00	1,644.35	0.50 ft

HW Elev. (ft)	Discharge (cfs)
1,639.00	0.00
1,639.50	2.43
1,640.00	11.59
1,640.50	24.55
1,641.00	40.39
1,641.50	58.66
1,642.00	79.07
1,642.50	101.42
1,643.00	125.55
1,643.50	151.33
1,644.00	178.68
1,644.50	207.50

APPENDIX G

HYDROGRAPH FLOOD ROUTING HYDROLOGY OUTPUT FILES

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
                Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                            Study date: 08/29/23

      ----------------------------------------------------------------------


      12804 Sunnymead MDP Line F and F-7
      SUH Flood Hydrograph Routing
      100-year, 3-hour Hydrograph
      WSP USA
      ----------------------------------------------------------------------


      Program License Serial Number 6485

      ----------------------------------------------------------------------
      ********************* HYDROGRAPH INFORMATION **********************

                    From study/file name: a13100.rte
      ****************************HYDROGRAPH DATA****************************
                    Number of intervals =    45
                    Time interval =    5.0 (Min.)
                    Maximum/Peak flow rate =      110.882 (CFS)
                    Total volume =       8.384 (Ac.Ft)
             Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
             Peak (CFS)      0.000     0.000     0.000     0.000     0.000
             Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      **********************************************************************



      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        0.000 to Point/Station        5.000
      **** STORE OR DELETE CURRENT HYDROGRAPH ****
      ______________________________________________________________________
      Current stream hydrograph saved in file route0to5.rte
      ****************************HYDROGRAPH DATA****************************
                    Number of intervals =     0
                    Time interval =    0.0 (Min.)
                    Maximum/Peak flow rate =        0.000 (CFS)
                    Total volume =       0.000 (Ac.Ft)
             Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
             Peak (CFS)      0.000     0.000     0.000     0.000     0.000
             Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      **********************************************************************

      ----------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       13.000 to Point/Station        6.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ______________________________________________________________________
      ********************* HYDROGRAPH INFORMATION **********************

                    From study/file name: a23100.rte
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       P R I N T  O F  S T O R M
                    R u n o f f     H y d r o g r a p h
      ----------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals (CFS)

      ----------------------------------------------------------------------
     Time(h+m) Add q(CFS)  Tot. Q   0       79.0     158.0     237.0     316.0
     ----------------------------------------------------------------------
       0+ 5       1.6871      1.69  Q         |         |         |         |
```

0+10	8.5732	8.57	Q				
0+15	19.4376	19.44	Q				
0+20	24.1610	24.16	Q				
0+25	27.4955	27.50	Q				
0+30	32.6888	32.69	Q				
0+35	37.0177	37.02	Q				
0+40	40.5871	40.59	Q				
0+45	42.0490	42.05	Q				
0+50	45.1219	45.12	Q				
0+55	44.9781	44.98	Q				
1+ 0	43.5038	43.50	Q				
1+ 5	46.3482	46.35	Q				
1+10	53.8492	53.85	Q				
1+15	62.6375	62.64	Q				
1+20	66.3963	66.40	Q				
1+25	68.3127	68.31	Q				
1+30	73.5643	73.56	Q				
1+35	84.5990	84.60	Q				
1+40	89.1215	89.12	Q				
1+45	92.5323	92.53	Q				
1+50	104.3120	104.31	Q				
1+55	115.5732	115.57	Q				
2+ 0	116.8713	116.87	Q				
2+ 5	117.0378	117.04	Q				
2+10	123.3345	123.33	Q				
2+15	141.3926	141.39	Q				
2+20	168.5267	168.53	Q				
2+25	186.1494	186.15	Q				
2+30	210.7847	210.78	Q				
2+35	275.3196	275.32	Q				
2+40	316.0023	316.00	Q				
2+45	315.0458	315.05	Q				
2+50	248.0319	248.03	Q				
2+55	166.8414	166.84	Q				
3+ 0	125.5692	125.57	Q				
3+ 5	96.2820	96.28	Q				
3+10	66.8592	66.86	Q				
3+15	45.8204	45.82	Q				
3+20	33.1258	33.13	Q				
3+25	25.0454	25.05	Q				
3+30	20.1069	20.11	Q				
3+35	16.4271	16.43	Q				
3+40	13.6216	13.62	Q				
3+45	11.3259	11.33	Q				
3+50	9.4189	9.42	Q				
3+55	7.9571	7.96	Q				
4+ 0	6.8502	6.85	Q				
4+ 5	5.9298	5.93	Q				
4+10	5.1414	5.14	Q				
4+15	4.4449	4.44	Q				
4+20	3.3848	3.38	Q				
4+25	2.2521	2.25	Q				
4+30	1.1312	1.13	Q				
4+35	0.4783	0.48	Q				
4+40	0.3040	0.30	Q				
4+45	0.1537	0.15	Q				
4+50	0.0333	0.03	Q				

**********HYDROGRAPH DATA**********

Number of intervals = 58
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 316.002 (CFS)
Total volume = 28.316 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++
Process from Point/Station 6.000 to Point/Station 5.000
**** FLOWBY BASIN ROUTING OR SPLIT FLOW ****

A constant split flow fraction of 0.5000 is
being diverted from the main stream into stream number 1
Total volume of excess flow diverted into flowby
basin (stream number 1) is 14.16(Ac.Ft)
++

P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Volume(Ac.Ft)	Q(CFS)	0	39.5	79.0	118.5	158.0
0+ 5	0.0058	0.84	Q				
0+10	0.0353	4.29	VQ				
0+15	0.1023	9.72	V Q				
0+20	0.1855	12.08	V Q				
0+25	0.2801	13.75	V Q				
0+30	0.3927	16.34	V Q				
0+35	0.5202	18.51	V Q				
0+40	0.6599	20.29	V Q				
0+45	0.8047	21.02	V Q				
0+50	0.9601	22.56	V Q				
0+55	1.1150	22.49	V Q				
1+ 0	1.2648	21.75	V Q				
1+ 5	1.4244	23.17	VQ				
1+10	1.6098	26.92	V Q				
1+15	1.8255	31.32	V Q				
1+20	2.0542	33.20	V Q				
1+25	2.2894	34.16	V Q				
1+30	2.5427	36.78	V Q				
1+35	2.8340	42.30	V Q				
1+40	3.1409	44.56	V Q				
1+45	3.4596	46.27	V Q				
1+50	3.8188	52.16	V Q				
1+55	4.2168	57.79	V Q				
2+ 0	4.6192	58.44	VQ				
2+ 5	5.0222	58.52	Q				
2+10	5.4469	61.67	Q				
2+15	5.9338	70.70	VQ				
2+20	6.5142	84.26	V Q				
2+25	7.1552	93.07	V Q				
2+30	7.8810	105.39	V Q				
2+35	8.8291	137.66	V	Q			
2+40	9.9172	158.00	V		Q		
2+45	11.0021	157.52	V		Q		
2+50	11.8562	124.02	Q V				
2+55	12.4307	83.42	Q	V			
3+ 0	12.8631	62.78	Q	V			
3+ 5	13.1947	48.14	Q	V			
3+10	13.4249	33.43	Q	V			
3+15	13.5827	22.91	Q	V			
3+20	13.6968	16.56	Q	V			
3+25	13.7830	12.52	Q	V			
3+30	13.8523	10.05	Q	V			
3+35	13.9088	8.21	Q	V			
3+40	13.9557	6.81	Q	V			
3+45	13.9947	5.66	Q	V			
3+50	14.0272	4.71	Q	V			
3+55	14.0546	3.98	Q	V			
4+ 0	14.0782	3.43	Q	V			
4+ 5	14.0986	2.96	Q	V			
4+10	14.1163	2.57	Q	V			
4+15	14.1316	2.22	Q	V			
4+20	14.1432	1.69	Q	V			
4+25	14.1510	1.13	Q	V			

```
   4+30      14.1549      0.57  Q         |         |         |        V|
   4+35      14.1565      0.24  Q         |         |         |        V|
   4+40      14.1576      0.15  Q         |         |         |        V|
   4+45      14.1581      0.08  Q         |         |         |        V|
   4+50      14.1582      0.02  Q         |         |         |         V
-------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    58
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      158.001 (CFS)
                  Total volume =      14.158 (Ac.Ft)
           Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)    158.001     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)     14.158     0.000     0.000     0.000     0.000
      ************************************************************************

      ------------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        5.000 to Point/Station        5.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ________________________________________________________________________
      ********************** HYDROGRAPH INFORMATION **********************

                  From study/file name: route0to5.rte
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     P R I N T  O F  S T O R M
                  R u n o f f     H y d r o g r a p h
      ------------------------------------------------------------------------
               Hydrograph in   5   Minute intervals (CFS)

      ------------------------------------------------------------------------
 Time(h+m) Add q(CFS)  Tot. Q   0       67.2     134.4     201.7     268.9
 ------------------------------------------------------------------------
   0+ 5       1.0977      1.94  Q         |         |         |         |
   0+10       7.1281     11.41  |Q        |         |         |         |
   0+15      10.2529     19.97  |qQ       |         |         |         |
   0+20      10.9548     23.04  |q Q      |         |         |         |
   0+25      12.9709     26.72  |q Q      |         |         |         |
   0+30      14.3178     30.66  | q Q     |         |         |         |
   0+35      15.8534     34.36  | q  Q    |         |         |         |
   0+40      15.7084     36.00  | q  Q    |         |         |         |
   0+45      16.7553     37.78  | q  Q    |         |         |         |
   0+50      17.1507     39.71  | q  Q    |         |         |         |
   0+55      16.0666     38.56  | q  Q    |         |         |         |
   1+ 0      16.0651     37.82  | q  Q    |         |         |         |
   1+ 5      17.3466     40.52  | q   Q   |         |         |         |
   1+10      19.6724     46.60  | q   Q   |         |         |         |
   1+15      20.8799     52.20  |  q   Q  |         |         |         |
   1+20      21.2171     54.42  |  q    Q |         |         |         |
   1+25      21.1484     55.30  |  q    Q |         |         |         |
   1+30      24.2789     61.06  |  q     Q|         |         |         |
   1+35      26.3860     68.69  |  q      Q         |         |         |
   1+40      25.5563     70.12  |  q      Q         |         |         |
   1+45      28.0875     74.35  |   q     |Q        |         |         |
   1+50      33.8785     86.03  |    q    | Q       |         |         |
   1+55      34.9822     92.77  |    q    |  Q      |         |         |
   2+ 0      33.8087     92.24  |    q    |  Q      |         |         |
   2+ 5      34.1876     92.71  |    q    |  Q      |         |         |
   2+10      36.8981     98.57  |    q    |   Q     |         |         |
   2+15      47.9016    118.60  |      q  |      Q  |         |         |
   2+20      57.6751    141.94  |       q |         |Q        |         |
   2+25      55.8870    148.96  |       q |         | Q       |         |
   2+30      80.1332    185.53  |         |q        |      Q  |         |
   2+35      99.4486    237.11  |         |   q     |         |    Q    |
   2+40     110.8823    268.88  |         |     q   |         |        Q
   2+45      93.5405    251.06  |         |  q      |         |      Q  |
   2+50      54.7987    178.81  |       q |         |     Q   |         |
   2+55      34.0551    117.48  |    q    |      Q  |         |         |
```

```
   3+ 0      24.3484     87.13  |  q      | Q       |         |         |
   3+ 5      14.0872     62.23  | q      Q|         |         |         |
   3+10       6.5622     39.99  q    Q    |         |         |         |
   3+15       3.1146     26.02  q  Q      |         |         |         |
   3+20       1.3825     17.95  q Q       |         |         |         |
   3+25       0.5227     13.05  qQ        |         |         |         |
   3+30       0.2293     10.28  qQ        |         |         |         |
   3+35       0.1147      8.33  qQ        |         |         |         |
   3+40       0.0385      6.85  qQ        |         |         |         |
   3+45       0.0056      5.67  Q         |         |         |         |
   3+50       0.0000      4.71  Q         |         |         |         |
   3+55       0.0000      3.98  Q         |         |         |         |
   4+ 0       0.0000      3.43  Q         |         |         |         |
   4+ 5       0.0000      2.96  Q         |         |         |         |
   4+10       0.0000      2.57  Q         |         |         |         |
   4+15       0.0000      2.22  Q         |         |         |         |
   4+20       0.0000      1.69  Q         |         |         |         |
   4+25       0.0000      1.13  Q         |         |         |         |
   4+30       0.0000      0.57  Q         |         |         |         |
   4+35       0.0000      0.24  Q         |         |         |         |
   4+40       0.0000      0.15  Q         |         |         |         |
   4+45       0.0000      0.08  Q         |         |         |         |
   4+50       0.0000      0.02  Q         |         |         |         |
--------------------------------------------------------------------------

      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    58
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      268.883 (CFS)
                  Total volume =      22.542 (Ac.Ft)
            Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)    158.001     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)     14.158     0.000     0.000     0.000     0.000
      ***********************************************************************

      ---------------------------------------------------------------------


      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        5.000 to Point/Station        5.000
      **** PRINT CURRENT HYDROGRAPH ****

      _______________________________________________________________________
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     P R I N T  O F  S T O R M
                   R u n o f f     H y d r o g r a p h
      -----------------------------------------------------------------------
                Hydrograph in   5   Minute intervals (CFS)

      -----------------------------------------------------------------------
 Time(h+m) Volume(Ac.Ft)   Q(CFS)  0       67.2     134.4     201.7     268.9
 --------------------------------------------------------------------------
   0+ 5       0.0134      1.94  Q         |         |         |         |
   0+10       0.0920     11.41  VQ        |         |         |         |
   0+15       0.2295     19.97  V Q       |         |         |         |
   0+20       0.3882     23.04  V  Q      |         |         |         |
   0+25       0.5722     26.72   V Q      |         |         |         |
   0+30       0.7834     30.66  |V  Q     |         |         |         |
   0+35       1.0200     34.36  |V   Q    |         |         |         |
   0+40       1.2680     36.00  | V  Q    |         |         |         |
   0+45       1.5282     37.78  | V  Q    |         |         |         |
   0+50       1.8016     39.71  |  V Q    |         |         |         |
   0+55       2.0672     38.56  |  V Q    |         |         |         |
   1+ 0       2.3276     37.82  |   VQ    |         |         |         |
   1+ 5       2.6067     40.52  |   V Q   |         |         |         |
   1+10       2.9276     46.60  |    VQ   |         |         |         |
   1+15       3.2871     52.20  |    V Q  |         |         |         |
   1+20       3.6619     54.42  |     V Q |         |         |         |
   1+25       4.0428     55.30  |      VQ |         |         |         |
   1+30       4.4633     61.06  |      V Q|         |         |         |
   1+35       4.9363     68.69  |       V Q         |         |         |
   1+40       5.4192     70.12  |        VQ         |         |         |
```

```
    1+45       5.9313     74.35  |          VQ        |          |          |
    1+50       6.5238     86.03  |           VQ       |          |          |
    1+55       7.1627     92.77  |          | VQ      |          |          |
    2+ 0       7.7980     92.24  |          |  Q      |          |          |
    2+ 5       8.4365     92.71  |          |  QV     |          |          |
    2+10       9.1153     98.57  |          |   Q V   |          |          |
    2+15       9.9321    118.60  |          |      Q  |          |          |
    2+20      10.9097    141.94  |          |        V|Q         |          |
    2+25      11.9356    148.96  |          |          VQ        |          |
    2+30      13.2133    185.53  |          |          |  V   Q  |          |
    2+35      14.8463    237.11  |          |          |     V   |    Q     |
    2+40      16.6981    268.88  |          |          |        V|          Q
    2+45      18.4272    251.06  |          |          |           V    Q  |
    2+50      19.6587    178.81  |          |          |     Q   |   V      |
    2+55      20.4677    117.48  |          |      Q  |          |     V    |
    3+ 0      21.0678     87.13  |          | Q       |          |      V   |
-------------------------------------------------------------------------------

      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    58
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      268.883 (CFS)
                  Total volume =      22.542 (Ac.Ft)
            Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)    158.001     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)     14.158     0.000     0.000     0.000     0.000
      ************************************************************************

      ------------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        5.000 to Point/Station       16.000
      **** STREAM ROUTING SCS CONVEX METHOD ****
      ________________________________________________________________________
      HYDROGRAPH STREAM ROUTING DATA:
      Length of stream =   1343.00 (Ft.)
      Elevation difference =   13.00 (Ft.)
      Slope of channel =  0.009680 (Vert/Horiz)
      Channel type - Pipe


      Pipe length  =  1343.00(Ft.)   Elevation difference =  13.00(Ft.)
      Manning's N = 0.013   No. of pipes = 1
      Pipe evaluation using mean flow rate of hydrograph
      Required pipe flow  =    83.954(CFS)
      Nearest computed pipe diameter  =     39.00(In.)
      Calculated individual pipe flow  =    83.954(CFS)
      Normal flow depth in pipe =   33.28(In.)
      Flow top width inside pipe =   27.59(In.)
      Critical Depth =    2.86(Ft.)
      Pipe flow velocity =     11.13(Ft/s)
      Travel time through pipe =    2.01 min.


      Pipe length  =  1343.00(Ft.)   Elevation difference =  13.00(Ft.)
      Manning's N = 0.013   No. of pipes = 1
      Pipe evaluation using maximum flow rate of hydrograph
      Required pipe flow  =   268.883(CFS)
      Nearest computed pipe diameter  =     60.00(In.)
      Calculated individual pipe flow  =   268.883(CFS)
      Normal flow depth in pipe =   52.31(In.)
      Flow top width inside pipe =   40.11(In.)
      Critical Depth =    4.53(Ft.)
      Pipe flow velocity =     14.79(Ft/s)
      Travel time through pipe =    1.51 min.


      ********************** SCS CONVEX CHANNEL ROUTING ********************
      Convex method of stream routing  data items:
      Using equation: Outflow =
```

O(t+dt) = (1-c*)O(t+dt-dt*) + Input(c*)
where c* = 1 - (1-c)^e and dt = c(length)/velocity
c(v/v+1.7) = 0.8969 Travel time = 1.51 (min.)
dt*(unit time interval) = 5.00(min.), e= 2.7888
dt(routing time-step) = 1.36 (min.), c* = 0.9982

Output hydrograph delayed by 0 unit time increments

++

P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Out = O(CFS)	In = I	0	67.2	134.4	201.7	268.9
0+ 5	1.4117	1.94	O				
0+10	8.8295	11.41	IO				
0+15	17.6328	19.97	I O				
0+20	22.1954	23.04	I O				
0+25	25.7124	26.72	I O				
0+30	29.5847	30.66	I O				
0+35	33.3511	34.36	I O				
0+40	35.5529	36.00	I O				
0+45	37.2940	37.78	I O				
0+50	39.1838	39.71	I O				
0+55	38.8700	38.56	I O				
1+ 0	38.0190	37.82	I O				
1+ 5	39.7835	40.52	I O				
1+10	44.9382	46.60	I O				
1+15	50.6676	52.20	I O				
1+20	53.8078	54.42	I O				
1+25	55.0610	55.30	I O				
1+30	59.4903	61.06	I O				
1+35	66.6028	68.69	I O				
1+40	69.7228	70.12	I O				
1+45	73.1973	74.35	I O				
1+50	82.8461	86.03	I O				
1+55	90.9261	92.77	I O				
2+ 0	92.3841	92.24	I O				
2+ 5	92.5807	92.71	I O				
2+10	96.9669	98.57	I O				
2+15	113.1304	118.60	I O				
2+20	135.5617	141.94	I O				
2+25	147.0346	148.96	I O				
2+30	175.5479	185.53	I O				
2+35	223.0195	237.11	I O				
2+40	260.1906	268.88	I O				
2+45	255.9092	251.06	I O				
2+50	198.5319	178.81	I O				
2+55	134.2433	117.48	I O				
3+ 0	95.4399	87.13	I O				
3+ 5	69.0367	62.23	I O				
3+10	46.0697	39.99	I O				
3+15	29.8456	26.02	I O				
3+20	20.1562	17.95	I O				
3+25	14.3860	13.05	IO				
3+30	11.0387	10.28	IO				
3+35	8.8627	8.33	IO				
3+40	7.2537	6.85	IO				
3+45	5.9914	5.67	O				
3+50	4.9717	4.71	O				
3+55	4.1784	3.98	O				
4+ 0	3.5764	3.43	O				
4+ 5	3.0907	2.96	O				
4+10	2.6784	2.57	O				
4+15	2.3176	2.22	O				
4+20	1.8372	1.69	O				
4+25	1.2808	1.13	O				

```
   4+30       0.7188      0.57  O         |         |         |         |
   4+35       0.3285      0.24  O         |         |         |         |
   4+40       0.1759      0.15  O         |         |         |         |
   4+45       0.0974      0.08  O         |         |         |         |
   4+50       0.0331      0.02  O         |         |         |         |
   4+55       0.0046      0.00  O         |         |         |         |
   5+ 0       0.0000      0.00  O         |         |         |         |
-------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    60
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      260.191 (CFS)
                  Total volume =      22.542 (Ac.Ft)
            Status of hydrographs being held in storage
                        Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)    158.001     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)     14.158     0.000     0.000     0.000     0.000
      *************************************************************************

      ------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        5.000 to Point/Station       16.000
      **** STORE OR DELETE CURRENT HYDROGRAPH ****
      ________________________________________________________________________
      Current stream hydrograph saved in file route5to16.rte
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =     0
                  Time interval =    0.0 (Min.)
                  Maximum/Peak flow rate =        0.000 (CFS)
                  Total volume =       0.000 (Ac.Ft)
            Status of hydrographs being held in storage
                        Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)    158.001     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)     14.158     0.000     0.000     0.000     0.000
      *************************************************************************

      ------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        1.000 to Point/Station        2.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ________________________________________________________________________
      ********************** HYDROGRAPH INFORMATION **********************

                  From study/file name: a33100.rte
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     P R I N T  O F  S T O R M
                  R u n o f f     H y d r o g r a p h
      ------------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals (CFS)

      ------------------------------------------------------------------------
 Time(h+m) Add q(CFS)  Tot. Q   0        6.7      13.5      20.2      27.0
 ------------------------------------------------------------------------
   0+ 5       0.2708      0.27  Q         |         |         |         |
   0+10       1.6887      1.69  | Q       |         |         |         |
   0+15       2.3169      2.32  |  Q      |         |         |         |
   0+20       2.4511      2.45  |  Q      |         |         |         |
   0+25       2.9149      2.91  |   Q     |         |         |         |
   0+30       3.1882      3.19  |   Q     |         |         |         |
   0+35       3.5357      3.54  |    Q    |         |         |         |
   0+40       3.4740      3.47  |    Q    |         |         |         |
   0+45       3.7266      3.73  |    Q    |         |         |         |
   0+50       3.7906      3.79  |    Q    |         |         |         |
   0+55       3.5304      3.53  |    Q    |         |         |         |
   1+ 0       3.5528      3.55  |    Q    |         |         |         |
   1+ 5       3.8533      3.85  |    Q    |         |         |         |
   1+10       4.3858      4.39  |     Q   |         |         |         |
```

```
  1+15       4.6347      4.63  |     Q   |         |         |         |
  1+20       4.6964      4.70  |     Q   |         |         |         |
  1+25       4.7122      4.71  |     Q   |         |         |         |
  1+30       5.6556      5.66  |       Q |         |         |         |
  1+35       6.1832      6.18  |        Q|         |         |         |
  1+40       5.9299      5.93  |       Q |         |         |         |
  1+45       6.6525      6.65  |        Q|         |         |         |
  1+50       8.1121      8.11  |         | Q       |         |         |
  1+55       8.2935      8.29  |         | Q       |         |         |
  2+ 0       7.9928      7.99  |         |Q        |         |         |
  2+ 5       8.1034      8.10  |         | Q       |         |         |
  2+10       8.8056      8.81  |         |  Q      |         |         |
  2+15      11.6510     11.65  |         |      Q  |         |         |
  2+20      13.9633     13.96  |         |         Q         |         |
  2+25      13.3684     13.37  |         |        Q|         |         |
  2+30      19.7847     19.78  |         |         |        Q|         |
  2+35      24.2727     24.27  |         |         |         |     Q   |
  2+40      26.9513     26.95  |         |         |         |        Q|
  2+45      22.1140     22.11  |         |         |         | Q       |
  2+50      12.2058     12.21  |         |       Q |         |         |
  2+55       7.4596      7.46  |         |Q        |         |         |
  3+ 0       5.2321      5.23  |      Q  |         |         |         |
  3+ 5       2.9146      2.91  |   Q     |         |         |         |
  3+10       1.3113      1.31  |Q        |         |         |         |
  3+15       0.5860      0.59  Q         |         |         |         |
  3+20       0.2257      0.23  Q         |         |         |         |
  3+25       0.0808      0.08  Q         |         |         |         |
  3+30       0.0400      0.04  Q         |         |         |         |
  3+35       0.0166      0.02  Q         |         |         |         |
  3+40       0.0032      0.00  Q         |         |         |         |
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    44
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =       26.951 (CFS)
                  Total volume =       1.960 (Ac.Ft)
            Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)    158.001     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)     14.158     0.000     0.000     0.000     0.000
      ***********************************************************************

      ---------------------------------------------------------------------


      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        5.000 to Point/Station        2.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      _____________________________________________________________________
      From stored stream number 1 the total
      volume of      14.16 (Ac.Ft) is being added to the
      current hydrograph at its original rate from user
      with a delay time to start of addition of    0.00 hours.
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        P R I N T  O F  S T O R M
                     R u n o f f     H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals (CFS)

      ---------------------------------------------------------------------
 Time(h+m) Add q(CFS)  Tot. Q   0       46.2      92.5     138.7     185.0
 ---------------------------------------------------------------------
   0+ 5       0.8436      1.11  Q         |         |         |         |
   0+10       4.2866      5.98  qQ        |         |         |         |
   0+15       9.7188     12.04  | Q       |         |         |         |
   0+20      12.0805     14.53  | qQ      |         |         |         |
   0+25      13.7478     16.66  | qQ      |         |         |         |
   0+30      16.3444     19.53  |  qQ     |         |         |         |
   0+35      18.5089     22.04  |   Q     |         |         |         |
   0+40      20.2936     23.77  |   qQ    |         |         |         |
   0+45      21.0245     24.75  |   qQ    |         |         |         |
```

```
    0+50      22.5609     26.35  |   qQ    |         |         |         |
    0+55      22.4890     26.02  |   qQ    |         |         |         |
    1+ 0      21.7519     25.30  |   qQ    |         |         |         |
    1+ 5      23.1741     27.03  |    Q    |         |         |         |
    1+10      26.9246     31.31  |    qQ   |         |         |         |
    1+15      31.3188     35.95  |     qQ  |         |         |         |
    1+20      33.1982     37.89  |      qQ |         |         |         |
    1+25      34.1563     38.87  |      qQ |         |         |         |
    1+30      36.7822     42.44  |      q Q|         |         |         |
    1+35      42.2995     48.48  |        qQ         |         |         |
    1+40      44.5607     50.49  |        qQ         |         |         |
    1+45      46.2661     52.92  |         qQ        |         |         |
    1+50      52.1560     60.27  |         |q Q      |         |         |
    1+55      57.7866     66.08  |         | q Q     |         |         |
    2+ 0      58.4356     66.43  |         | q Q     |         |         |
    2+ 5      58.5189     66.62  |         | q Q     |         |         |
    2+10      61.6672     70.47  |         |  q Q    |         |         |
    2+15      70.6963     82.35  |         |    q Q  |         |         |
    2+20      84.2633     98.23  |         |       q |Q        |         |
    2+25      93.0747    106.44  |         |         q  Q      |         |
    2+30     105.3923    125.18  |         |          | q    Q  |         |
    2+35     137.6598    161.93  |         |          |        q|    Q    |
    2+40     158.0012    184.95  |         |          |         |   q     Q
    2+45     157.5229    179.64  |         |          |         |   q   Q |
    2+50     124.0159    136.22  |         |          |     q  Q|         |
    2+55      83.4207     90.88  |         |        qQ|         |         |
    3+ 0      62.7846     68.02  |         |  qQ      |         |         |
    3+ 5      48.1410     51.06  |         qQ         |         |         |
    3+10      33.4296     34.74  |       Q  |         |         |         |
    3+15      22.9102     23.50  |   qQ     |         |         |         |
    3+20      16.5629     16.79  |  Q       |         |         |         |
    3+25      12.5227     12.60  | Q        |         |         |         |
    3+30      10.0534     10.09  | Q        |         |         |         |
    3+35       8.2135      8.23  |Q         |         |         |         |
    3+40       6.8108      6.81  |Q         |         |         |         |
    3+45       5.6630      5.66  |Q         |         |         |         |
    3+50       4.7095      4.71  |Q         |         |         |         |
    3+55       3.9785      3.98  Q          |         |         |         |
    4+ 0       3.4251      3.43  Q          |         |         |         |
    4+ 5       2.9649      2.96  Q          |         |         |         |
    4+10       2.5707      2.57  Q          |         |         |         |
    4+15       2.2225      2.22  Q          |         |         |         |
    4+20       1.6924      1.69  Q          |         |         |         |
    4+25       1.1261      1.13  Q          |         |         |         |
    4+30       0.5656      0.57  Q          |         |         |         |
    4+35       0.2392      0.24  Q          |         |         |         |
    4+40       0.1520      0.15  Q          |         |         |         |
    4+45       0.0769      0.08  Q          |         |         |         |
    4+50       0.0166      0.02  Q          |         |         |         |
    4+55       0.0000      0.00  Q          |         |         |         |
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    59
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      184.953 (CFS)
                  Total volume =      16.119 (Ac.Ft)
           Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ************************************************************************

      ------------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        2.000 to Point/Station       14.000
      **** RETARDING BASIN ROUTING ****
      ________________________________________________________________________

      User entry of depth-outflow-storage data
```

Total number of inflow hydrograph intervals = 59
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.270	0.001	2.430	-0.007	0.009
0.770	0.002	11.590	-0.038	0.042
1.270	0.003	24.550	-0.082	0.088
1.770	0.005	40.390	-0.134	0.144
2.270	0.012	58.660	-0.190	0.214
2.770	0.031	79.070	-0.241	0.303
3.270	0.108	101.420	-0.241	0.457
3.770	0.347	125.550	-0.085	0.779
4.270	0.792	151.330	0.271	1.313
4.770	1.441	178.680	0.826	2.056
5.120	2.006	198.700	1.322	2.690

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 46.2 92.48 138.71 184.95	Depth (Ft.)
0.083	1.11	1.00	0.000	O	0.11
0.167	5.98	5.82	0.001	|O	0.45
0.250	12.04	12.00	0.002	| O	0.79
0.333	14.53	14.51	0.002	| O	0.88
0.417	16.66	16.64	0.002	| O	0.96
0.500	19.53	19.49	0.003	| O	1.07
0.583	22.04	22.03	0.003	| O	1.17
0.667	23.77	23.75	0.003	| O	1.24
0.750	24.75	24.75	0.003	| O	1.28
0.833	26.35	26.30	0.003	| O	1.33
0.917	26.02	26.08	0.003	| O	1.32
1.000	25.30	25.27	0.003	| O	1.29
1.083	27.03	27.00	0.003	| O	1.35
1.167	31.31	31.19	0.004	| O	1.48
1.250	35.95	35.90	0.004	| O	1.63
1.333	37.89	37.87	0.005	| O	1.69
1.417	38.87	38.85	0.005	| O	1.72
1.500	42.44	42.20	0.006	| O	1.82
1.583	48.48	48.07	0.008	| O	1.98
1.667	50.49	50.62	0.009	| O	2.05
1.750	52.92	52.57	0.010	| O	2.10
1.833	60.27	59.66	0.013	| O	2.29
1.917	66.08	65.19	0.018	| O	2.43
2.000	66.43	66.87	0.020	| O	2.47
2.083	66.62	66.33	0.019	| O	2.46
2.167	70.47	69.82	0.022	| O	2.54
2.250	82.35	79.78	0.033	| OI	2.79
2.333	98.23	90.28	0.070	| OI	3.02
2.417	106.44	101.89	0.113	| OI	3.28
2.500	125.18	109.07	0.184	| O I	3.43
2.583	161.93	126.40	0.362	| O | I	3.79
2.667	184.95	142.05	0.632	| O I	4.09
2.750	179.64	154.46	0.866	| O I|	4.33
2.833	136.22	155.34	0.887	| I| O	4.34
2.917	90.88	142.69	0.643	| I| O	4.10
3.000	68.02	119.51	0.287	| I | O |	3.64

```
3.083   51.06   75.04      0.027  |       I   O   |       |       |     2.67
3.167   34.74   17.95      0.002  |  O  I |       |       |       |     1.02
3.250   23.50   39.59      0.005  |   I O |       |       |       |     1.74
3.333   16.79    1.89      0.001  O I     |       |       |       |     0.21
3.417   12.60   26.77      0.003  | I O   |       |       |       |     1.34
3.500   10.09    0.00      0.000  OI      |       |       |       |     0.00
3.583    8.23   20.01      0.003  |I O    |       |       |       |     1.09
3.667    6.81    0.00      0.000  OI      |       |       |       |     0.00
3.750    5.66   15.12      0.002  I O     |       |       |       |     0.91
3.833    4.71    0.00      0.000  O       |       |       |       |     0.00
3.917    3.98   11.33      0.002  IO      |       |       |       |     0.76
4.000    3.43    0.00      0.000  O       |       |       |       |     0.00
4.083    2.96    8.54      0.002  IO      |       |       |       |     0.60
4.167    2.57    0.00      0.000  O       |       |       |       |     0.00
4.250    2.22    6.36      0.001  IO      |       |       |       |     0.48
4.333    1.69    0.00      0.000  O       |       |       |       |     0.00
4.417    1.13    4.07      0.001  O       |       |       |       |     0.36
4.500    0.57    0.00      0.000  O       |       |       |       |     0.00
4.583    0.24    2.15      0.001  O       |       |       |       |     0.24
4.667    0.15    0.00      0.000  O       |       |       |       |     0.00
4.750    0.08    1.26      0.001  O       |       |       |       |     0.14
4.833    0.02    0.00      0.000  O       |       |       |       |     0.00
4.917    0.00    0.73      0.000  O       |       |       |       |     0.08
5.000    0.00    0.00      0.000  O       |       |       |       |     0.00

****************************HYDROGRAPH DATA****************************
               Number of intervals =    60
               Time interval =    5.0 (Min.)
               Maximum/Peak flow rate =      155.337 (CFS)
               Total volume =      16.268 (Ac.Ft)
       Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
       Peak (CFS)      0.000     0.000     0.000     0.000     0.000
       Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** STREAM ROUTING SCS CONVEX METHOD ****
________________________________________________________________________
HYDROGRAPH STREAM ROUTING DATA:
Length of stream =    230.00 (Ft.)
Elevation difference =    3.00 (Ft.)
Slope of channel =  0.013043 (Vert/Horiz)
Channel type - Improved Channel


Channel length =   230.00(Ft.)     Elevation difference =   3.00(Ft.)
Channel evaluation using mean flow rate of hydrograph
Covered channel
Channel base width  =    7.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =     59.201(CFS)
Depth of flow =     0.922(Ft.)
Average velocity =     9.172(Ft/s)
Total flow rate =    59.201(CFS)
Channel flow top width =    7.000(Ft.)
Depth of flow in channel =   0.92(Ft.)
Total number of channels (same dimensions) = 1
Flow Velocity =    9.17(Ft/s)
Travel time  =    1.51 min.
Individual channel flow =   59.201(CFS)
Total capacity of improved channels =     59.201(CFS)
Critical Depth in Channel =    1.31(Ft.)
```

Channel evaluation using maximum flow rate of hydrograph
Covered channel
Flow(q) thru subarea = 155.337(CFS)
Depth of flow = 1.764(Ft.)
Average velocity = 12.582(Ft/s)
Total flow rate = 155.337(CFS)
Channel flow top width = 7.000(Ft.)
Depth of flow in channel = 1.76(Ft.)
Total number of channels (same dimensions) = 1
Flow Velocity = 12.58(Ft/s)
Travel time = 1.51 min.
Individual channel flow = 155.337(CFS)
Total capacity of improved channels = 155.337(CFS)
Critical Depth in Channel = 2.47(Ft.)

********** SCS CONVEX CHANNEL ROUTING **********
Convex method of stream routing data items:
Using equation: Outflow =
O(t+dt) = (1-c*)O(t+dt-dt*) + Input(c*)
where c* = 1 - (1-c)^e and dt = c(length)/velocity
c(v/v+1.7) = 0.8810 Travel time = 0.30 (min.)
dt*(unit time interval) = 5.00(min.), e= 12.7526
dt(routing time-step) = 0.27 (min.), c* = 1.0000

Output hydrograph delayed by 0 unit time increments

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P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Out = O(CFS)	In = I	0	38.8	77.7	116.5	155.3
0+ 5	0.9420	1.00	O				
0+10	5.5567	5.82	O				
0+15	11.6711	12.00	O				
0+20	14.3736	14.51	O				
0+25	16.5242	16.64	O				
0+30	19.3396	19.49	OI				
0+35	21.8915	22.03	O				
0+40	23.6538	23.75	O				
0+45	24.6936	24.75	O				
0+50	26.2151	26.30	O				
0+55	26.0923	26.08	O				
1+ 0	25.3165	25.27	O				
1+ 5	26.9032	27.00	O				
1+10	30.9633	31.19	OI				
1+15	35.6497	35.90	O				
1+20	37.7673	37.87	O				
1+25	38.8014	38.85	OI				
1+30	42.0157	42.20	O				
1+35	47.7561	48.07		O			
1+40	50.4817	50.62		OI			
1+45	52.4684	52.57		O			
1+50	59.2840	59.66		O			
1+55	64.8933	65.19		O			
2+ 0	66.7757	66.87		O			
2+ 5	66.3587	66.33		O			
2+10	69.6340	69.82		O			
2+15	79.2493	79.78			O		
2+20	89.7208	90.28			O		
2+25	101.2676	101.89			O		
2+30	108.6869	109.07			OI		
2+35	125.4669	126.40				O	
2+40	141.2056	142.05				O	
2+45	153.7906	154.46				O	

```
    2+50     155.2897    155.34  |         |         |         |        OI
    2+55     143.3684    142.69  |         |         |         |     O   |
    3+ 0     120.7509    119.51  |         |         |         IO        |
    3+ 5      77.4258     75.04  |         |        O|         |         |
    3+10      21.0117     17.95  |   IO    |         |         |         |
    3+15      38.4288     39.59  |        OI         |         |         |
    3+20       3.9146      1.89  IO        |         |         |         |
    3+25      25.4387     26.77  |     O   |         |         |         |
    3+30       1.4372      0.00  O         |         |         |         |
    3+35      18.9374     20.01  |   OI    |         |         |         |
    3+40       1.0742      0.00  O         |         |         |         |
    3+45      14.3073     15.12  |  O      |         |         |         |
    3+50       0.8116      0.00  O         |         |         |         |
    3+55      10.7213     11.33  | O       |         |         |         |
    4+ 0       0.6082      0.00  O         |         |         |         |
    4+ 5       8.0846      8.54  | O       |         |         |         |
    4+10       0.4586      0.00  O         |         |         |         |
    4+15       6.0212      6.36  |O        |         |         |         |
    4+20       0.3416      0.00  O         |         |         |         |
    4+25       3.8560      4.07  OI        |         |         |         |
    4+30       0.2187      0.00  O         |         |         |         |
    4+35       2.0369      2.15  O         |         |         |         |
    4+40       0.1155      0.00  O         |         |         |         |
    4+45       1.1934      1.26  O         |         |         |         |
    4+50       0.0677      0.00  O         |         |         |         |
    4+55       0.6901      0.73  O         |         |         |         |
    5+ 0       0.0391      0.00  O         |         |         |         |
    5+ 5       0.0000      0.00  O         |         |         |         |
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    61
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      155.290 (CFS)
                  Total volume =      16.268 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ************************************************************************

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      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       14.000 to Point/Station       15.000
      **** STORE OR DELETE CURRENT HYDROGRAPH ****
      ________________________________________________________________________
      Current stream hydrograph saved in file route14to15.rte
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =     0
                  Time interval =    0.0 (Min.)
                  Maximum/Peak flow rate =        0.000 (CFS)
                  Total volume =       0.000 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ************************************************************************

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      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       10.000 to Point/Station       11.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ________________________________________________________________________
      ********************* HYDROGRAPH INFORMATION **********************

                  From study/file name: b3100.rte
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        P R I N T  O F  S T O R M
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R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Add q(CFS)	Tot. Q	0 3.0 6.0 9.0 12.0
0+ 5	0.6737	0.67	Q
0+10	1.5022	1.50	Q
0+15	1.5149	1.51	Q
0+20	1.6150	1.61	Q
0+25	1.8520	1.85	Q
0+30	2.0401	2.04	Q
0+35	2.0821	2.08	Q
0+40	2.0732	2.07	Q
0+45	2.2422	2.24	Q
0+50	2.1089	2.11	Q
0+55	1.9742	1.97	Q
1+ 0	2.1147	2.11	Q
1+ 5	2.4770	2.48	Q
1+10	2.7799	2.78	Q
1+15	2.8228	2.82	Q
1+20	2.7029	2.70	Q
1+25	2.9539	2.95	Q
1+30	3.5024	3.50	Q
1+35	3.4450	3.44	Q
1+40	3.4210	3.42	Q
1+45	4.0654	4.07	Q
1+50	4.4720	4.47	Q
1+55	4.2386	4.24	Q
2+ 0	4.1248	4.12	Q
2+ 5	4.2526	4.25	Q
2+10	5.1169	5.12	Q
2+15	6.6387	6.64	Q
2+20	6.4124	6.41	Q
2+25	7.5515	7.55	Q
2+30	10.5789	10.58	Q
2+35	12.0075	12.01	Q
2+40	11.3018	11.30	Q
2+45	6.7224	6.72	Q
2+50	3.0170	3.02	Q
2+55	2.3716	2.37	Q
3+ 0	1.6503	1.65	Q
3+ 5	0.5715	0.57	Q
3+10	0.0817	0.08	Q
3+15	0.0093	0.01	Q

**********HYDROGRAPH DATA**********

Number of intervals = 39
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 12.008 (CFS)
Total volume = 0.972 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 11.000 to Point/Station 12.000

**** STREAM ROUTING SCS CONVEX METHOD ****

HYDROGRAPH STREAM ROUTING DATA:
Length of stream = 159.00 (Ft.)
Elevation difference = 2.00 (Ft.)
Slope of channel = 0.012579 (Vert/Horiz)
Channel type - Pipe

Pipe length = 159.00(Ft.) Elevation difference = 2.00(Ft.)
Manning's N = 0.013 No. of pipes = 1
Pipe evaluation using mean flow rate of hydrograph
Required pipe flow = 4.042(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 4.042(CFS)
Normal flow depth in pipe = 8.00(In.)
Flow top width inside pipe = 14.97(In.)
Critical Depth = 0.81(Ft.)
Pipe flow velocity = 6.06(Ft/s)
Travel time through pipe = 0.44 min.

Pipe length = 159.00(Ft.) Elevation difference = 2.00(Ft.)
Manning's N = 0.013 No. of pipes = 1
Pipe evaluation using maximum flow rate of hydrograph
Required pipe flow = 12.008(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 12.008(CFS)
Normal flow depth in pipe = 12.64(In.)
Flow top width inside pipe = 20.56(In.)
Critical Depth = 1.29(Ft.)
Pipe flow velocity = 7.93(Ft/s)
Travel time through pipe = 0.33 min.

********** SCS CONVEX CHANNEL ROUTING **********
Convex method of stream routing data items:
Using equation: Outflow =
O(t+dt) = (1-c*)O(t+dt-dt*) + Input(c*)
where c* = 1 - (1-c)^e and dt = c(length)/velocity
c(v/v+1.7) = 0.8235 Travel time = 0.33 (min.)
dt*(unit time interval) = 5.00(min.), e= 12.4500
dt(routing time-step) = 0.28 (min.), c* = 1.0000

Output hydrograph delayed by 0 unit time increments

++
P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Out = O(CFS)	In = I	0	3.0	6.0	9.0	12.0
0+ 5	0.6366	0.67	O				
0+10	1.4566	1.50	OI				
0+15	1.5142	1.51	O				
0+20	1.6095	1.61	O				
0+25	1.8389	1.85	O				
0+30	2.0298	2.04	O				
0+35	2.0798	2.08	O				
0+40	2.0737	2.07	O				
0+45	2.2329	2.24	O				
0+50	2.1163	2.11	O				
0+55	1.9816	1.97	O				
1+ 0	2.1070	2.11	O				
1+ 5	2.4570	2.48	O				
1+10	2.7632	2.78	O				
1+15	2.8204	2.82	O				
1+20	2.7095	2.70	O				
1+25	2.9401	2.95	O				
1+30	3.4723	3.50	O				
1+35	3.4481	3.44	O				
1+40	3.4223	3.42	O				
1+45	4.0299	4.07	O				
1+50	4.4496	4.47	O				
1+55	4.2515	4.24	O				

```
    2+ 0       4.1311      4.12  |         |  O      |         |         |
    2+ 5       4.2455      4.25  |         |   O     |         |         |
    2+10       5.0694      5.12  |         |     OI  |         |         |
    2+15       6.5549      6.64  |         |         |OI       |         |
    2+20       6.4248      6.41  |         |         |O        |         |
    2+25       7.4888      7.55  |         |         |   OI    |         |
    2+30      10.4123     10.58  |         |         |         |   OI    |
    2+35      11.9289     12.01  |         |         |         |       OI
    2+40      11.3406     11.30  |         |         |         |      O  |
    2+45       6.9744      6.72  |         |         | IO      |         |
    2+50       3.2209      3.02  |         O         |         |         |
    2+55       2.4071      2.37  |       IO |         |         |         |
    3+ 0       1.6900      1.65  |    O    |         |         |         |
    3+ 5       0.6309      0.57  |IO       |         |         |         |
    3+10       0.1087      0.08  O         |         |         |         |
    3+15       0.0133      0.01  O         |         |         |         |
    3+20       0.0000      0.00  O         |         |         |         |
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    40
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =       11.929 (CFS)
                  Total volume =       0.972 (Ac.Ft)
           Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ****************************************************************************

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      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       12.000 to Point/Station       15.000
      **** STREAM ROUTING SCS CONVEX METHOD ****
      ________________________________________________________________________
      HYDROGRAPH STREAM ROUTING DATA:
      Length of stream =   1608.00 (Ft.)
      Elevation difference =    5.00 (Ft.)
      Slope of channel =  0.003109 (Vert/Horiz)
      Channel type - Improved Channel


      Channel length =  1608.00(Ft.)     Elevation difference =   5.00(Ft.)
      Channel evaluation using mean flow rate of hydrograph
      Channel base width  =    3.000(Ft.)
      Slope or 'Z' of left channel bank =   3.000
      Slope or 'Z' of right channel bank =   3.000
      Manning's 'N'    = 0.025
      Maximum depth of channel  =    3.000(Ft.)
      Flow(q) thru subarea =      4.031(CFS)
      Depth of flow =     0.515(Ft.)
      Average velocity =     1.721(Ft/s)
      Total flow rate =     4.031(CFS)
      Channel flow top width =    6.091(Ft.)
      Depth of flow in channel =   0.52(Ft.)
      Total number of channels (same dimensions) = 1
      Flow Velocity =    1.72(Ft/s)
      Travel time  =    0.33 min.
      Individual channel flow =    4.031(CFS)
      Total capacity of improved channels =      4.031(CFS)
      Critical Depth in Channel =    0.34(Ft.)


      Channel evaluation using maximum flow rate of hydrograph
      Flow(q) thru subarea =     11.929(CFS)
      Depth of flow =     0.899(Ft.)
      Average velocity =     2.330(Ft/s)
      Total flow rate =    11.929(CFS)
      Channel flow top width =    8.392(Ft.)
      Depth of flow in channel =   0.90(Ft.)
```

Total number of channels (same dimensions) = 1
Flow Velocity = 2.33(Ft/s)
Travel time = 0.33 min.
Individual channel flow = 11.929(CFS)
Total capacity of improved channels = 11.929(CFS)
Critical Depth in Channel = 0.63(Ft.)

********** SCS CONVEX CHANNEL ROUTING **********
Convex method of stream routing data items:
Using equation: Outflow =
O(t+dt) = (1-c*)O(t+dt-dt*) + Input(c*)
where c* = 1 - (1-c)^e and dt = c(length)/velocity
c(v/v+1.7) = 0.5782 Travel time = 11.50 (min.)
dt*(unit time interval) = 5.00(min.), e= 0.8346
dt(routing time-step) = 6.65 (min.), c* = 0.5135

Output hydrograph delayed by 0 unit time increments

++
P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Out = O(CFS)	In = I	0 3.0 6.0 8.9 11.9
0+ 5	0.0811	0.64	O I
0+10	0.4708	1.46	O I
0+15	0.9843	1.51	O I
0+20	1.2685	1.61	OI
0+25	1.4728	1.84	O I
0+30	1.6851	2.03	OI
0+35	1.8685	2.08	O
0+40	1.9762	2.07	O
0+45	2.0465	2.23	OI
0+50	2.1274	2.12	O
0+55	2.1045	1.98	IO
1+ 0	2.0574	2.11	OI
1+ 5	2.1275	2.46	OI
1+10	2.3357	2.76	O I
1+15	2.5625	2.82	OI
1+20	2.6808	2.71	OI
1+25	2.7249	2.94	O
1+30	2.9032	3.47	O I
1+35	3.1923	3.45	OI
1+40	3.3204	3.42	O
1+45	3.4501	4.03	O I
1+50	3.8013	4.45	O I
1+55	4.1089	4.25	OI
2+ 0	4.1668	4.13	O
2+ 5	4.1630	4.25	OI
2+10	4.3103	5.07	O I
2+15	4.8893	6.55	O I
2+20	5.7280	6.42	O I
2+25	6.2213	7.49	O I
2+30	7.2445	10.41	O I
2+35	9.0643	11.93	O I
2+40	10.4602	11.34	O I
2+45	10.3561	6.97	I O
2+50	8.1416	3.22	I O
2+55	5.5113	2.41	I O
3+ 0	3.8261	1.69	I O
3+ 5	2.5944	0.63	I O
3+10	1.5197	0.11	I O
3+15	0.7830	0.01	I O
3+20	0.3861	0.00	IO
3+25	0.1879	0.00	O
3+30	0.0914	0.00	O

```
   3+35       0.0445      0.00  O         |         |         |         |
   3+40       0.0216      0.00  O         |         |         |         |
   3+45       0.0105      0.00  O         |         |         |         |
   3+50       0.0051      0.00  O         |         |         |         |
   3+55       0.0025      0.00  O         |         |         |         |
   4+ 0       0.0012      0.00  O         |         |         |         |
   4+ 5       0.0000      0.00  O         |         |         |         |
--------------------------------------------------------------------------

      ***************************HYDROGRAPH DATA**************************
                  Number of intervals =    49
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =       10.460 (CFS)
                  Total volume =       0.972 (Ac.Ft)
            Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ********************************************************************************

      ------------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       15.000 to Point/Station       15.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ________________________________________________________________________
      ********************** HYDROGRAPH INFORMATION **********************

                  From study/file name: route14to15.rte
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        P R I N T  O F  S T O R M
                     R u n o f f     H y d r o g r a p h
      ------------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals (CFS)

      ------------------------------------------------------------------------
 Time(h+m) Add q(CFS)  Tot. Q   0       41.0      82.1     123.1     164.1
 ---------------------------------------------------------------------------
   0+ 5       0.9420      1.02  Q         |         |         |         |
   0+10       5.5567      6.03  |Q        |         |         |         |
   0+15      11.6711     12.66  | qQ      |         |         |         |
   0+20      14.3736     15.64  |  Q      |         |         |         |
   0+25      16.5242     18.00  |   Q     |         |         |         |
   0+30      19.3396     21.02  |   qQ    |         |         |         |
   0+35      21.8915     23.76  |    Q    |         |         |         |
   0+40      23.6538     25.63  |    qQ   |         |         |         |
   0+45      24.6936     26.74  |     Q   |         |         |         |
   0+50      26.2151     28.34  |     Q   |         |         |         |
   0+55      26.0923     28.20  |     Q   |         |         |         |
   1+ 0      25.3165     27.37  |     Q   |         |         |         |
   1+ 5      26.9032     29.03  |     qQ  |         |         |         |
   1+10      30.9633     33.30  |      qQ |         |         |         |
   1+15      35.6497     38.21  |       qQ|         |         |         |
   1+20      37.7673     40.45  |        Q|         |         |         |
   1+25      38.8014     41.53  |        qQ         |         |         |
   1+30      42.0157     44.92  |         Q         |         |         |
   1+35      47.7561     50.95  |         |qQ       |         |         |
   1+40      50.4817     53.80  |         | qQ      |         |         |
   1+45      52.4684     55.92  |         | qQ      |         |         |
   1+50      59.2840     63.09  |         |   qQ    |         |         |
   1+55      64.8933     69.00  |         |    qQ   |         |         |
   2+ 0      66.7757     70.94  |         |     qQ  |         |         |
   2+ 5      66.3587     70.52  |         |     qQ  |         |         |
   2+10      69.6340     73.94  |         |     q Q |         |         |
   2+15      79.2493     84.14  |         |        qQ         |         |
   2+20      89.7208     95.45  |         |         |q Q      |         |
   2+25     101.2676    107.49  |         |         |   q Q   |         |
   2+30     108.6869    115.93  |         |         |     q Q |         |
   2+35     125.4669    134.53  |         |         |         q Q       |
   2+40     141.2056    151.67  |         |         |         |   q Q   |
   2+45     153.7906    164.15  |         |         |         |      q  Q
```

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  2+50     155.2897    163.43  |          |          |          |      q Q|
  2+55     143.3684    148.88  |          |          |          |   q Q   |
  3+ 0     120.7509    124.58  |          |          |        qQ          |
  3+ 5      77.4258     80.02  |          |       qQ|          |          |
  3+10      21.0117     22.53  |    Q     |          |          |          |
  3+15      38.4288     39.21  |        Q|          |          |          |
  3+20       3.9146      4.30  qQ         |          |          |          |
  3+25      25.4387     25.63  |     Q    |          |          |          |
  3+30       1.4372      1.53  Q          |          |          |          |
  3+35      18.9374     18.98  |   Q      |          |          |          |
  3+40       1.0742      1.10  Q          |          |          |          |
  3+45      14.3073     14.32  |  Q       |          |          |          |
  3+50       0.8116      0.82  Q          |          |          |          |
  3+55      10.7213     10.72  | Q        |          |          |          |
  4+ 0       0.6082      0.61  Q          |          |          |          |
  4+ 5       8.0846      8.08  |Q         |          |          |          |
  4+10       0.4586      0.46  Q          |          |          |          |
  4+15       6.0212      6.02  |Q         |          |          |          |
  4+20       0.3416      0.34  Q          |          |          |          |
  4+25       3.8560      3.86  Q          |          |          |          |
  4+30       0.2187      0.22  Q          |          |          |          |
  4+35       2.0369      2.04  Q          |          |          |          |
  4+40       0.1155      0.12  Q          |          |          |          |
  4+45       1.1934      1.19  Q          |          |          |          |
  4+50       0.0677      0.07  Q          |          |          |          |
  4+55       0.6901      0.69  Q          |          |          |          |
  5+ 0       0.0391      0.04  Q          |          |          |          |
  5+ 5       0.0000      0.00  Q          |          |          |          |
--------------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    61
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      164.147 (CFS)
                  Total volume =      17.239 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ********************************************************************************

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      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       15.000 to Point/Station       15.000
      **** PRINT CURRENT HYDROGRAPH ****
      ________________________________________________________________________
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        P R I N T  O F  S T O R M
                     R u n o f f     H y d r o g r a p h
      ------------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals (CFS)

      ------------------------------------------------------------------------
 Time(h+m) Volume(Ac.Ft)   Q(CFS)  0       41.0      82.1     123.1     164.1
 ------------------------------------------------------------------------
   0+ 5       0.0070      1.02  Q         |         |         |         |
   0+10       0.0486      6.03  VQ        |         |         |         |
   0+15       0.1357     12.66  V  Q      |         |         |         |
   0+20       0.2434     15.64  V  Q      |         |         |         |
   0+25       0.3674     18.00  V   Q     |         |         |         |
   0+30       0.5122     21.02   V   Q    |         |         |         |
   0+35       0.6758     23.76  |V   Q    |         |         |         |
   0+40       0.8523     25.63  |V    Q   |         |         |         |
   0+45       1.0365     26.74  | V   Q   |         |         |         |
   0+50       1.2317     28.34  | V   Q   |         |         |         |
   0+55       1.4259     28.20  |  V  Q   |         |         |         |
   1+ 0       1.6144     27.37  |  V  Q   |         |         |         |
   1+ 5       1.8144     29.03  |   V  Q  |         |         |         |
   1+10       2.0437     33.30  |   V   Q |         |         |         |
   1+15       2.3069     38.21  |    V   Q|         |         |         |
```

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    1+20       2.5854     40.45  |    V   Q|         |         |         |
    1+25       2.8714     41.53  |     V   Q         |         |         |
    1+30       3.1808     44.92  |      V  Q         |         |         |
    1+35       3.5317     50.95  |       V | Q       |         |         |
    1+40       3.9022     53.80  |        V|  Q      |         |         |
    1+45       4.2873     55.92  |        V|  Q      |         |         |
    1+50       4.7218     63.09  |         V    Q    |         |         |
    1+55       5.1970     69.00  |         | V   Q   |         |         |
    2+ 0       5.6856     70.94  |         |  V   Q  |         |         |
    2+ 5       6.1713     70.52  |         |   V  Q  |         |         |
    2+10       6.6805     73.94  |         |    V  Q |         |         |
    2+15       7.2600     84.14  |         |     V   Q         |         |
    2+20       7.9174     95.45  |         |       V |  Q      |         |
    2+25       8.6576    107.49  |         |         V     Q   |         |
    2+30       9.4561    115.93  |         |          V      Q |         |
    2+35      10.3826    134.53  |         |          |   V     | Q       |
    2+40      11.4271    151.67  |         |          |     V   |     Q   |
    2+45      12.5576    164.15  |         |          |       V|         Q
    2+50      13.6832    163.43  |         |          |         V       Q|
    2+55      14.7085    148.88  |         |          |         |   V Q   |
    3+ 0      15.5665    124.58  |         |          |         Q     V   |
-------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                    Number of intervals =    61
                    Time interval =    5.0 (Min.)
                    Maximum/Peak flow rate =      164.147 (CFS)
                    Total volume =      17.239 (Ac.Ft)
             Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
             Peak (CFS)      0.000     0.000     0.000     0.000     0.000
             Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ***********************************************************************

      ------------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       15.000 to Point/Station        7.000
      **** STREAM ROUTING SCS CONVEX METHOD ****
      ________________________________________________________________________
      HYDROGRAPH STREAM ROUTING DATA:
      Length of stream =    478.00 (Ft.)
      Elevation difference =    5.70 (Ft.)
      Slope of channel =  0.011925 (Vert/Horiz)
      Channel type - Irregular Channel


      Channel evaluation using mean flow rate of hydrograph
      Depth of flow =     1.332(Ft.)
      Average velocity =     3.085(Ft/s)
      Total flow rate =    62.785(CFS)
             ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
             1              0.00              3.00
             2             23.00              0.00
             3             61.20              2.50
      Manning's 'N' friction factor =   0.040
      ------------------------------------------------------------------
      Sub-Channel flow  =     62.785(CFS)
        '     '       flow top width =     30.562(Ft.)
        '     '       velocity=    3.085(Ft/s)
        '     '       area =     20.352(Sq.Ft)
        '     '       Froude number =     0.666

      Travel time  =    0.33 min.
      Depth of flow =   1.332(Ft.)
      Average velocity =   3.085(Ft/s)
      Total irregular channel flow =    62.785(CFS)
      Irregular channel normal depth above invert elev. =   1.332(Ft.)
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```
Average velocity of channel(s) =   3.085(Ft/s)

Sub-Channel No. 1 Critical depth =      1.133(Ft.)
  '     '       '     Critical flow top width =     25.994(Ft.)
  '     '       '     Critical flow velocity=    4.264(Ft/s)
  '     '       '     Critical flow area =     14.723(Sq.Ft)



Channel evaluation using maximum flow rate of hydrograph
Depth of flow =     1.910(Ft.)
Average velocity =     3.923(Ft/s)
Total flow rate =   164.147(CFS)
       ******* Irregular Channel Data ***********
--------------------------------------------------------------
Sub-Channel flow  =    164.147(CFS)
  '     '       flow top width =     43.823(Ft.)
  '     '       velocity=    3.923(Ft/s)
  '     '       area =     41.845(Sq.Ft)
  '     '       Froude number =     0.707

Travel time  =    0.33 min.
Depth of flow =   1.910(Ft.)
Average velocity =   3.923(Ft/s)
Total irregular channel flow =   164.147(CFS)
Irregular channel normal depth above invert elev. =   1.910(Ft.)
Average velocity of channel(s) =   3.923(Ft/s)

Sub-Channel No. 1 Critical depth =      1.656(Ft.)
  '     '       '     Critical flow top width =     38.005(Ft.)
  '     '       '     Critical flow velocity=    5.215(Ft/s)
  '     '       '     Critical flow area =     31.473(Sq.Ft)



********************** SCS CONVEX CHANNEL ROUTING *********************
Convex method of stream routing  data items:
Using equation: Outflow =
O(t+dt) = (1-c*)O(t+dt-dt*) + Input(c*)
          where c* = 1 - (1-c)^e and dt = c(length)/velocity
          c(v/v+1.7) =   0.6977   Travel time =   2.03 (min.)
        dt*(unit time interval) =   5.00(min.),  e=   2.6859
        dt(routing time-step) =   1.42 (min.),   c* =   0.9598

Output hydrograph delayed by 0  unit time increments


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                  P R I N T  O F  S T O R M
               R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals (CFS)

     ----------------------------------------------------------------
Time(h+m) Out = O(CFS) In = I  0       41.0      82.1     123.1     164.1
-------------------------------------------------------------------------
  0+ 5       0.7036      1.02  O         |         |         |         |
  0+10       4.4522      6.03  |O        |         |         |         |
  0+15      10.5227     12.66  | OI      |         |         |         |
  0+20      14.6238     15.64  |  O      |         |         |         |
  0+25      17.2208     18.00  |   O     |         |         |         |
  0+30      20.0482     21.02  |   OI    |         |         |         |
  0+35      22.8667     23.76  |    O    |         |         |         |
  0+40      25.0102     25.63  |     O   |         |         |         |
  0+45      26.3686     26.74  |     O   |         |         |         |
  0+50      27.8273     28.34  |     O   |         |         |         |
  0+55      28.2216     28.20  |     O   |         |         |         |
  1+ 0      27.6318     27.37  |     O   |         |         |         |
  1+ 5      28.5238     29.03  |     OI  |         |         |         |
  1+10      31.9460     33.30  |      OI |         |         |         |
  1+15      36.6238     38.21  |       OI|         |         |         |
```

```
    1+20      39.6861     40.45  |        O|         |         |         |
    1+25      41.1590     41.53  |         O         |         |         |
    1+30      43.8449     44.92  |         O         |         |         |
    1+35      49.0227     50.95  |         |OI       |         |         |
    1+40      52.8336     53.80  |         | OI      |         |         |
    1+45      55.2188     55.92  |         |  O      |         |         |
    1+50      60.8195     63.09  |         |   OI    |         |         |
    1+55      67.0637     69.00  |         |     O   |         |         |
    2+ 0      70.2587     70.94  |         |      O  |         |         |
    2+ 5      70.6256     70.52  |         |      O  |         |         |
    2+10      72.8799     73.94  |         |      OI |         |         |
    2+15      80.9130     84.14  |         |        OI         |         |
    2+20      91.7878     95.45  |         |          | OI     |         |
    2+25     103.5825    107.49  |         |          |    OI  |         |
    2+30     113.1384    115.93  |         |          |      OI |         |
    2+35     128.6117    134.53  |         |          |         |OI       |
    2+40     146.0779    151.67  |         |          |         |    OI   |
    2+45     160.0251    164.15  |         |          |         |       O I
    2+50     163.4888    163.43  |         |          |         |        O|
    2+55     153.4252    148.88  |         |          |         |     IO  |
    3+ 0     132.3475    124.58  |         |          |         I O       |
    3+ 5      94.2441     80.02  |         |        I| O       |         |
    3+10      41.0525     22.53  |    I    O         |         |         |
    3+15      34.7493     39.21  |       OI|         |         |         |
    3+20      15.0209      4.30  |I O      |         |         |         |
    3+25      19.3998     25.63  |   O I   |         |         |         |
    3+30       8.8018      1.53  I O       |         |         |         |
    3+35      13.8254     18.98  |  OI     |         |         |         |
    3+40       6.4726      1.10  IO        |         |         |         |
    3+45      10.4061     14.32  | OI      |         |         |         |
    3+50       4.8745      0.82  IO        |         |         |         |
    3+55       7.7940     10.72  |OI       |         |         |         |
    4+ 0       3.6493      0.61  O         |         |         |         |
    4+ 5       5.8731      8.08  |O        |         |         |         |
    4+10       2.7505      0.46  O         |         |         |         |
    4+15       4.3767      6.02  |O        |         |         |         |
    4+20       2.0486      0.34  O         |         |         |         |
    4+25       2.8274      3.86  O         |         |         |         |
    4+30       1.3129      0.22  O         |         |         |         |
    4+35       1.5132      2.04  O         |         |         |         |
    4+40       0.6943      0.12  O         |         |         |         |
    4+45       0.8801      1.19  O         |         |         |         |
    4+50       0.4065      0.07  O         |         |         |         |
    4+55       0.5094      0.69  O         |         |         |         |
    5+ 0       0.2351      0.04  O         |         |         |         |
    5+ 5       0.0201      0.00  O         |         |         |         |
    5+10       0.0000      0.00  O         |         |         |         |
---------------------------------------------------------------------------

      ****************************HYDROGRAPH DATA**************************
                Number of intervals =    62
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =      163.489 (CFS)
                Total volume =      17.239 (Ac.Ft)
          Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
          Peak (CFS)      0.000     0.000     0.000     0.000     0.000
          Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ***************************************************************************

      ---------------------------------------------------------------------


      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        1.000 to Point/Station        7.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ___________________________________________________________________________
      ********************* HYDROGRAPH INFORMATION **********************

                    From study/file name: c3100.rte
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       P R I N T  O F  S T O R M
```

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Add q(CFS)	Tot. Q	0	56.2	112.4	168.6	224.8
0+ 5	3.7186	4.42	Q				
0+10	8.8530	13.31	qQ				
0+15	9.1350	19.66	q Q				
0+20	9.6569	24.28	q Q				
0+25	11.1053	28.33	q Q				
0+30	12.2005	32.25	q Q				
0+35	12.5788	35.45	q Q				
0+40	12.4491	37.46	q Q				
0+45	13.4756	39.84	q Q				
0+50	12.7759	40.60	q Q				
0+55	11.9157	40.14	q Q				
1+ 0	12.6857	40.32	q Q				
1+ 5	14.6468	43.17	q Q				
1+10	16.3709	48.32	q Q				
1+15	16.6595	53.28	q Q				
1+20	16.1390	55.83	q Q				
1+25	17.6211	58.78	q Q				
1+30	21.0941	64.94	q Q				
1+35	20.8333	69.86	q Q				
1+40	20.5093	73.34	q Q				
1+45	24.9487	80.17	q Q				
1+50	28.1448	88.96	q Q				
1+55	26.6266	93.69	q Q				
2+ 0	25.7151	95.97	q Q				
2+ 5	26.5710	97.20	q Q				
2+10	32.4229	105.30	q Q				
2+15	43.3893	124.30	q	Q			
2+20	42.7430	134.53	q	Q			
2+25	49.5776	153.16	q		Q		
2+30	71.7694	184.91	q			Q	
2+35	82.4290	211.04	q			Q	
2+40	78.7192	224.80	q			Q	
2+45	47.2516	207.28	q			Q	
2+50	19.9667	183.46	q			Q	
2+55	14.6278	168.05	q		Q		
3+ 0	10.2659	142.61	q	Q			
3+ 5	3.7844	98.03	q	Q			
3+10	0.6263	41.68	q Q				
3+15	0.0774	34.83	q Q				
3+20	0.0000	15.02	q Q				
3+25	0.0000	19.40	q Q				
3+30	0.0000	8.80	qQ				
3+35	0.0000	13.83	q Q				
3+40	0.0000	6.47	qQ				
3+45	0.0000	10.41	qQ				
3+50	0.0000	4.87	Q				
3+55	0.0000	7.79	qQ				
4+ 0	0.0000	3.65	Q				
4+ 5	0.0000	5.87	qQ				
4+10	0.0000	2.75	Q				
4+15	0.0000	4.38	Q				
4+20	0.0000	2.05	Q				
4+25	0.0000	2.83	Q				
4+30	0.0000	1.31	Q				
4+35	0.0000	1.51	Q				
4+40	0.0000	0.69	Q				
4+45	0.0000	0.88	Q				
4+50	0.0000	0.41	Q				
4+55	0.0000	0.51	Q				
5+ 0	0.0000	0.24	Q				
5+ 5	0.0000	0.02	Q				
5+10	0.0000	0.00	Q				

**********HYDROGRAPH DATA**********

```
                Number of intervals =    62
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =      224.797 (CFS)
                Total volume =      23.466 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
******************************************************************************

----------------------------------------------------------------------


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station       18.000
**** FLOWBY BASIN ROUTING OR SPLIT FLOW ****
______________________________________________________________________________
All flow in excess of   102.00(CFS) is diverted
into stream number 2
Total volume of excess flow diverted into flowby
basin (stream number 2 ) is       4.94(Ac.Ft)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                  P R I N T  O F  S T O R M
                Runoff     Hydrograph
----------------------------------------------------------------------
             Hydrograph in   5   Minute intervals (CFS)

----------------------------------------------------------------------
Time(h+m) Volume(Ac.Ft)   Q(CFS)  0       25.5      51.0      76.5     102.0
----------------------------------------------------------------------
  0+ 5       0.0305      4.42  VQ        |         |         |         |
  0+10       0.1221     13.31  V    Q    |         |         |         |
  0+15       0.2575     19.66  V      Q  |         |         |         |
  0+20       0.4247     24.28  V        Q|         |         |         |
  0+25       0.6198     28.33  |V        |Q        |         |         |
  0+30       0.8419     32.25  |V        | Q       |         |         |
  0+35       1.0860     35.45  | V       |  Q      |         |         |
  0+40       1.3440     37.46  | V       |   Q     |         |         |
  0+45       1.6184     39.84  |  V      |    Q    |         |         |
  0+50       1.8980     40.60  |   V     |    Q    |         |         |
  0+55       2.1744     40.14  |   V     |    Q    |         |         |
  1+ 0       2.4521     40.32  |    V    |    Q    |         |         |
  1+ 5       2.7494     43.17  |    V    |     Q   |         |         |
  1+10       3.0822     48.32  |     V   |       Q |         |         |
  1+15       3.4492     53.28  |      V  |         Q         |         |
  1+20       3.8336     55.83  |       V |         |Q        |         |
  1+25       4.2385     58.78  |        V|         |  Q      |         |
  1+30       4.6857     64.94  |         V         |    Q    |         |
  1+35       5.1668     69.86  |          V        |      Q  |         |
  1+40       5.6719     73.34  |         | V       |       Q |         |
  1+45       6.2240     80.17  |         |  V      |         |Q        |
  1+50       6.8367     88.96  |         |   V     |         |   Q     |
  1+55       7.4820     93.69  |         |     V   |         |     Q   |
  2+ 0       8.1430     95.97  |         |      V  |         |      Q  |
  2+ 5       8.8124     97.20  |         |        V|         |       Q |
  2+10       9.5148    102.00  |         |         V         |         Q
  2+15      10.2173    102.00  |         |           V       |         Q
  2+20      10.9198    102.00  |         |         |  V      |         Q
  2+25      11.6223    102.00  |         |         |    V    |         Q
  2+30      12.3248    102.00  |         |         |     V   |         Q
  2+35      13.0272    102.00  |         |         |       V |         Q
  2+40      13.7297    102.00  |         |         |        V|         Q
  2+45      14.4322    102.00  |         |         |          V        Q
  2+50      15.1347    102.00  |         |         |         | V       Q
  2+55      15.8371    102.00  |         |         |         |   V     Q
  3+ 0      16.5396    102.00  |         |         |         |    V    Q
  3+ 5      17.2148     98.03  |         |         |         |     VQ  |
  3+10      17.5018     41.68  |         |     Q   |         |     V   |
  3+15      17.7417     34.83  |         |  Q      |         |      V  |
  3+20      17.8451     15.02  |    Q    |         |         |      V  |
  3+25      17.9787     19.40  |      Q  |         |         |      V  |
```

```
    3+30      18.0393      8.80  |  Q      |         |         |       V |
    3+35      18.1345     13.83  |    Q    |         |         |        V|
    3+40      18.1791      6.47  | Q       |         |         |        V|
    3+45      18.2508     10.41  |   Q     |         |         |        V|
    3+50      18.2844      4.87  |Q        |         |         |        V|
    3+55      18.3380      7.79  |  Q      |         |         |        V|
    4+ 0      18.3632      3.65  |Q        |         |         |        V|
    4+ 5      18.4036      5.87  | Q       |         |         |        V|
    4+10      18.4226      2.75  |Q        |         |         |        V|
    4+15      18.4527      4.38  |Q        |         |         |        V|
    4+20      18.4668      2.05  Q         |         |         |        V|
    4+25      18.4863      2.83  |Q        |         |         |        V|
    4+30      18.4953      1.31  Q         |         |         |        V|
    4+35      18.5057      1.51  Q         |         |         |        V|
    4+40      18.5105      0.69  Q         |         |         |        V|
    4+45      18.5166      0.88  Q         |         |         |        V|
    4+50      18.5194      0.41  Q         |         |         |        V|
    4+55      18.5229      0.51  Q         |         |         |        V|
    5+ 0      18.5245      0.24  Q         |         |         |        V|
    5+ 5      18.5247      0.02  Q         |         |         |        V|
    5+10      18.5247      0.00  Q         |         |         |        V|
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    62
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      102.000 (CFS)
                  Total volume =      18.525 (Ac.Ft)
           Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000   122.797     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     4.941     0.000     0.000     0.000
      ************************************************************************

      ------------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       18.000 to Point/Station       19.000
      **** STREAM ROUTING SCS CONVEX METHOD ****
      ________________________________________________________________________
      HYDROGRAPH STREAM ROUTING DATA:
      Length of stream =   1867.00 (Ft.)
      Elevation difference =   18.00 (Ft.)
      Slope of channel =  0.009641 (Vert/Horiz)
      Channel type - Improved Channel


      Channel length =  1867.00(Ft.)     Elevation difference =  18.00(Ft.)
      Channel evaluation using mean flow rate of hydrograph
      Channel base width  =    5.000(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  =    5.000(Ft.)
      Flow(q) thru subarea =     67.556(CFS)
      Depth of flow =     1.208(Ft.)
      Average velocity =     9.007(Ft/s)
      Total flow rate =    67.556(CFS)
      Channel flow top width =    7.416(Ft.)
      Depth of flow in channel =   1.21(Ft.)
      Total number of channels (same dimensions) = 1
      Flow Velocity =    9.01(Ft/s)
      Travel time  =    0.33 min.
      Individual channel flow =   67.556(CFS)
      Total capacity of improved channels =     67.556(CFS)
      Critical Depth in Channel =    1.59(Ft.)


      Channel evaluation using maximum flow rate of hydrograph
      Flow(q) thru subarea =    102.000(CFS)
      Depth of flow =     1.532(Ft.)
```

Average velocity = 10.191(Ft/s)
Total flow rate = 102.000(CFS)
Channel flow top width = 8.064(Ft.)
Depth of flow in channel = 1.53(Ft.)
Total number of channels (same dimensions) = 1
Flow Velocity = 10.19(Ft/s)
Travel time = 0.33 min.
Individual channel flow = 102.000(CFS)
Total capacity of improved channels = 102.000(CFS)
Critical Depth in Channel = 2.03(Ft.)

********** SCS CONVEX CHANNEL ROUTING **********
Convex method of stream routing data items:
Using equation: Outflow =
O(t+dt) = (1-c*)O(t+dt-dt*) + Input(c*)
where c* = 1 - (1-c)^e and dt = c(length)/velocity
c(v/v+1.7) = 0.8570 Travel time = 3.05 (min.)
dt*(unit time interval) = 5.00(min.), e= 1.6071
dt(routing time-step) = 2.62 (min.), c* = 0.9561

Output hydrograph delayed by 0 unit time increments

++
P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Out = O(CFS)	In = I	0	25.5	51.0	76.5	102.0
0+ 5	2.0153	4.42	OI				
0+10	8.3647	13.31	O I				
0+15	15.9832	19.66	OI				
0+20	21.6032	24.28	OI				
0+25	26.0067	28.33	OI				
0+30	30.0119	32.25	OI				
0+35	33.6073	35.45	O				
0+40	36.2825	37.46	O				
0+45	38.4945	39.84	O				
0+50	40.1308	40.60	O				
0+55	40.3701	40.14	O				
1+ 0	40.2297	40.32	O				
1+ 5	41.6139	43.17	O				
1+10	45.4475	48.32	OI				
1+15	50.4542	53.28	OI				
1+20	54.3174	55.83	O				
1+25	57.1056	58.78	OI				
1+30	61.5133	64.94	OI				
1+35	67.0294	69.86	OI				
1+40	71.3209	73.34	OI				
1+45	76.3642	80.17	O I				
1+50	84.0094	88.96	O I				
1+55	90.9006	93.69	OI				
2+ 0	94.6085	95.97	O				
2+ 5	96.4711	97.20	OI				
2+10	99.3537	102.00	O I				
2+15	101.8839	102.00	OI				
2+20	101.9949	102.00	OI				
2+25	101.9998	102.00	OI				
2+30	102.0000	102.00	OI				
2+35	102.0000	102.00	OI				
2+40	102.0000	102.00	OI				
2+45	102.0000	102.00	OI				
2+50	102.0000	102.00	OI				
2+55	102.0000	102.00	OI				
3+ 0	102.0000	102.00	OI				
3+ 5	100.1901	98.03	IO				
3+10	72.4442	41.68	I			O	

```
    3+15      39.9065     34.83  |         |  I O    |         |         |
    3+20      26.0239     15.02  |    I    O         |         |         |
    3+25      17.4993     19.40  |     OI  |         |         |         |
    3+30      14.4867      8.80  |  I O    |         |         |         |
    3+35      11.3406     13.83  |   OI    |         |         |         |
    3+40      10.3656      6.47  | I O     |         |         |         |
    3+45       8.4360     10.41  |  OI     |         |         |         |
    3+50       7.7988      4.87  |I O      |         |         |         |
    3+55       6.3333      7.79  | OI      |         |         |         |
    4+ 0       5.8411      3.65  |IO       |         |         |         |
    4+ 5       4.7589      5.87  |OI       |         |         |         |
    4+10       4.4012      2.75  |O        |         |         |         |
    4+15       3.5640      4.38  |O        |         |         |         |
    4+20       3.2801      2.05  IO        |         |         |         |
    4+25       2.4576      2.83  OI        |         |         |         |
    4+30       2.1210      1.31  O         |         |         |         |
    4+35       1.4397      1.51  O         |         |         |         |
    4+40       1.1368      0.69  O         |         |         |         |
    4+45       0.7984      0.88  O         |         |         |         |
    4+50       0.6607      0.41  O         |         |         |         |
    4+55       0.4646      0.51  O         |         |         |         |
    5+ 0       0.3824      0.24  O         |         |         |         |
    5+ 5       0.1436      0.02  O         |         |         |         |
    5+10       0.0164      0.00  O         |         |         |         |
    5+15       0.0000      0.00  O         |         |         |         |
--------------------------------------------------------------------------

      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    63
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      102.000 (CFS)
                  Total volume =      18.525 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000   122.797     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     4.941     0.000     0.000     0.000
      ***********************************************************************

      ---------------------------------------------------------------------


      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       18.000 to Point/Station       19.000
      **** STORE OR DELETE CURRENT HYDROGRAPH ****
      _____________________________________________________________________
      Current stream hydrograph saved in file route18to19.rte
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =     0
                  Time interval =    0.0 (Min.)
                  Maximum/Peak flow rate =        0.000 (CFS)
                  Total volume =       0.000 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000   122.797     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     4.941     0.000     0.000     0.000
      ***********************************************************************

      ---------------------------------------------------------------------


      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        5.000 to Point/Station       16.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      _____________________________________________________________________
      ********************* HYDROGRAPH INFORMATION **********************

                  From study/file name: route5to16.rte
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     P R I N T  O F  S T O R M
                  R u n o f f     H y d r o g r a p h
      ---------------------------------------------------------------------
               Hydrograph in   5   Minute intervals (CFS)
```

Time(h+m)	Add q(CFS)	Tot. Q	0	65.0	130.1	195.1	260.2
0+ 5	1.4117	1.41	Q				
0+10	8.8295	8.83	Q				
0+15	17.6328	17.63	Q				
0+20	22.1954	22.20	Q				
0+25	25.7124	25.71	Q				
0+30	29.5847	29.58	Q				
0+35	33.3511	33.35	Q				
0+40	35.5529	35.55	Q				
0+45	37.2940	37.29	Q				
0+50	39.1838	39.18	Q				
0+55	38.8700	38.87	Q				
1+ 0	38.0190	38.02	Q				
1+ 5	39.7835	39.78	Q				
1+10	44.9382	44.94	Q				
1+15	50.6676	50.67	Q				
1+20	53.8078	53.81	Q				
1+25	55.0610	55.06	Q				
1+30	59.4903	59.49	Q				
1+35	66.6028	66.60	Q				
1+40	69.7228	69.72	Q				
1+45	73.1973	73.20	Q				
1+50	82.8461	82.85	Q				
1+55	90.9261	90.93	Q				
2+ 0	92.3841	92.38	Q				
2+ 5	92.5807	92.58	Q				
2+10	96.9669	96.97	Q				
2+15	113.1304	113.13	Q				
2+20	135.5617	135.56	Q				
2+25	147.0346	147.03	Q				
2+30	175.5479	175.55	Q				
2+35	223.0195	223.02	Q				
2+40	260.1906	260.19	Q				
2+45	255.9092	255.91	Q				
2+50	198.5319	198.53	Q				
2+55	134.2433	134.24	Q				
3+ 0	95.4399	95.44	Q				
3+ 5	69.0367	69.04	Q				
3+10	46.0697	46.07	Q				
3+15	29.8456	29.85	Q				
3+20	20.1562	20.16	Q				
3+25	14.3860	14.39	Q				
3+30	11.0387	11.04	Q				
3+35	8.8627	8.86	Q				
3+40	7.2537	7.25	Q				
3+45	5.9914	5.99	Q				
3+50	4.9717	4.97	Q				
3+55	4.1784	4.18	Q				
4+ 0	3.5764	3.58	Q				
4+ 5	3.0907	3.09	Q				
4+10	2.6784	2.68	Q				
4+15	2.3176	2.32	Q				
4+20	1.8372	1.84	Q				
4+25	1.2808	1.28	Q				
4+30	0.7188	0.72	Q				
4+35	0.3285	0.33	Q				
4+40	0.1759	0.18	Q				
4+45	0.0974	0.10	Q				
4+50	0.0331	0.03	Q				
4+55	0.0046	0.00	Q				
5+ 0	0.0000	0.00	Q				

**********HYDROGRAPH DATA**********

Number of intervals = 60
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 260.191 (CFS)
Total volume = 22.542 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	122.797	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	4.941	0.000	0.000	0.000

****

++
Process from Point/Station 16.000 to Point/Station 16.000
**** ADD/COMBINE/RECOVER HYDROGRAPHS ****

From stored stream number 2 the total
volume of 4.94 (Ac.Ft) is being added to the
current hydrograph at its original rate from user
with a delay time to start of addition of 0.00 hours.
++

P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Add q(CFS)	Tot. Q	0	95.7	191.5	287.2	383.0
0+ 5	0.0000	1.41	Q				
0+10	0.0000	8.83	Q				
0+15	0.0000	17.63	qQ				
0+20	0.0000	22.20	q Q				
0+25	0.0000	25.71	q Q				
0+30	0.0000	29.58	q Q				
0+35	0.0000	33.35	q Q				
0+40	0.0000	35.55	q Q				
0+45	0.0000	37.29	q Q				
0+50	0.0000	39.18	q Q				
0+55	0.0000	38.87	q Q				
1+ 0	0.0000	38.02	q Q				
1+ 5	0.0000	39.78	q Q				
1+10	0.0000	44.94	q Q				
1+15	0.0000	50.67	q Q				
1+20	0.0000	53.81	q Q				
1+25	0.0000	55.06	q Q				
1+30	0.0000	59.49	q Q				
1+35	0.0000	66.60	q Q				
1+40	0.0000	69.72	q Q				
1+45	0.0000	73.20	q Q				
1+50	0.0000	82.85	q Q				
1+55	0.0000	90.93	q Q				
2+ 0	0.0000	92.38	q Q				
2+ 5	0.0000	92.58	q Q				
2+10	3.3028	100.27	q Q				
2+15	22.3023	135.43	q	Q			
2+20	32.5308	168.09	q	Q			
2+25	51.1601	198.19	q	Q			
2+30	82.9077	258.46	q	Q			
2+35	109.0408	332.06	q	Q			
2+40	122.7971	382.99	q	Q			
2+45	105.2767	361.19	q	Q			
2+50	81.4555	279.99	q	Q			
2+55	66.0530	200.30	q	Q			
3+ 0	40.6134	136.05	q	Q			
3+ 5	0.0000	69.04	q Q				
3+10	0.0000	46.07	q Q				
3+15	0.0000	29.85	q Q				
3+20	0.0000	20.16	q Q				
3+25	0.0000	14.39	qQ				
3+30	0.0000	11.04	qQ				
3+35	0.0000	8.86	Q				
3+40	0.0000	7.25	Q				
3+45	0.0000	5.99	Q				
3+50	0.0000	4.97	Q				

3+55	0.0000	4.18	Q	|	|	|	|
4+ 0	0.0000	3.58	Q	|	|	|	|
4+ 5	0.0000	3.09	Q	|	|	|	|
4+10	0.0000	2.68	Q	|	|	|	|
4+15	0.0000	2.32	Q	|	|	|	|
4+20	0.0000	1.84	Q	|	|	|	|
4+25	0.0000	1.28	Q	|	|	|	|
4+30	0.0000	0.72	Q	|	|	|	|
4+35	0.0000	0.33	Q	|	|	|	|
4+40	0.0000	0.18	Q	|	|	|	|
4+45	0.0000	0.10	Q	|	|	|	|
4+50	0.0000	0.03	Q	|	|	|	|
4+55	0.0000	0.00	Q	|	|	|	|
5+ 0	0.0000	0.00	Q	|	|	|	|
5+ 5	0.0000	0.00	Q	|	|	|	|
5+10	0.0000	0.00	Q	|	|	|	|
5+15	0.0000	0.00	Q	|	|	|	|

**********HYDROGRAPH DATA**********

Number of intervals = 63
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 382.988 (CFS)
Total volume = 27.483 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++++++++++

Process from Point/Station 16.000 to Point/Station 17.000

**** RETARDING BASIN ROUTING ****

_____

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 63
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.040	1.550	0.035	0.045
1.500	0.119	13.060	0.074	0.164
2.500	0.198	34.260	0.080	0.316
3.500	0.278	63.600	0.059	0.497
4.500	0.357	98.990	0.016	0.698
5.500	0.436	136.460	-0.034	0.906
6.500	0.516	169.690	-0.068	1.100
7.500	0.595	191.400	-0.064	1.254
8.500	0.674	210.130	-0.050	1.398
9.500	0.763	228.060	-0.022	1.548
10.000	0.925	236.700	0.110	1.740
10.500	1.108	245.140	0.264	1.952
11.500	1.514	261.430	0.614	2.414
12.500	1.978	276.980	1.024	2.932
13.000	2.232	284.500	1.252	3.212
13.500	2.501	291.850	1.496	3.506
14.500	3.086	306.110	2.032	4.140

15.500	3.734	319.800	2.633	4.835
15.620	3.817	321.410	2.710	4.924

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 95.7 191.49 287.24 382.99	Depth (Ft.)
0.083	1.41	0.17	0.004	O	0.05
0.167	8.83	1.33	0.034	O	0.43
0.250	17.63	8.88	0.090	OI	1.14
0.333	22.20	17.65	0.136	|O	1.72
0.417	25.71	23.71	0.159	|OI	2.00
0.500	29.58	27.49	0.173	| O	2.18
0.583	33.35	31.31	0.187	| O	2.36
0.667	35.55	34.34	0.198	| O	2.50
0.750	37.29	36.67	0.205	| O	2.58
0.833	39.18	38.42	0.209	| O	2.64
0.917	38.87	39.10	0.211	| O	2.66
1.000	38.02	38.37	0.209	| O	2.64
1.083	39.78	38.96	0.211	| O	2.66
1.167	44.94	42.76	0.221	| O	2.79
1.250	50.67	48.39	0.237	| O	2.98
1.333	53.81	52.68	0.248	| O	3.13
1.417	55.06	54.64	0.254	| O	3.19
1.500	59.49	57.58	0.262	| O	3.29
1.583	66.60	63.69	0.278	| O	3.50
1.667	69.72	69.12	0.290	| O	3.66
1.750	73.20	71.96	0.297	| O	3.74
1.833	82.85	79.32	0.313	| O	3.94
1.917	90.93	88.50	0.334	| O|	4.20
2.000	92.38	92.33	0.342	| O|	4.31
2.083	92.58	92.52	0.343	| O|	4.32
2.167	100.27	97.26	0.353	| O	4.45
2.250	135.43	122.76	0.407	| OI	5.13
2.333	168.09	157.60	0.487	| OI	6.14
2.417	198.19	184.54	0.570	| OI	7.18
2.500	258.46	223.15	0.739	| O I	9.23
2.583	332.06	246.96	1.153	| O | I |	10.61
2.667	382.99	271.97	1.829	| O | I	12.18
2.750	361.19	290.57	2.454	| O I |	13.41
2.833	279.99	295.34	2.644	| IO |	13.75
2.917	200.30	286.24	2.296	| I O|	13.12
3.000	136.05	263.05	1.562	| I | O |	11.60
3.083	69.04	205.58	0.655	| I |O |	8.26
3.167	46.07	38.68	0.210	| O |	2.65
3.250	29.85	37.87	0.208	| IO |	2.62
3.333	20.16	25.00	0.164	|IO |	2.06
3.417	14.39	17.58	0.136	|O |	1.71
3.500	11.04	12.95	0.118	IO |	1.49
3.583	8.86	10.95	0.104	O |	1.32
3.667	7.25	9.02	0.091	O |	1.15
3.750	5.99	7.42	0.080	O |	1.01
3.833	4.97	6.12	0.071	O |	0.90
3.917	4.18	5.09	0.064	O |	0.81
4.000	3.58	4.28	0.059	O |	0.74
4.083	3.09	3.65	0.054	O |	0.68
4.167	2.68	3.14	0.051	O |	0.64
4.250	2.32	2.71	0.048	O |	0.60
4.333	1.84	2.29	0.045	O |	0.56
4.417	1.28	1.80	0.042	O |	0.52
4.500	0.72	1.45	0.037	O |	0.47
4.583	0.33	1.23	0.032	O |	0.40
4.667	0.18	1.00	0.026	O |	0.32
4.750	0.10	0.80	0.021	O |	0.26
4.833	0.03	0.63	0.016	O |	0.20
4.917	0.00	0.48	0.012	O |	0.16
5.000	0.00	0.37	0.010	O |	0.12
5.083	0.00	0.28	0.007	O |	0.09

```
5.167    0.00    0.22      0.006  O       |       |       |       |     0.07
5.250    0.00    0.17      0.004  O       |       |       |       |     0.05
5.333    0.00    0.13      0.003  O       |       |       |       |     0.04
5.417    0.00    0.10      0.002  O       |       |       |       |     0.03
5.500    0.00    0.07      0.002  O       |       |       |       |     0.02
5.583    0.00    0.06      0.001  O       |       |       |       |     0.02
5.667    0.00    0.04      0.001  O       |       |       |       |     0.01
5.750    0.00    0.03      0.001  O       |       |       |       |     0.01
5.833    0.00    0.03      0.001  O       |       |       |       |     0.01
5.917    0.00    0.02      0.000  O       |       |       |       |     0.01
6.000    0.00    0.01      0.000  O       |       |       |       |     0.00
6.083    0.00    0.01      0.000  O       |       |       |       |     0.00
6.167    0.00    0.01      0.000  O       |       |       |       |     0.00
6.250    0.00    0.01      0.000  O       |       |       |       |     0.00
6.333    0.00    0.01      0.000  O       |       |       |       |     0.00
6.417    0.00    0.00      0.000  O       |       |       |       |     0.00
6.500    0.00    0.00      0.000  O       |       |       |       |     0.00

**************************HYDROGRAPH DATA**************************
               Number of intervals =    78
               Time interval =    5.0 (Min.)
               Maximum/Peak flow rate =      295.344 (CFS)
               Total volume =      27.483 (Ac.Ft)
       Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
       Peak (CFS)      0.000     0.000     0.000     0.000     0.000
       Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       19.000
**** STREAM ROUTING SCS CONVEX METHOD ****
________________________________________________________________________
HYDROGRAPH STREAM ROUTING DATA:
Length of stream =   1491.00 (Ft.)
Elevation difference =    4.50 (Ft.)
Slope of channel =  0.003018 (Vert/Horiz)
Channel type - Pipe


Pipe length  =  1491.00(Ft.)   Elevation difference =   4.50(Ft.)
Manning's N = 0.013   No. of pipes = 1
Pipe evaluation using mean flow rate of hydrograph
Required pipe flow  =   102.565(CFS)
Nearest computed pipe diameter  =     54.00(In.)
Calculated individual pipe flow  =   102.565(CFS)
Normal flow depth in pipe =   42.00(In.)
Flow top width inside pipe =   44.90(In.)
Critical Depth =    2.98(Ft.)
Pipe flow velocity =      7.73(Ft/s)
Travel time through pipe =    3.21 min.


Pipe length  =  1491.00(Ft.)   Elevation difference =   4.50(Ft.)
Manning's N = 0.013   No. of pipes = 1
Pipe evaluation using maximum flow rate of hydrograph
Required pipe flow  =   295.344(CFS)
Nearest computed pipe diameter  =     78.00(In.)
Calculated individual pipe flow  =   295.344(CFS)
Normal flow depth in pipe =   65.81(In.)
Flow top width inside pipe =   56.64(In.)
Critical Depth =    4.62(Ft.)
Pipe flow velocity =      9.88(Ft/s)
Travel time through pipe =    2.52 min.


********************** SCS CONVEX CHANNEL ROUTING ********************
Convex method of stream routing  data items:
```

Using equation: Outflow =
O(t+dt) = (1-c*)O(t+dt-dt*) + Input(c*)
where c* = 1 - (1-c)^e and dt = c(length)/velocity
c(v/v+1.7) = 0.8532 Travel time = 2.52 (min.)
dt*(unit time interval) = 5.00(min.), e= 1.8866
dt(routing time-step) = 2.15 (min.), c* = 0.9732

Output hydrograph delayed by 0 unit time increments

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P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Out = O(CFS)	In = I	0	73.8	147.7	221.5	295.3
0+ 5	0.0923	0.17	O				
0+10	0.8122	1.33	O				
0+15	5.5135	8.88	OI				
0+20	13.6641	17.65	|OI				
0+25	20.9077	23.71	| OI				
0+30	25.7344	27.49	| O				
0+35	29.5668	31.31	| O				
0+40	32.9464	34.34	| O				
0+45	35.5942	36.67	| O				
0+50	37.6125	38.42	| O				
0+55	38.7753	39.10	| O				
1+ 0	38.6839	38.37	| O				
1+ 5	38.7074	38.96	| O				
1+10	41.0631	42.76	| O				
1+15	45.8399	48.39	| O				
1+20	50.7072	52.68	| OI				
1+25	53.7167	54.64	| O				
1+30	56.2487	57.58	| O				
1+35	60.9386	63.69	| O				
1+40	66.6308	69.12	| O				
1+45	70.6300	71.96	| O				
1+50	76.0103	79.32	| O				
1+55	84.3299	88.50	| O				
2+ 0	90.5156	92.33	| O				
2+ 5	92.3835	92.52	| O				
2+10	95.1473	97.26	| OI				
2+15	111.3714	122.76	| OI				
2+20	141.8095	157.60	| O		I		
2+25	172.1423	184.54	|		OI		
2+30	205.6572	223.15	|		O I		
2+35	235.9062	246.96	|		O I		
2+40	260.5574	271.97	|		OI		
2+45	281.9967	290.57	|		OI		
2+50	292.9915	295.34	|		OI		
2+55	290.2216	286.24	|		IO		
3+ 0	273.4617	263.05	|		I O		
3+ 5	231.4014	205.58	|		I O		
3+10	113.5566	38.68	| I | O				
3+15	40.2387	37.87	| O				
3+20	30.7882	25.00	| IO				
3+25	21.0331	17.58	| O				
3+30	15.0998	12.95	|IO				
3+35	11.8953	10.95	|O				
3+40	9.8998	9.02	|O				
3+45	8.1516	7.42	|O				
3+50	6.7182	6.12	O				
3+55	5.5648	5.09	O				
4+ 0	4.6520	4.28	O				
4+ 5	3.9383	3.65	O				
4+10	3.3721	3.14	O				
4+15	2.9065	2.71	O				
4+20	2.4806	2.29	O				

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    4+25       2.0222      1.80  O         |         |         |         |
    4+30       1.6117      1.45  O         |         |         |         |
    4+35       1.3330      1.23  O         |         |         |         |
    4+40       1.1063      1.00  O         |         |         |         |
    4+45       0.8908      0.80  O         |         |         |         |
    4+50       0.7043      0.63  O         |         |         |         |
    4+55       0.5479      0.48  O         |         |         |         |
    5+ 0       0.4213      0.37  O         |         |         |         |
    5+ 5       0.3224      0.28  O         |         |         |         |
    5+10       0.2465      0.22  O         |         |         |         |
    5+15       0.1885      0.17  O         |         |         |         |
    5+20       0.1441      0.13  O         |         |         |         |
    5+25       0.1102      0.10  O         |         |         |         |
    5+30       0.0842      0.07  O         |         |         |         |
    5+35       0.0644      0.06  O         |         |         |         |
    5+40       0.0492      0.04  O         |         |         |         |
    5+45       0.0376      0.03  O         |         |         |         |
    5+50       0.0288      0.03  O         |         |         |         |
    5+55       0.0220      0.02  O         |         |         |         |
    6+ 0       0.0168      0.01  O         |         |         |         |
    6+ 5       0.0129      0.01  O         |         |         |         |
    6+10       0.0098      0.01  O         |         |         |         |
    6+15       0.0075      0.01  O         |         |         |         |
    6+20       0.0057      0.01  O         |         |         |         |
    6+25       0.0044      0.00  O         |         |         |         |
    6+30       0.0034      0.00  O         |         |         |         |
    6+35       0.0013      0.00  O         |         |         |         |
    6+40       0.0000      0.00  O         |         |         |         |
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    80
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      292.992 (CFS)
                  Total volume =      27.483 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ************************************************************************

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      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       17.000 to Point/Station       19.000
      **** STORE OR DELETE CURRENT HYDROGRAPH ****
      ________________________________________________________________________
      Current stream hydrograph saved in file route17to19.rte
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =     0
                  Time interval =    0.0 (Min.)
                  Maximum/Peak flow rate =        0.000 (CFS)
                  Total volume =       0.000 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ************************************************************************

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      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       25.000 to Point/Station       19.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ________________________________________________________________________
      ********************** HYDROGRAPH INFORMATION **********************

                  From study/file name: d3100.rte
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        P R I N T  O F  S T O R M
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R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Add q(CFS)	Tot. Q	0	18.0	36.0	54.1	72.1
0+ 5	1.0423	1.04	Q				
0+10	5.0887	5.09	Q				
0+15	6.2700	6.27	Q				
0+20	6.5100	6.51	Q				
0+25	7.7290	7.73	Q				
0+30	8.3609	8.36	Q				
0+35	9.2333	9.23	Q				
0+40	8.9050	8.90	Q				
0+45	9.6671	9.67	Q				
0+50	9.6636	9.66	Q				
0+55	8.9106	8.91	Q				
1+ 0	9.1093	9.11	Q				
1+ 5	10.2355	10.24	Q				
1+10	12.4613	12.46	Q				
1+15	13.2136	13.21	Q				
1+20	13.1856	13.19	Q				
1+25	13.0029	13.00	Q				
1+30	16.5232	16.52	Q				
1+35	17.7578	17.76	Q				
1+40	17.0270	17.03	Q				
1+45	19.4683	19.47	Q				
1+50	23.3244	23.32	Q				
1+55	23.2076	23.21	Q				
2+ 0	22.2798	22.28	Q				
2+ 5	22.6611	22.66	Q				
2+10	25.1031	25.10	Q				
2+15	33.4904	33.49	Q				
2+20	38.4239	38.42	Q				
2+25	36.9681	36.97	Q				
2+30	56.2020	56.20	Q				
2+35	66.6530	66.65	Q				
2+40	72.0799	72.08	Q				
2+45	54.6204	54.62	Q				
2+50	26.5192	26.52	Q				
2+55	16.2648	16.26	Q				
3+ 0	11.3232	11.32	Q				
3+ 5	5.7661	5.77	Q				
3+10	2.1252	2.13	Q				
3+15	0.7196	0.72	Q				
3+20	0.2393	0.24	Q				
3+25	0.0972	0.10	Q				
3+30	0.0315	0.03	Q				
3+35	0.0043	0.00	Q				

**********HYDROGRAPH DATA**********

Number of intervals = 43
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 72.080 (CFS)
Total volume = 5.244 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 25.000 to Point/Station 19.000

**** STORE OR DELETE CURRENT HYDROGRAPH ****

Current stream hydrograph saved in file route25to19.rte

**********HYDROGRAPH DATA**********

```
                Number of intervals =     0
                Time interval =    0.0 (Min.)
                Maximum/Peak flow rate =        0.000 (CFS)
                Total volume =       0.000 (Ac.Ft)
        Status of hydrographs being held in storage
                  Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
*******************************************************************************

-------------------------------------------------------------------------


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** ADD/COMBINE/RECOVER HYDROGRAPHS ****
_______________________________________________________________________________
********************* HYDROGRAPH INFORMATION **********************

                From study/file name: route18to19.rte
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                   P R I N T  O F  S T O R M
                R u n o f f     H y d r o g r a p h
-------------------------------------------------------------------------------
             Hydrograph in   5   Minute intervals (CFS)

-------------------------------------------------------------------------------
Time(h+m) Add q(CFS)  Tot. Q   0       25.5      51.0      76.5     102.0
-------------------------------------------------------------------------------
  0+ 5       2.0153      2.02  Q         |         |         |         |
  0+10       8.3647      8.36  |  Q      |         |         |         |
  0+15      15.9832     15.98  |     Q   |         |         |         |
  0+20      21.6032     21.60  |       Q |         |         |         |
  0+25      26.0067     26.01  |         Q         |         |         |
  0+30      30.0119     30.01  |         |Q        |         |         |
  0+35      33.6073     33.61  |         |  Q      |         |         |
  0+40      36.2825     36.28  |         |   Q     |         |         |
  0+45      38.4945     38.49  |         |    Q    |         |         |
  0+50      40.1308     40.13  |         |    Q    |         |         |
  0+55      40.3701     40.37  |         |    Q    |         |         |
  1+ 0      40.2297     40.23  |         |    Q    |         |         |
  1+ 5      41.6139     41.61  |         |     Q   |         |         |
  1+10      45.4475     45.45  |         |      Q  |         |         |
  1+15      50.4542     50.45  |         |        Q|         |         |
  1+20      54.3174     54.32  |         |         |Q        |         |
  1+25      57.1056     57.11  |         |         | Q       |         |
  1+30      61.5133     61.51  |         |         |   Q     |         |
  1+35      67.0294     67.03  |         |         |     Q   |         |
  1+40      71.3209     71.32  |         |         |      Q  |         |
  1+45      76.3642     76.36  |         |         |        Q|         |
  1+50      84.0094     84.01  |         |         |         | Q       |
  1+55      90.9006     90.90  |         |         |         |    Q    |
  2+ 0      94.6085     94.61  |         |         |         |      Q  |
  2+ 5      96.4711     96.47  |         |         |         |      Q  |
  2+10      99.3537     99.35  |         |         |         |       Q |
  2+15     101.8839    101.88  |         |         |         |        Q|
  2+20     101.9949    101.99  |         |         |         |        Q|
  2+25     101.9998    102.00  |         |         |         |        Q|
  2+30     102.0000    102.00  |         |         |         |        Q|
  2+35     102.0000    102.00  |         |         |         |        Q|
  2+40     102.0000    102.00  |         |         |         |        Q|
  2+45     102.0000    102.00  |         |         |         |        Q|
  2+50     102.0000    102.00  |         |         |         |        Q|
  2+55     102.0000    102.00  |         |         |         |        Q|
  3+ 0     102.0000    102.00  |         |         |         |         Q
  3+ 5     100.1901    100.19  |         |         |         |        Q|
  3+10      72.4442     72.44  |         |         |       Q |         |
  3+15      39.9065     39.91  |         |    Q    |         |         |
  3+20      26.0239     26.02  |         Q         |         |         |
  3+25      17.4993     17.50  |     Q   |         |         |         |
  3+30      14.4867     14.49  |    Q    |         |         |         |
```

3+35	11.3406	11.34	| Q	|	|	|	|
3+40	10.3656	10.37	| Q	|	|	|	|
3+45	8.4360	8.44	| Q	|	|	|	|
3+50	7.7988	7.80	| Q	|	|	|	|
3+55	6.3333	6.33	| Q	|	|	|	|
4+ 0	5.8411	5.84	| Q	|	|	|	|
4+ 5	4.7589	4.76	|Q	|	|	|	|
4+10	4.4012	4.40	|Q	|	|	|	|
4+15	3.5640	3.56	|Q	|	|	|	|
4+20	3.2801	3.28	|Q	|	|	|	|
4+25	2.4576	2.46	Q	|	|	|	|
4+30	2.1210	2.12	Q	|	|	|	|
4+35	1.4397	1.44	Q	|	|	|	|
4+40	1.1368	1.14	Q	|	|	|	|
4+45	0.7984	0.80	Q	|	|	|	|
4+50	0.6607	0.66	Q	|	|	|	|
4+55	0.4646	0.46	Q	|	|	|	|
5+ 0	0.3824	0.38	Q	|	|	|	|
5+ 5	0.1436	0.14	Q	|	|	|	|
5+10	0.0164	0.02	Q	|	|	|	|
5+15	0.0000	0.00	Q	|	|	|	|

**********HYDROGRAPH DATA**********

Number of intervals = 63
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 102.000 (CFS)
Total volume = 18.525 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++++++++++

Process from Point/Station 25.000 to Point/Station 19.000
**** ADD/COMBINE/RECOVER HYDROGRAPHS ****

****

********** HYDROGRAPH INFORMATION **********

From study/file name: route25to19.rte

++++++++++

P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Add q(CFS)	Tot. Q	0	43.5	87.0	130.6	174.1
0+ 5	1.0423	3.06	Q	|	|	|	|
0+10	5.0887	13.45	|q Q	|	|	|	|
0+15	6.2700	22.25	|q Q	|	|	|	|
0+20	6.5100	28.11	|q Q	|	|	|	|
0+25	7.7290	33.74	|q Q	|	|	|	|
0+30	8.3609	38.37	|q Q	|	|	|	|
0+35	9.2333	42.84	| q Q|	|	|	|	|
0+40	8.9050	45.19	| q Q	|	|	|	|
0+45	9.6671	48.16	| q |Q	|	|	|	|
0+50	9.6636	49.79	| q |Q	|	|	|	|
0+55	8.9106	49.28	| q |Q	|	|	|	|
1+ 0	9.1093	49.34	| q |Q	|	|	|	|
1+ 5	10.2355	51.85	| q |Q	|	|	|	|
1+10	12.4613	57.91	| q | Q	|	|	|	|
1+15	13.2136	63.67	| q | Q	|	|	|	|
1+20	13.1856	67.50	| q | Q	|	|	|	|
1+25	13.0029	70.11	| q | Q	|	|	|	|
1+30	16.5232	78.04	| q | Q	|	|	|	|
1+35	17.7578	84.79	| q | Q|	|	|	|	|

```
    1+40      17.0270     88.35  |  q      |         Q         |         |
    1+45      19.4683     95.83  |   q     |         | Q       |         |
    1+50      23.3244    107.33  |    q    |         |   Q     |         |
    1+55      23.2076    114.11  |    q    |         |     Q   |         |
    2+ 0      22.2798    116.89  |    q    |         |     Q   |         |
    2+ 5      22.6611    119.13  |    q    |         |      Q  |         |
    2+10      25.1031    124.46  |    q    |         |       Q |         |
    2+15      33.4904    135.37  |      q  |         |         |Q        |
    2+20      38.4239    140.42  |       q |         |         | Q       |
    2+25      36.9681    138.97  |       q |         |         |Q        |
    2+30      56.2020    158.20  |         | q       |         |     Q   |
    2+35      66.6530    168.65  |         |    q    |         |       Q |
    2+40      72.0799    174.08  |         |     q   |         |         Q
    2+45      54.6204    156.62  |         | q       |         |    Q    |
    2+50      26.5192    128.52  |     q   |         |         |Q        |
    2+55      16.2648    118.26  |  q      |         |       Q |         |
    3+ 0      11.3232    113.32  | q       |         |     Q   |         |
    3+ 5       5.7661    105.96  |q        |         |   Q     |         |
    3+10       2.1252     74.57  q         |      Q  |         |         |
    3+15       0.7196     40.63  q        Q|         |         |         |
    3+20       0.2393     26.26  q     Q   |         |         |         |
    3+25       0.0972     17.60  q   Q     |         |         |         |
    3+30       0.0315     14.52  q  Q      |         |         |         |
    3+35       0.0043     11.34  q Q       |         |         |         |
    3+40       0.0000     10.37  q Q       |         |         |         |
    3+45       0.0000      8.44  qQ        |         |         |         |
    3+50       0.0000      7.80  qQ        |         |         |         |
    3+55       0.0000      6.33  qQ        |         |         |         |
    4+ 0       0.0000      5.84  qQ        |         |         |         |
    4+ 5       0.0000      4.76  qQ        |         |         |         |
    4+10       0.0000      4.40  qQ        |         |         |         |
    4+15       0.0000      3.56  Q         |         |         |         |
    4+20       0.0000      3.28  Q         |         |         |         |
    4+25       0.0000      2.46  Q         |         |         |         |
    4+30       0.0000      2.12  Q         |         |         |         |
    4+35       0.0000      1.44  Q         |         |         |         |
    4+40       0.0000      1.14  Q         |         |         |         |
    4+45       0.0000      0.80  Q         |         |         |         |
    4+50       0.0000      0.66  Q         |         |         |         |
    4+55       0.0000      0.46  Q         |         |         |         |
    5+ 0       0.0000      0.38  Q         |         |         |         |
    5+ 5       0.0000      0.14  Q         |         |         |         |
    5+10       0.0000      0.02  Q         |         |         |         |
    5+15       0.0000      0.00  Q         |         |         |         |
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =    63
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      174.080 (CFS)
                  Total volume =      23.769 (Ac.Ft)
            Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ************************************************************************

      ------------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       17.000 to Point/Station       19.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ________________________________________________________________________
      ********************** HYDROGRAPH INFORMATION **********************

                  From study/file name: route17to19.rte
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     P R I N T  O F  S T O R M
                  R u n o f f     H y d r o g r a p h
      ------------------------------------------------------------------------
               Hydrograph in   5   Minute intervals (CFS)
```

Time(h+m)	Add q(CFS)	Tot. Q	0	109.7	219.3	329.0	438.6
0+ 5	0.0923	3.15	Q				
0+10	0.8122	14.27	qQ				
0+15	5.5135	27.77	q Q				
0+20	13.6641	41.78	q Q				
0+25	20.9077	54.64	q Q				
0+30	25.7344	64.11	q Q				
0+35	29.5668	72.41	q Q				
0+40	32.9464	78.13	q Q				
0+45	35.5942	83.76	q Q				
0+50	37.6125	87.41	q Q				
0+55	38.7753	88.06	q Q				
1+ 0	38.6839	88.02	q Q				
1+ 5	38.7074	90.56	q Q				
1+10	41.0631	98.97	q Q				
1+15	45.8399	109.51	q Q				
1+20	50.7072	118.21	q Q				
1+25	53.7167	123.83	q Q				
1+30	56.2487	134.29	q Q				
1+35	60.9386	145.73	q Q				
1+40	66.6308	154.98	q Q				
1+45	70.6300	166.46	q Q				
1+50	76.0103	183.34	q Q				
1+55	84.3299	198.44	q Q				
2+ 0	90.5156	207.40	q Q				
2+ 5	92.3835	211.52	q Q				
2+10	95.1473	219.60	q Q				
2+15	111.3714	246.75	q Q				
2+20	141.8095	282.23	q Q				
2+25	172.1423	311.11	q Q				
2+30	205.6572	363.86	q Q				
2+35	235.9062	404.56	q Q				
2+40	260.5574	434.64	q Q				
2+45	281.9967	438.62	q Q				
2+50	292.9915	421.51	q Q				
2+55	290.2216	408.49	q Q				
3+ 0	273.4617	386.78	q Q				
3+ 5	231.4014	337.36	q Q				
3+10	113.5566	188.13	q Q				
3+15	40.2387	80.86	q Q				
3+20	30.7882	57.05	q Q				
3+25	21.0331	38.63	q Q				
3+30	15.0998	29.62	qQ				
3+35	11.8953	23.24	qQ				
3+40	9.8998	20.27	qQ				
3+45	8.1516	16.59	qQ				
3+50	6.7182	14.52	qQ				
3+55	5.5648	11.90	qQ				
4+ 0	4.6520	10.49	Q				
4+ 5	3.9383	8.70	Q				
4+10	3.3721	7.77	Q				
4+15	2.9065	6.47	Q				
4+20	2.4806	5.76	Q				
4+25	2.0222	4.48	Q				
4+30	1.6117	3.73	Q				
4+35	1.3330	2.77	Q				
4+40	1.1063	2.24	Q				
4+45	0.8908	1.69	Q				
4+50	0.7043	1.36	Q				
4+55	0.5479	1.01	Q				
5+ 0	0.4213	0.80	Q				
5+ 5	0.3224	0.47	Q				
5+10	0.2465	0.26	Q				
5+15	0.1885	0.19	Q				
5+20	0.1441	0.14	Q				
5+25	0.1102	0.11	Q				
5+30	0.0842	0.08	Q				
5+35	0.0644	0.06	Q				

```
   5+40       0.0492      0.05  Q         |         |         |         |
   5+45       0.0376      0.04  Q         |         |         |         |
   5+50       0.0288      0.03  Q         |         |         |         |
   5+55       0.0220      0.02  Q         |         |         |         |
   6+ 0       0.0168      0.02  Q         |         |         |         |
   6+ 5       0.0129      0.01  Q         |         |         |         |
   6+10       0.0098      0.01  Q         |         |         |         |
   6+15       0.0075      0.01  Q         |         |         |         |
   6+20       0.0057      0.01  Q         |         |         |         |
   6+25       0.0044      0.00  Q         |         |         |         |
   6+30       0.0034      0.00  Q         |         |         |         |
   6+35       0.0013      0.00  Q         |         |         |         |
   6+40       0.0000      0.00  Q         |         |         |         |
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA**************************
                  Number of intervals =    80
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =      438.617 (CFS)
                  Total volume =      51.252 (Ac.Ft)
            Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ***************************************************************************

      ---------------------------------------------------------------------------


      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       30.000 to Point/Station       19.000
      **** ADD/COMBINE/RECOVER HYDROGRAPHS ****
      ___________________________________________________________________________
      ********************** HYDROGRAPH INFORMATION **********************

                  From study/file name: e3100.rte
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     P R I N T  O F  S T O R M
                  R u n o f f     H y d r o g r a p h
      ---------------------------------------------------------------------------
               Hydrograph in   5   Minute intervals (CFS)

      ---------------------------------------------------------------------------
 Time(h+m) Add q(CFS)  Tot. Q   0      120.5     241.1     361.6     482.2
 ---------------------------------------------------------------------------
   0+ 5       1.0963      4.25  Q         |         |         |         |
   0+10       3.7689     18.03  qQ        |         |         |         |
   0+15       4.3142     32.08  q Q       |         |         |         |
   0+20       4.4561     46.23  q  Q      |         |         |         |
   0+25       5.2225     59.87  q   Q     |         |         |         |
   0+30       5.6907     69.80  q    Q    |         |         |         |
   0+35       6.1126     78.52  q     Q   |         |         |         |
   0+40       5.9257     84.06  q     Q   |         |         |         |
   0+45       6.4364     90.19  q      Q  |         |         |         |
   0+50       6.3108     93.72  q      Q  |         |         |         |
   0+55       5.8223     93.88  q      Q  |         |         |         |
   1+ 0       6.0376     94.06  q      Q  |         |         |         |
   1+ 5       7.0714     97.63  q       Q |         |         |         |
   1+10       8.6746    107.65  q       Q |         |         |         |
   1+15       9.1032    118.61  q        Q|         |         |         |
   1+20       8.8965    127.11  q         Q         |         |         |
   1+25       9.1206    132.95  q         |Q        |         |         |
   1+30      11.5526    145.84  q         | Q       |         |         |
   1+35      12.0505    157.78  q         |  Q      |         |         |
   1+40      11.6153    166.59  q         |  Q      |         |         |
   1+45      13.6054    180.07  |q        |   Q     |         |         |
   1+50      15.9999    199.34  |q        |     Q   |         |         |
   1+55      15.5784    214.02  |q        |      Q  |         |         |
   2+ 0      14.9158    222.32  |q        |       Q |         |         |
   2+ 5      15.2726    226.79  |q        |       Q |         |         |
   2+10      17.5924    237.20  |q        |        Q|         |         |
   2+15      23.5822    270.33  |q        |         | Q       |         |
```

```
    2+20      25.5826    307.81  | q       |         |    Q    |         |
    2+25      26.2372    337.35  | q       |         |      Q  |         |
    2+30      39.3628    403.22  |  q      |         |         |  Q      |
    2+35      46.1787    450.74  |  q      |         |         |      Q  |
    2+40      47.5553    482.19  |  q      |         |         |         Q
    2+45      32.8825    471.50  | q       |         |         |        Q|
    2+50      14.5327    436.04  |q        |         |         |    Q    |
    2+55       8.9155    417.40  q         |         |         |   Q     |
    3+ 0       6.2802    393.07  q         |         |         | Q       |
    3+ 5       2.8282    340.19  q         |         |       Q |         |
    3+10       0.7498    188.88  q         |    Q    |         |         |
    3+15       0.2140     81.08  q     Q   |         |         |         |
    3+20       0.0647     57.12  q   Q     |         |         |         |
    3+25       0.0133     38.64  q  Q      |         |         |         |
    3+30       0.0000     29.62  q Q       |         |         |         |
    3+35       0.0000     23.24  qQ        |         |         |         |
    3+40       0.0000     20.27  qQ        |         |         |         |
    3+45       0.0000     16.59  qQ        |         |         |         |
    3+50       0.0000     14.52  qQ        |         |         |         |
    3+55       0.0000     11.90  Q         |         |         |         |
    4+ 0       0.0000     10.49  Q         |         |         |         |
    4+ 5       0.0000      8.70  Q         |         |         |         |
    4+10       0.0000      7.77  Q         |         |         |         |
    4+15       0.0000      6.47  Q         |         |         |         |
    4+20       0.0000      5.76  Q         |         |         |         |
    4+25       0.0000      4.48  Q         |         |         |         |
    4+30       0.0000      3.73  Q         |         |         |         |
    4+35       0.0000      2.77  Q         |         |         |         |
    4+40       0.0000      2.24  Q         |         |         |         |
    4+45       0.0000      1.69  Q         |         |         |         |
    4+50       0.0000      1.36  Q         |         |         |         |
    4+55       0.0000      1.01  Q         |         |         |         |
    5+ 0       0.0000      0.80  Q         |         |         |         |
    5+ 5       0.0000      0.47  Q         |         |         |         |
    5+10       0.0000      0.26  Q         |         |         |         |
    5+15       0.0000      0.19  Q         |         |         |         |
    5+20       0.0000      0.14  Q         |         |         |         |
    5+25       0.0000      0.11  Q         |         |         |         |
    5+30       0.0000      0.08  Q         |         |         |         |
    5+35       0.0000      0.06  Q         |         |         |         |
    5+40       0.0000      0.05  Q         |         |         |         |
    5+45       0.0000      0.04  Q         |         |         |         |
    5+50       0.0000      0.03  Q         |         |         |         |
    5+55       0.0000      0.02  Q         |         |         |         |
    6+ 0       0.0000      0.02  Q         |         |         |         |
    6+ 5       0.0000      0.01  Q         |         |         |         |
    6+10       0.0000      0.01  Q         |         |         |         |
    6+15       0.0000      0.01  Q         |         |         |         |
    6+20       0.0000      0.01  Q         |         |         |         |
    6+25       0.0000      0.00  Q         |         |         |         |
    6+30       0.0000      0.00  Q         |         |         |         |
    6+35       0.0000      0.00  Q         |         |         |         |
    6+40       0.0000      0.00  Q         |         |         |         |
--------------------------------------------------------------------------
      ****************************HYDROGRAPH DATA**************************
                Number of intervals =    80
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =      482.193 (CFS)
                Total volume =      54.746 (Ac.Ft)
          Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
          Peak (CFS)      0.000     0.000     0.000     0.000     0.000
          Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ****************************************************************************

      ----------------------------------------------------------------------


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station       19.000 to Point/Station       19.000
      **** PRINT CURRENT HYDROGRAPH ****
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P R I N T O F S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals (CFS)

Time(h+m)	Volume(Ac.Ft)	Q(CFS)	0	120.5	241.1	361.6	482.2
0+ 5	0.0292	4.25	Q				
0+10	0.1534	18.03	VQ				
0+15	0.3744	32.08	V Q				
0+20	0.6928	46.23	V Q				
0+25	1.1051	59.87	V Q				
0+30	1.5858	69.80	V Q				
0+35	2.1266	78.52	V Q				
0+40	2.7055	84.06	V Q				
0+45	3.3267	90.19	V Q				
0+50	3.9721	93.72	V Q				
0+55	4.6186	93.88	V Q				
1+ 0	5.2664	94.06	V Q				
1+ 5	5.9388	97.63	V Q				
1+10	6.6802	107.65	V Q				
1+15	7.4971	118.61	V Q				
1+20	8.3724	127.11	V Q				
1+25	9.2881	132.95	V Q				
1+30	10.2924	145.84	V Q				
1+35	11.3791	157.78	V Q				
1+40	12.5264	166.59	V Q				
1+45	13.7665	180.07	V Q				
1+50	15.1394	199.34	V Q				
1+55	16.6134	214.02	V Q				
2+ 0	18.1445	222.32	V Q				
2+ 5	19.7064	226.79	V Q				
2+10	21.3400	237.20	V Q				
2+15	23.2018	270.33	V Q				
2+20	25.3217	307.81	V Q				
2+25	27.6450	337.35	V Q				
2+30	30.4220	403.22	V Q				
2+35	33.5263	450.74	V Q				
2+40	36.8471	482.19	V Q				
2+45	40.0944	471.50	V Q				
2+50	43.0974	436.04	V Q				
2+55	45.9721	417.40	VQ				
3+ 0	48.6792	393.07	Q V				

**********HYDROGRAPH DATA**********

Number of intervals = 80
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 482.193 (CFS)
Total volume = 54.746 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

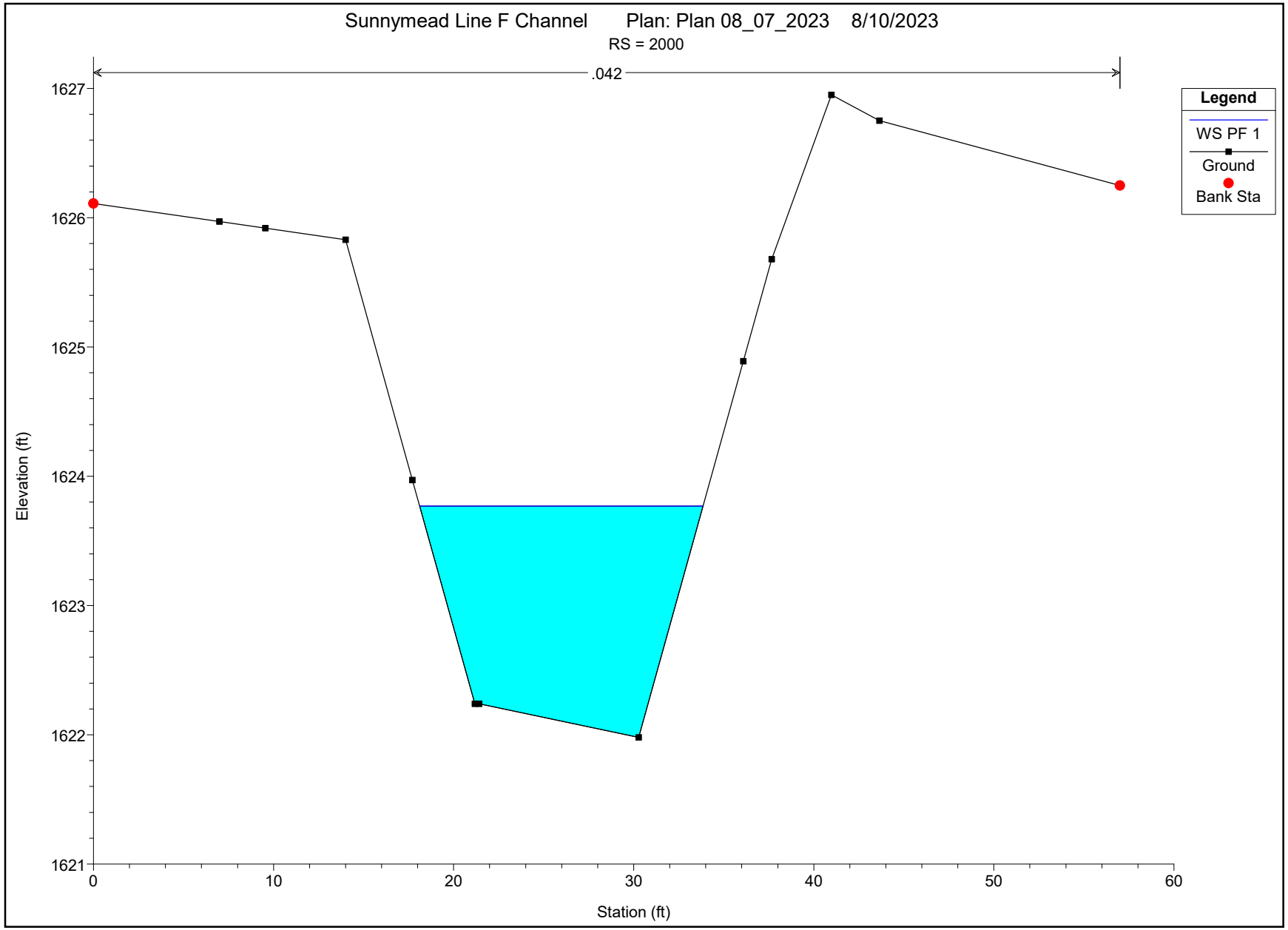
****

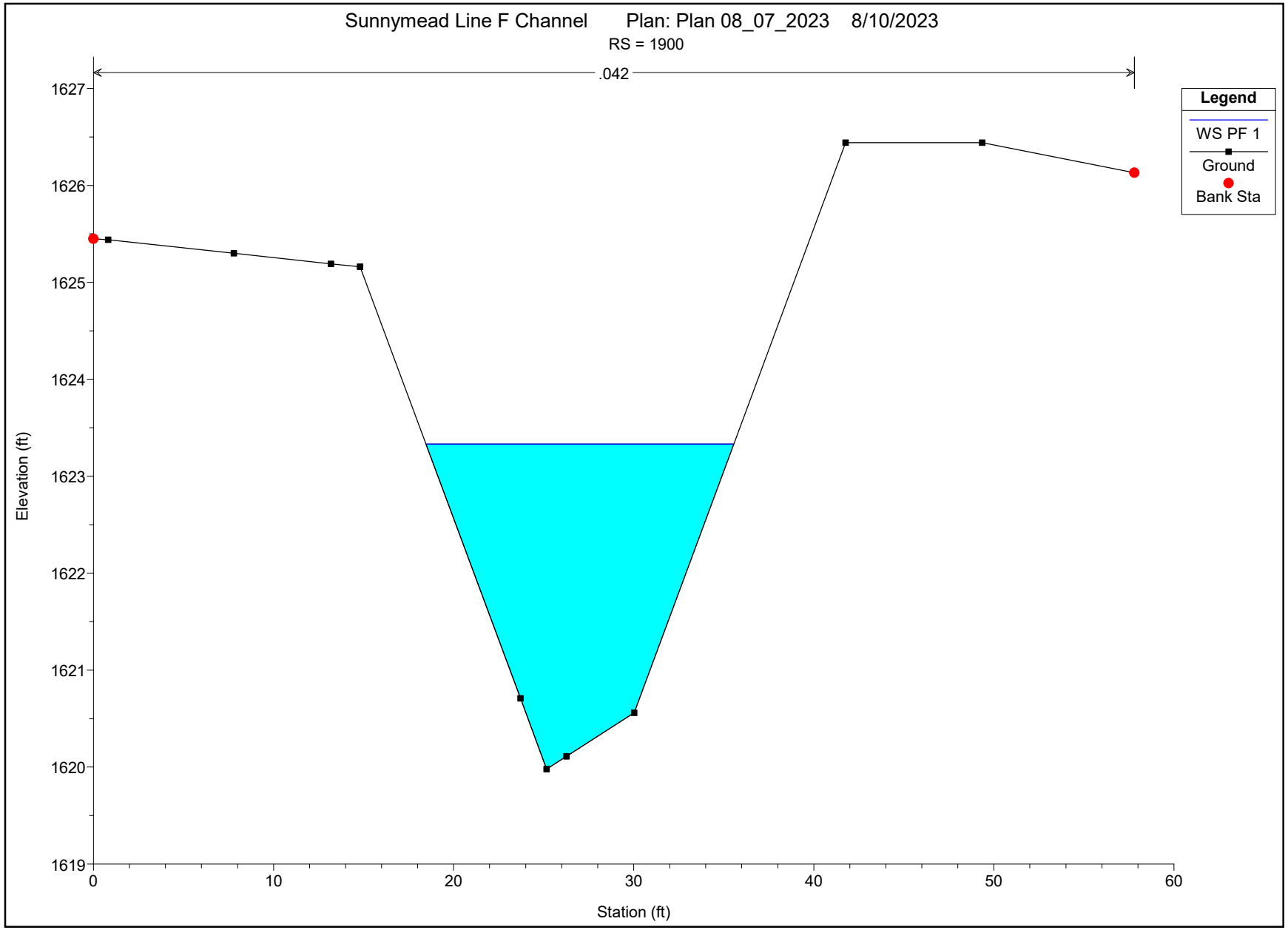
APPENDIX H

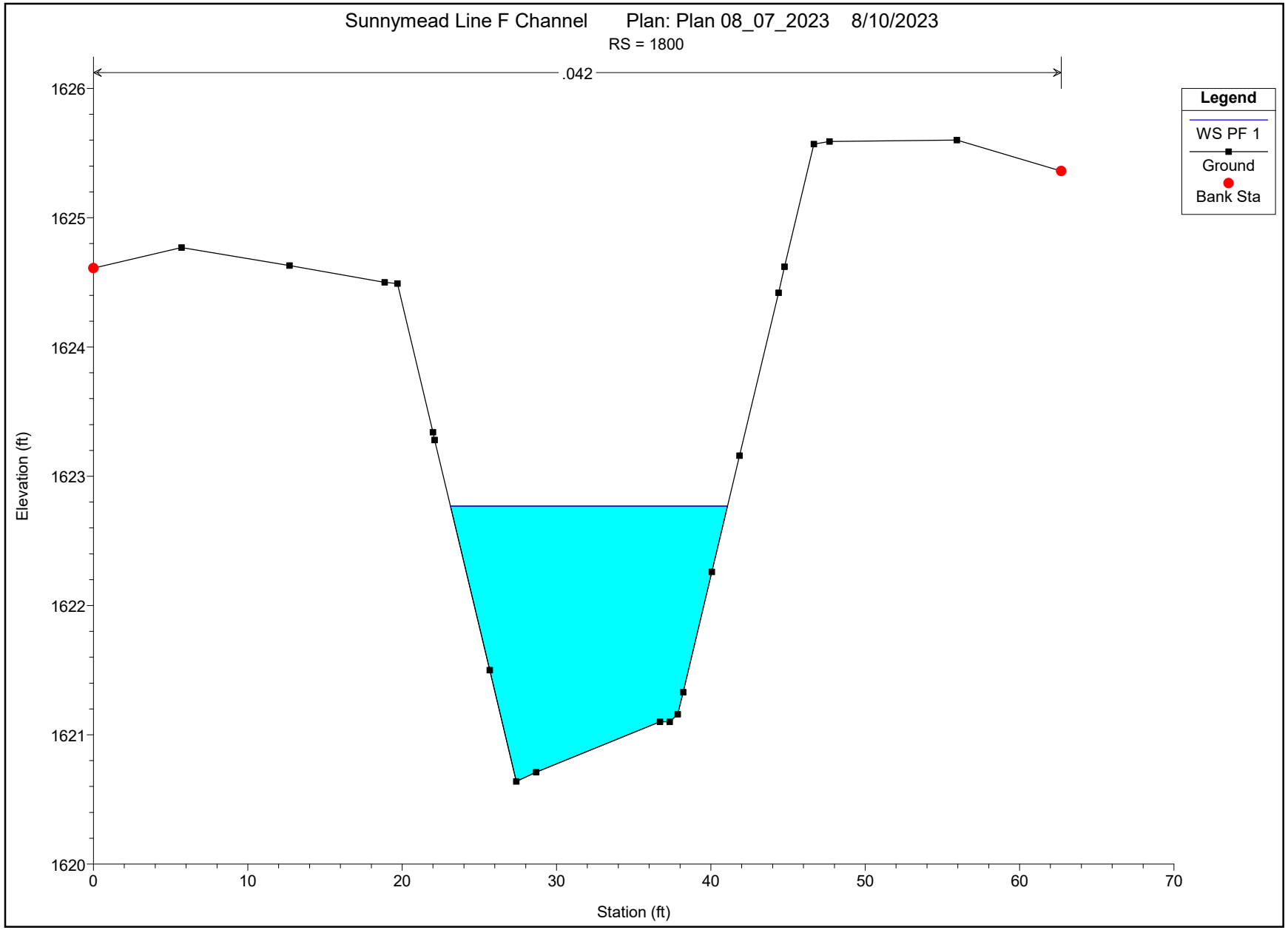
HEC-RAS HYDRAULICS OUTPUT FILES

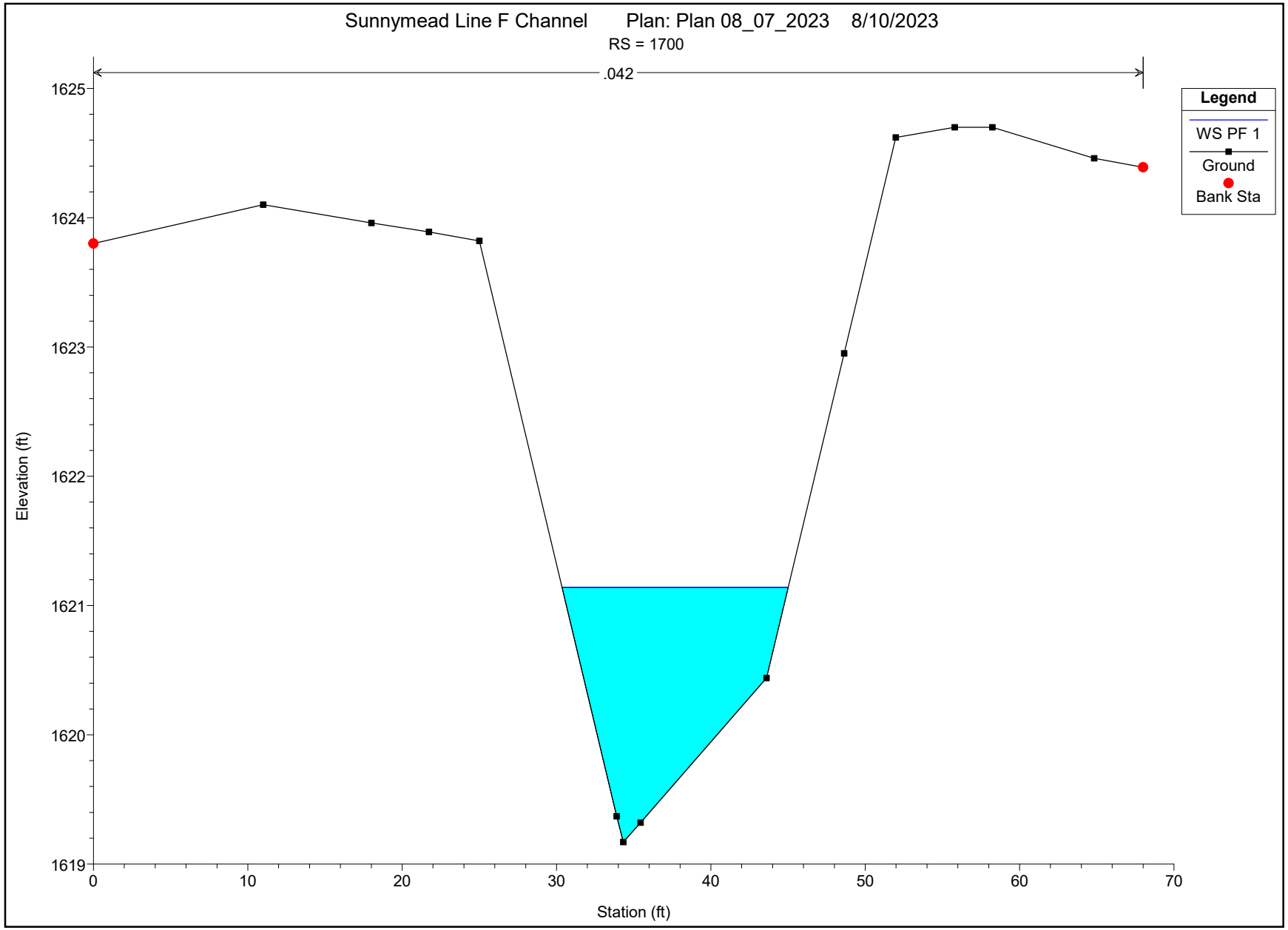
HEC-RAS Plan: 60% River: Post_Conditions_ Reach: RCFCD - LINE F T Profile: PF 1

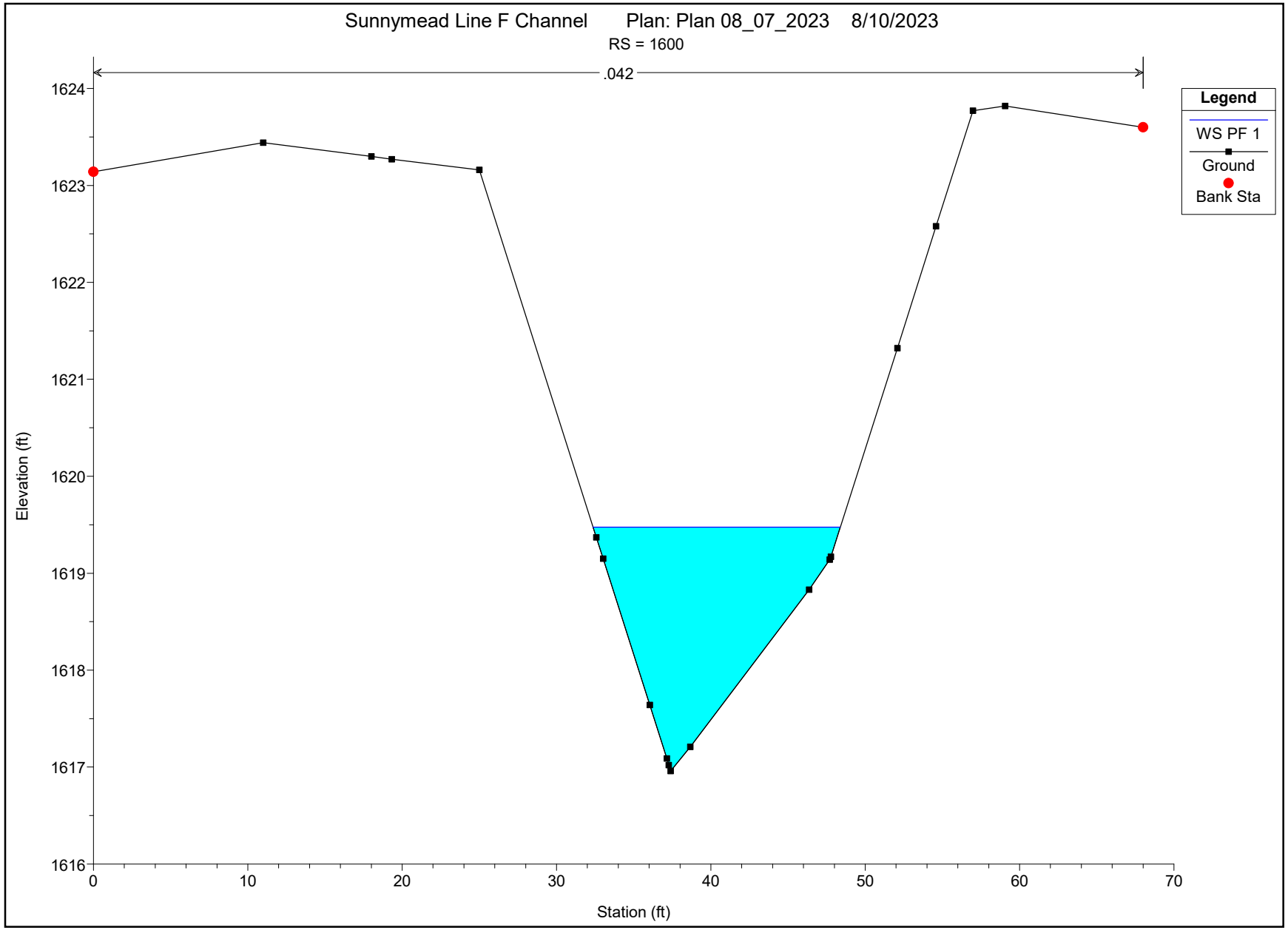
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
RCFCD - LINE F T	2000	PF 1	102.00	1621.98	1623.77	1623.52	1624.15	0.014622	4.95	20.59	15.73	0.76
RCFCD - LINE F T	1900	PF 1	102.00	1619.98	1623.33		1623.48	0.003274	3.02	33.81	17.10	0.38
RCFCD - LINE F T	1800	PF 1	102.00	1620.64	1622.77		1623.00	0.007339	3.82	26.69	17.95	0.55
RCFCD - LINE F T	1700	PF 1	102.00	1619.17	1621.14	1621.13	1621.71	0.025916	6.05	16.85	14.66	1.00
RCFCD - LINE F T	1600	PF 1	102.00	1616.96	1619.48		1619.83	0.013454	4.79	21.31	16.02	0.73
RCFCD - LINE F T	1500	PF 1	102.00	1615.62	1619.04		1619.18	0.003241	2.98	34.19	17.53	0.38
RCFCD - LINE F T	1400	PF 1	102.00	1614.59	1618.88		1618.96	0.001420	2.20	46.41	20.09	0.25
RCFCD - LINE F T	1300	PF 1	102.00	1615.86	1618.52		1618.71	0.004920	3.44	29.69	17.07	0.46
RCFCD - LINE F T	1200	PF 1	102.00	1615.89	1617.22	1617.22	1617.70	0.027517	5.54	18.40	19.55	1.01
RCFCD - LINE F T	1100	PF 1	102.00	1614.33	1616.08	1615.57	1616.15	0.003992	2.09	48.79	53.49	0.39
RCFCD - LINE F T	1020	PF 1	102.00	1614.15	1615.17	1615.17	1615.42	0.034364	3.99	25.59	53.68	1.02
RCFCD - LINE F T	980	PF 1	102.00	1613.65	1614.96	1614.44	1615.01	0.002903	1.71	59.48	69.25	0.33
RCFCD - LINE F T	940	PF 1	102.00	1613.06	1614.92		1614.94	0.000995	1.13	90.24	87.88	0.20
RCFCD - LINE F T	915	PF 1	174.08	1610.22	1614.92		1614.93	0.000069	0.69	252.94	93.17	0.07
RCFCD - LINE F T	885.01	PF 1	438.62	1609.99	1614.88		1614.92	0.000101	1.57	279.74	120.25	0.18
RCFCD - LINE F T	869	PF 1	438.62	1609.77	1614.89		1614.92	0.000052	1.36	322.08	122.42	0.15
RCFCD - LINE F T	850	PF 1	438.62	1609.52	1614.87		1614.92	0.000164	1.68	260.38	129.49	0.21
RCFCD - LINE F T	825	PF 1	438.62	1609.19	1614.83		1614.91	0.000246	2.17	201.92	99.95	0.27
RCFCD - LINE F T	810	PF 1	438.62	1609.00	1614.28		1614.85	0.001276	6.05	72.55	36.00	0.75
RCFCD - LINE F T	800	PF 1	482.19	1608.84	1613.93	1613.93	1614.81	0.002295	7.53	64.07	36.00	0.99
RCFCD - LINE F T	775	PF 1	482.19	1608.43	1613.05	1613.50	1614.65	0.005409	10.17	47.42	32.74	1.49
RCFCD - LINE F T	750	PF 1	482.19	1608.03	1612.38	1613.11	1614.49	0.003615	11.67	41.31	16.03	1.28
RCFCD - LINE F T	725	PF 1	482.19	1607.63	1611.70	1612.70	1614.33	0.004844	13.03	37.02	15.20	1.47
RCFCD - LINE F T	700	PF 1	482.19	1607.23	1611.13	1612.30	1614.16	0.005832	13.97	34.53	14.70	1.61
RCFCD - LINE F T	600	PF 1	482.19	1605.62	1609.16	1610.70	1613.34	0.008953	16.39	29.41	13.62	1.97
RCFCD - LINE F T	500	PF 1	482.19	1604.01	1607.38	1609.07	1612.27	0.011058	17.74	27.18	13.12	2.17
RCFCD - LINE F T	400	PF 1	482.19	1602.40	1605.68	1607.47	1611.05	0.012545	18.59	25.93	12.83	2.31
RCFCD - LINE F T	300	PF 1	482.19	1600.80	1604.01	1605.86	1609.72	0.013592	19.16	25.17	12.65	2.40
RCFCD - LINE F T	200	PF 1	482.19	1599.19	1602.37	1604.26	1608.30	0.014312	19.54	24.68	12.53	2.45
RCFCD - LINE F T	120	PF 1	482.19	1597.92	1601.08	1602.99	1607.13	0.014688	19.72	24.45	12.47	2.48
RCFCD - LINE F T	93.27	PF 1	482.19	1597.50	1600.65	1602.57	1606.73	0.014777	19.77	24.39	12.46	2.49

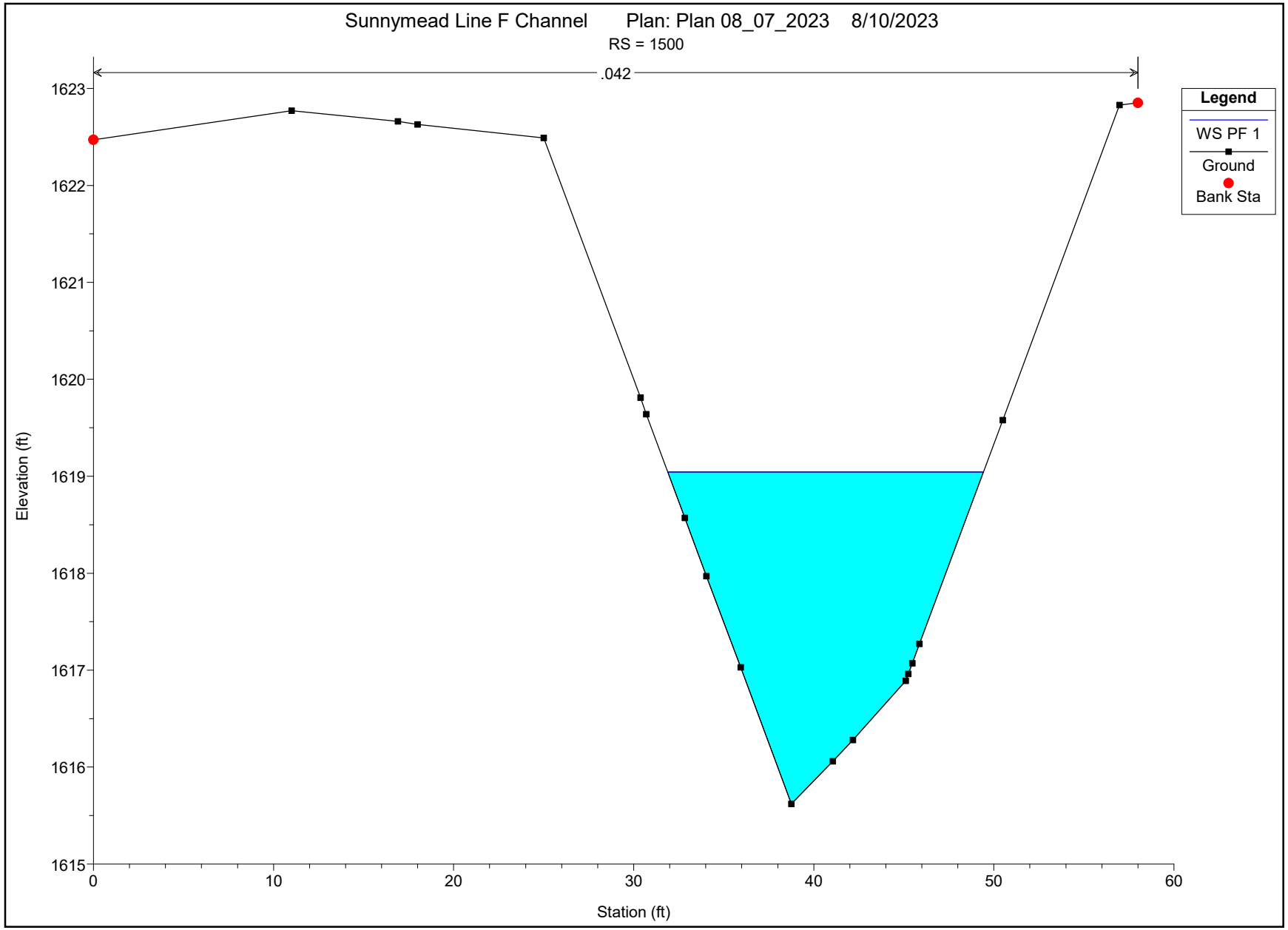

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 2000
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1627
1626
1625
1624
1623
1622
1621
0
10
20
30
40
50
60
Station (ft)

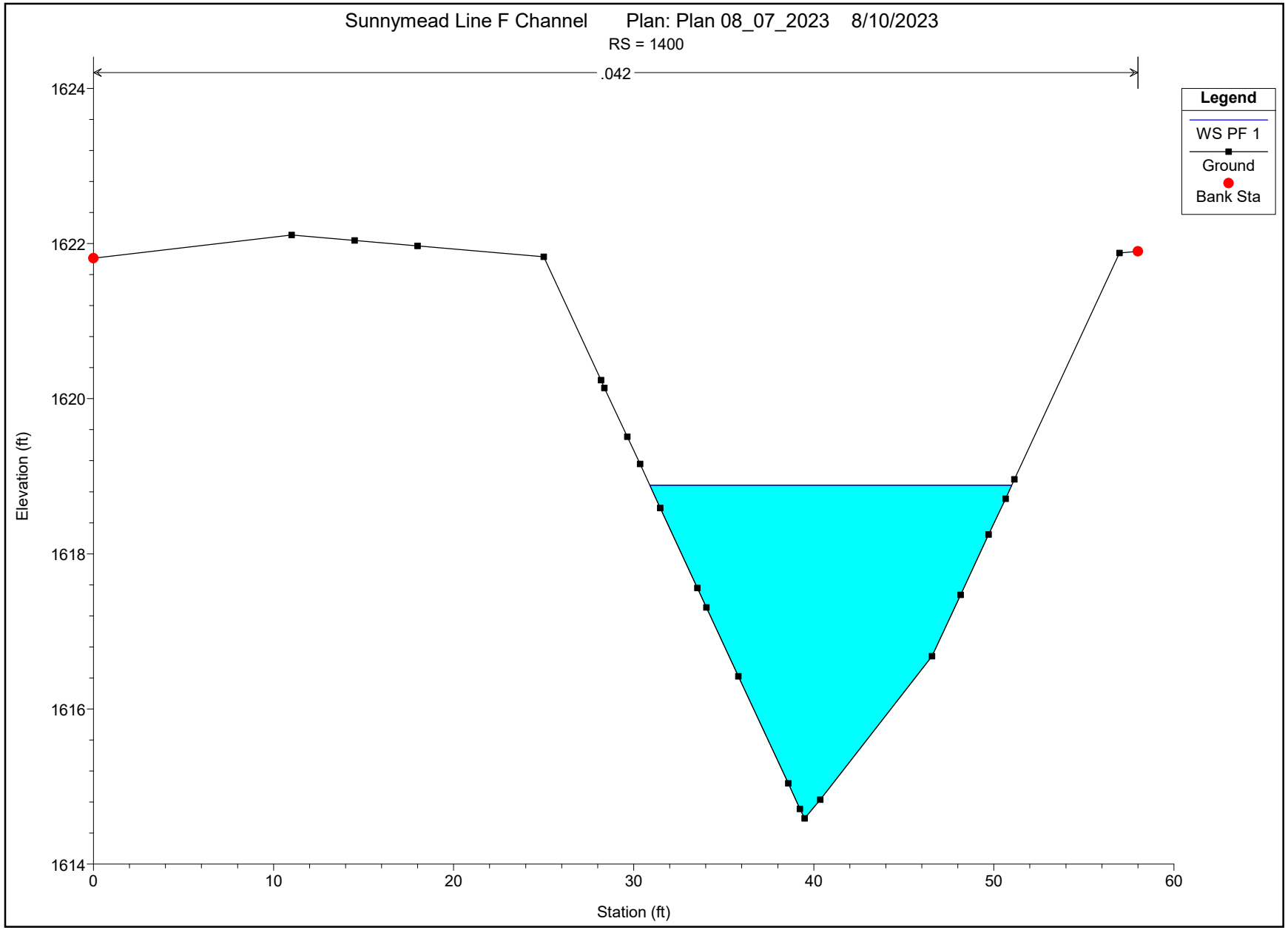

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1900
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1627
1626
1625
1624
1623
1622
1621
1620
1619
0
10
20
30
40
50
60
Station (ft)

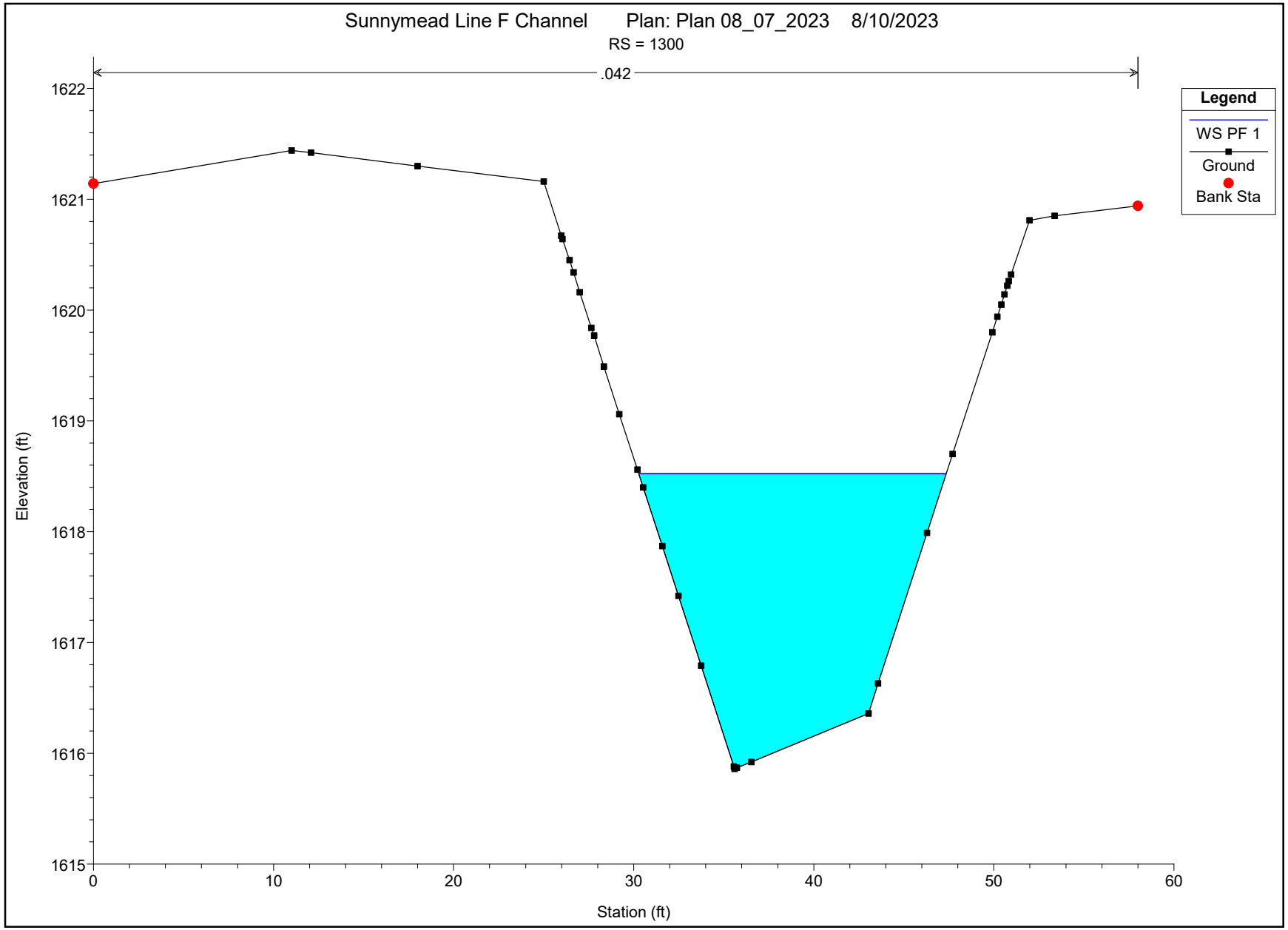

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1800
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1626
1625
1624
1623
1622
1621
1620
0
10
20
30
40
50
60
70
Station (ft)

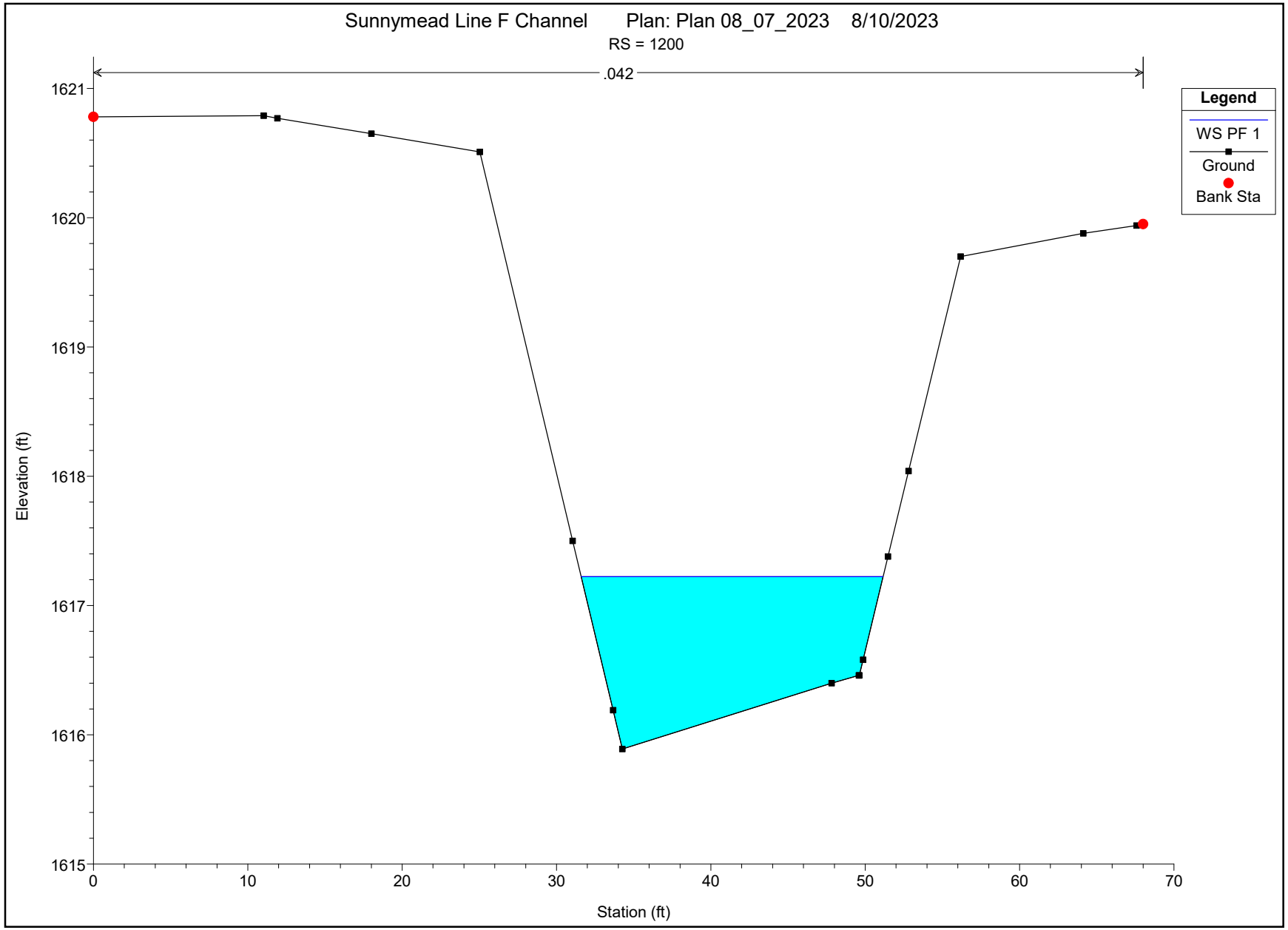

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1700
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1625
1624
1623
1622
1621
1620
1619
0
10
20
30
40
50
60
70
Station (ft)

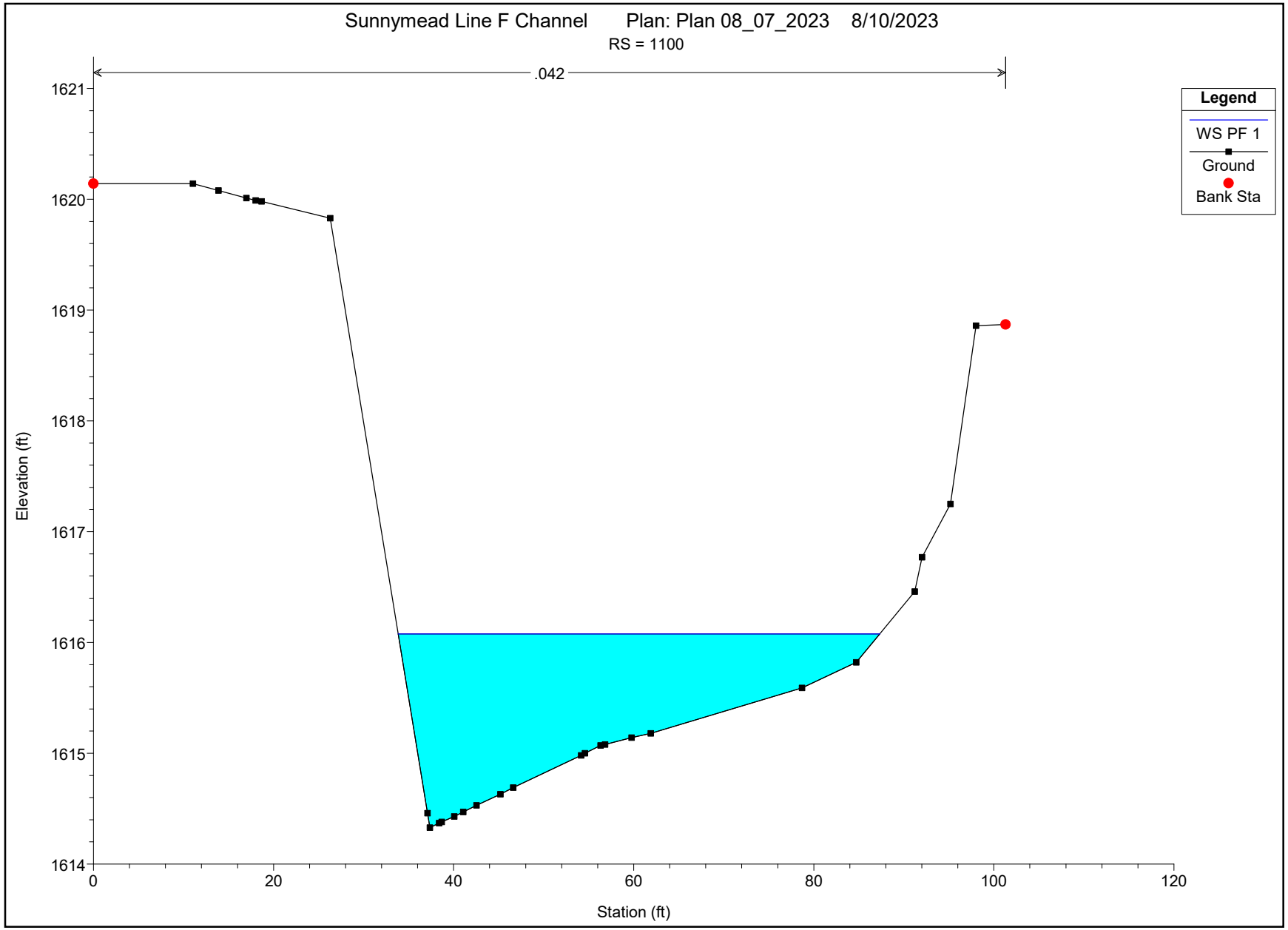

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1600
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1624
1623
1622
1621
1620
1619
1618
1617
1616
0
10
20
30
40
50
60
70
Station (ft)

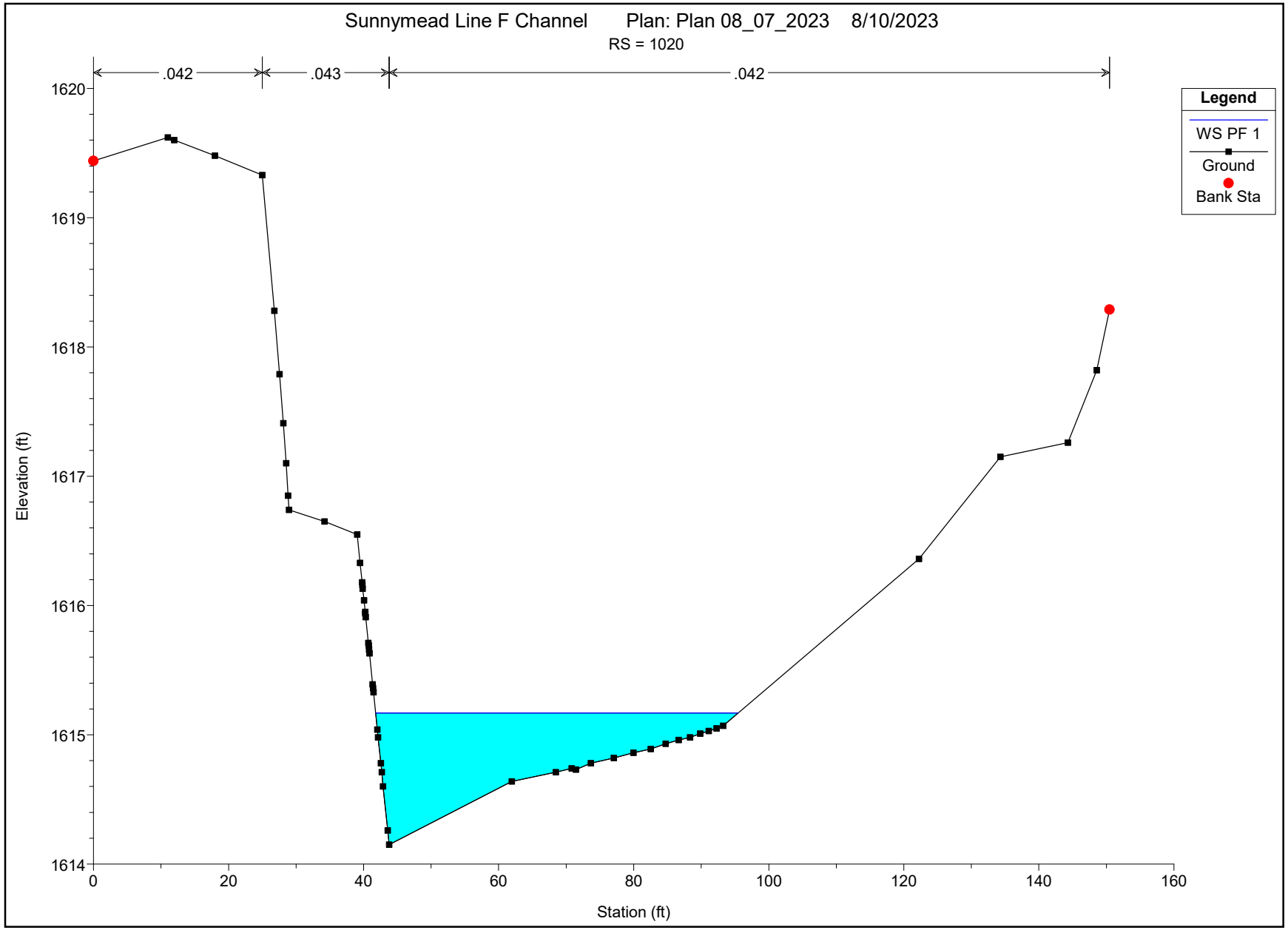

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1500
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1623
1622
1621
1620
1619
1618
1617
1616
1615
0
10
20
30
40
50
60
Station (ft)

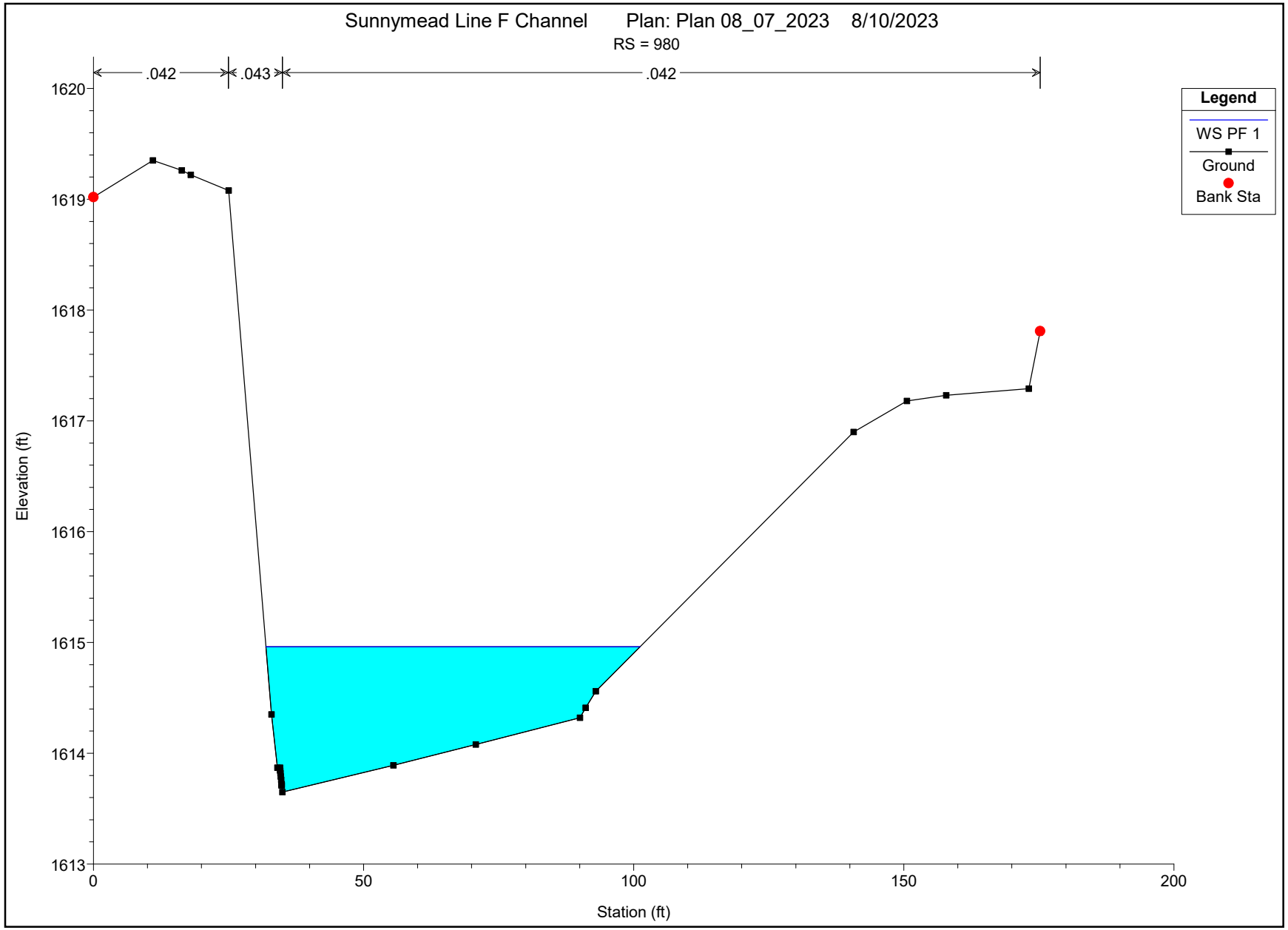

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1400
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1624
1622
1620
1618
1616
1614
0
10
20
30
40
50
60
Station (ft)

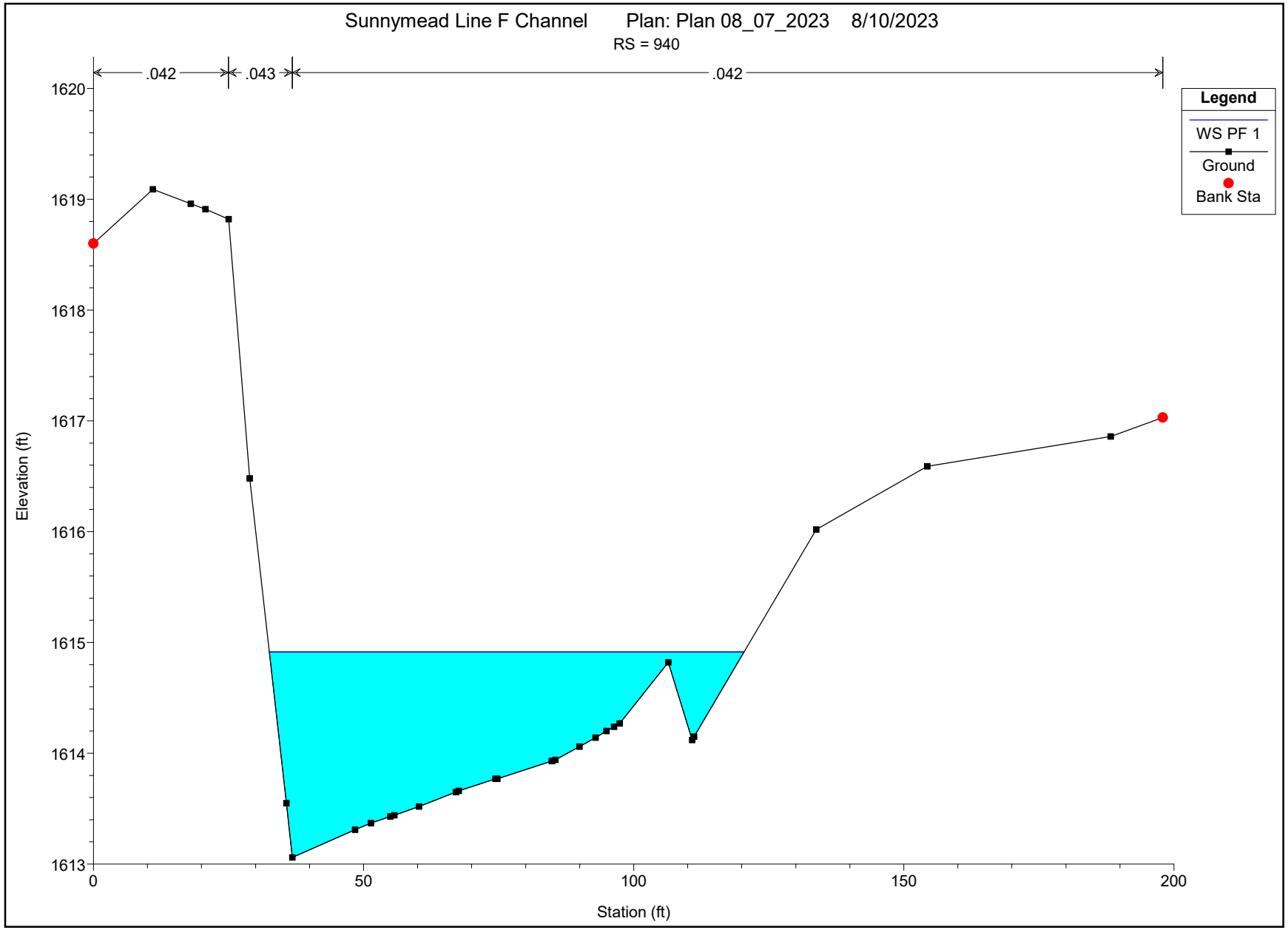

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1300
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1622
1621
1620
1619
1618
1617
1616
1615
0
10
20
30
40
50
60
Station (ft)

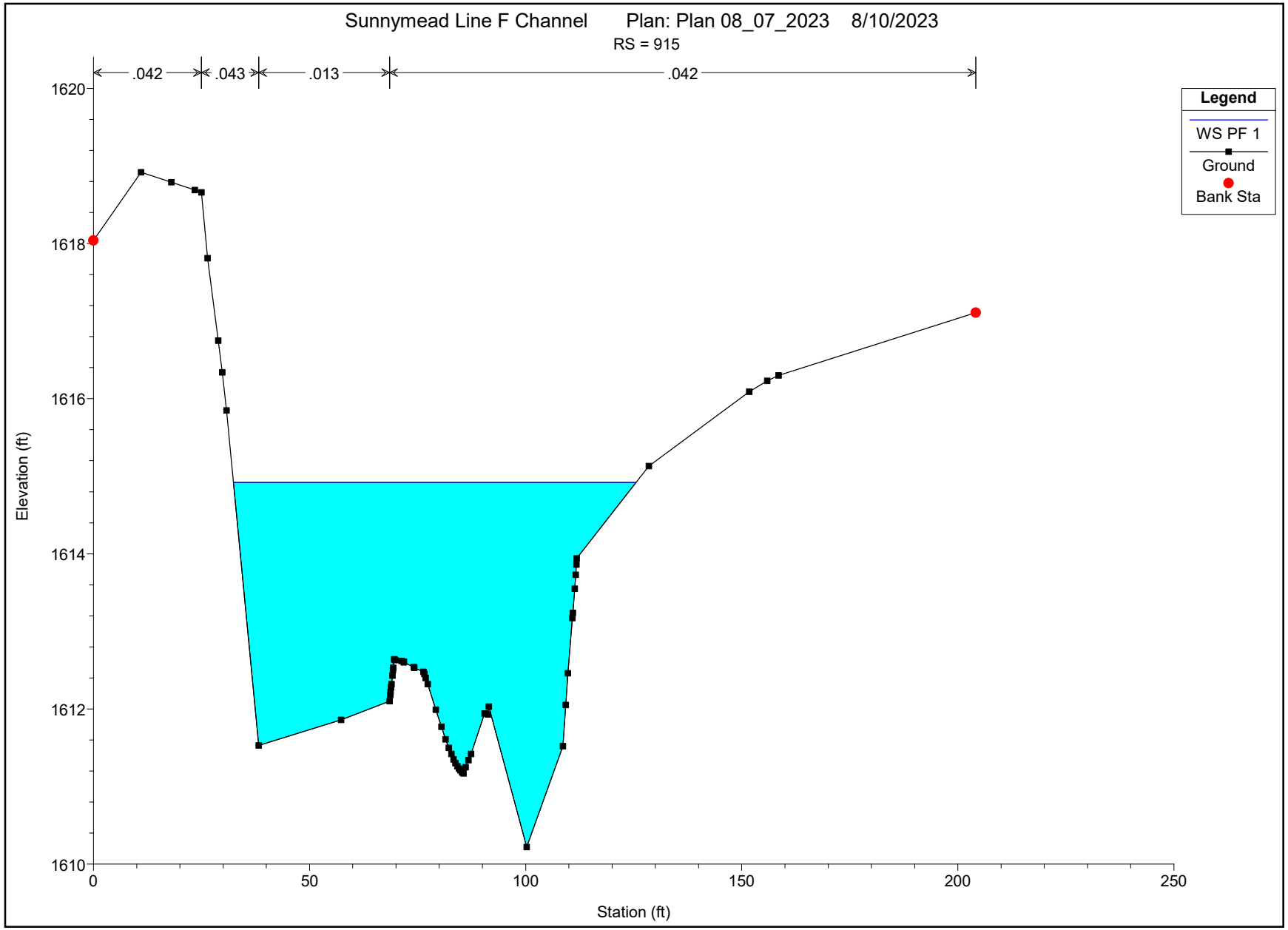

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1200
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1621
1620
1619
1618
1617
1616
1615
0
10
20
30
40
50
60
70
Station (ft)

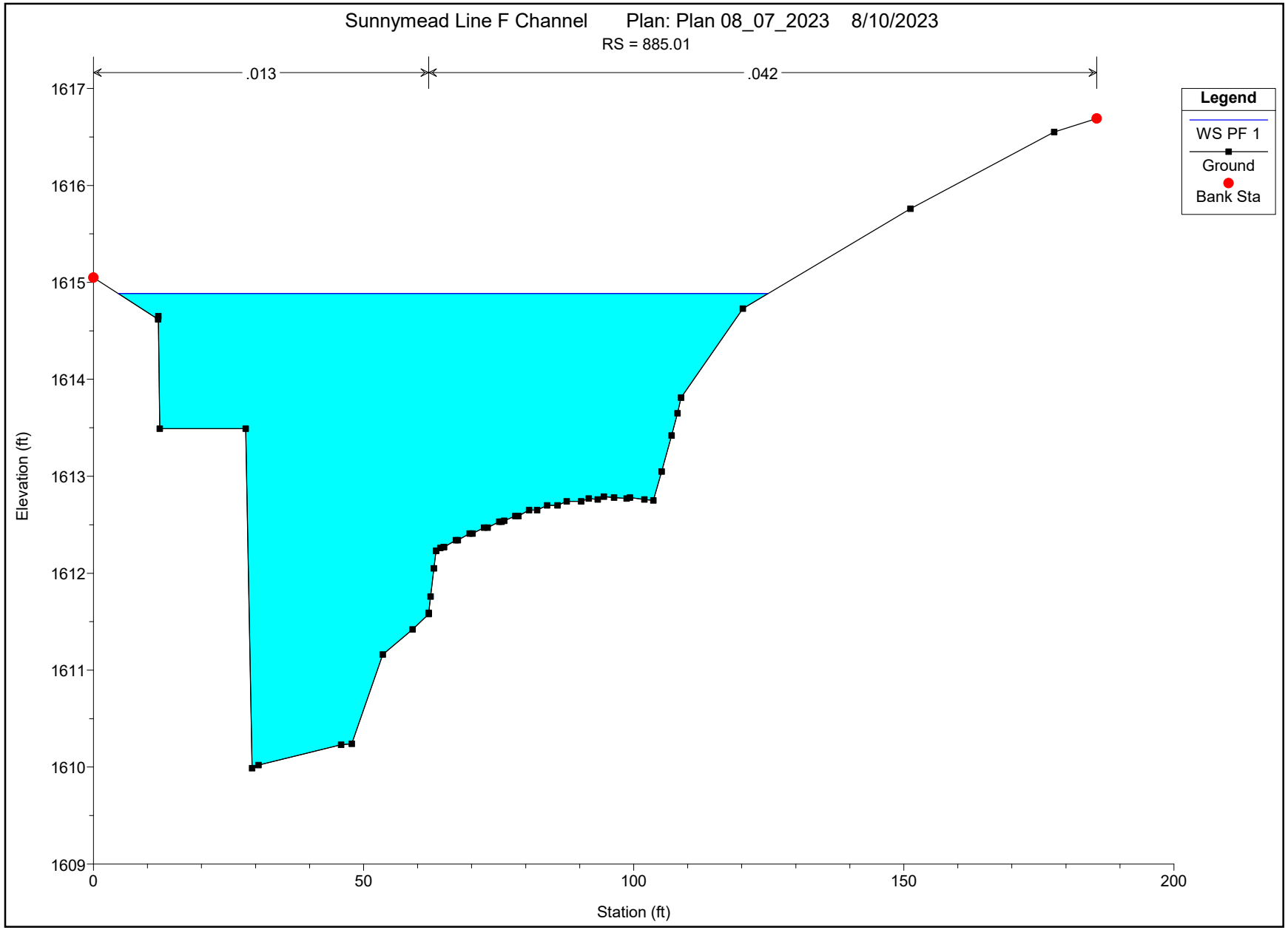

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1100
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1621
1620
1619
1618
1617
1616
1615
1614
0
20
40
60
80
100
120
Station (ft)

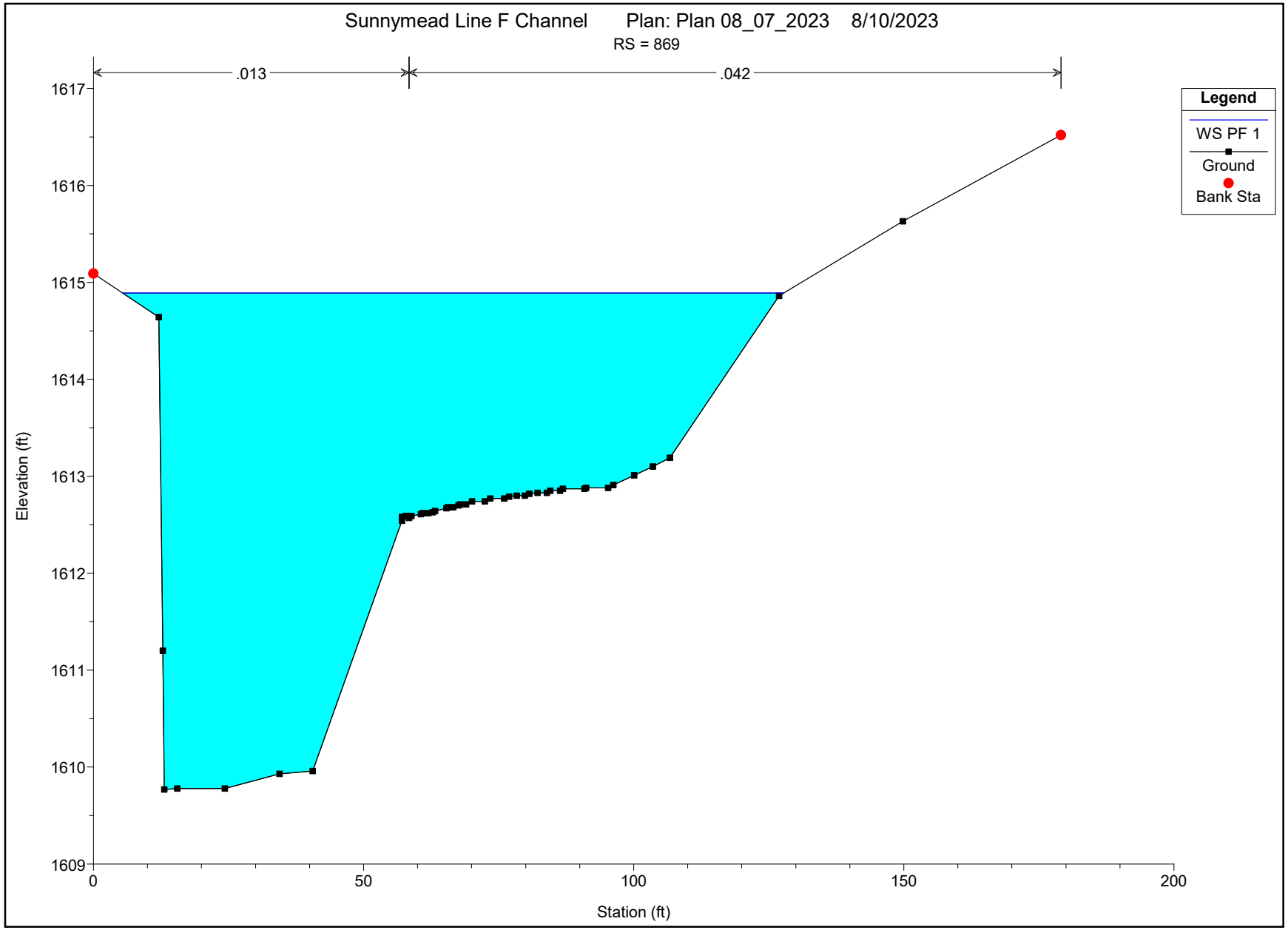

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 1020
.042
.043
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1620
1619
1618
1617
1616
1615
1614
0
20
40
60
80
100
120
140
160
Station (ft)

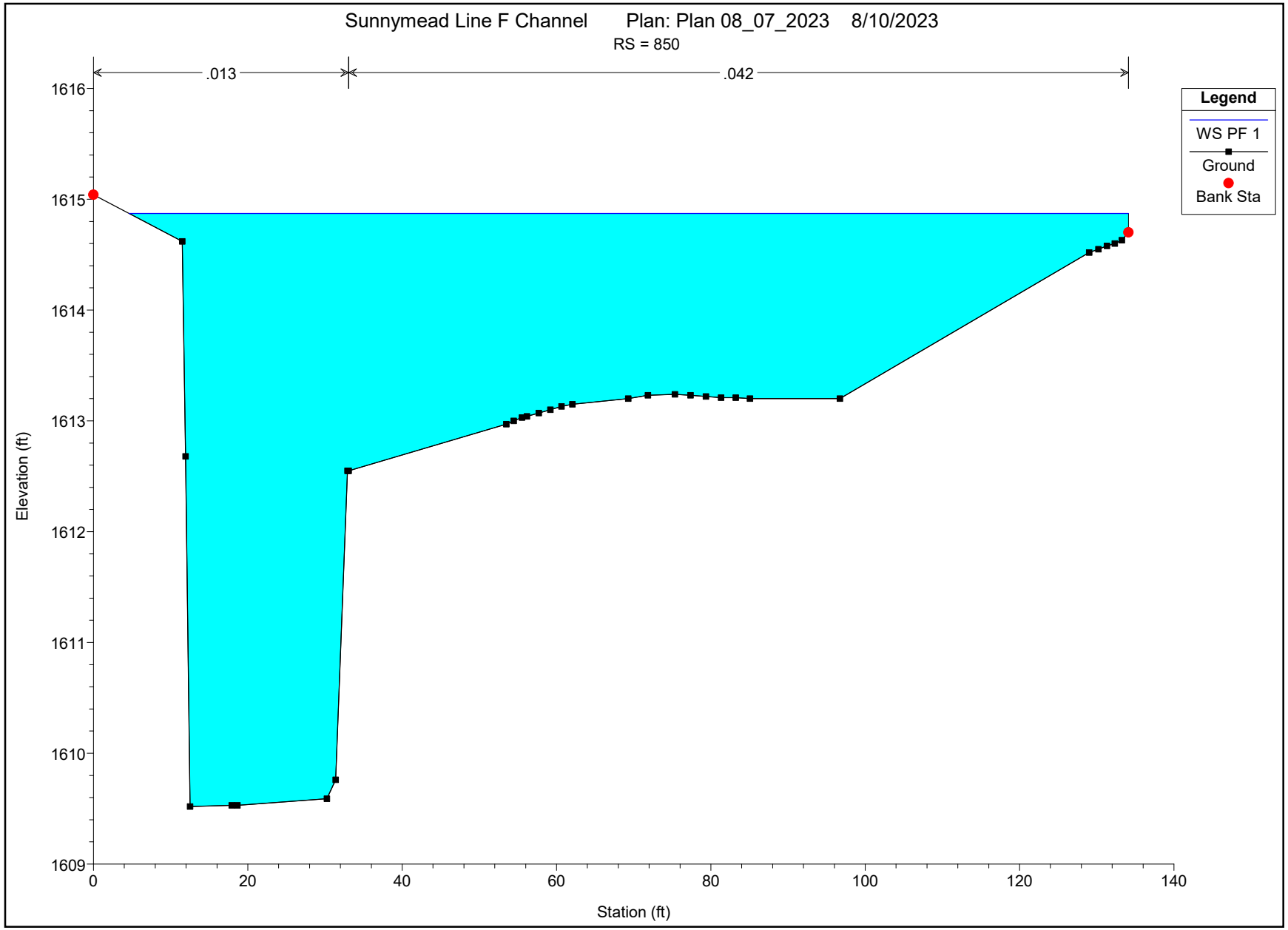

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 980
.042
.043
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1620
1619
1618
1617
1616
1615
1614
1613
0
50
100
150
200
Station (ft)

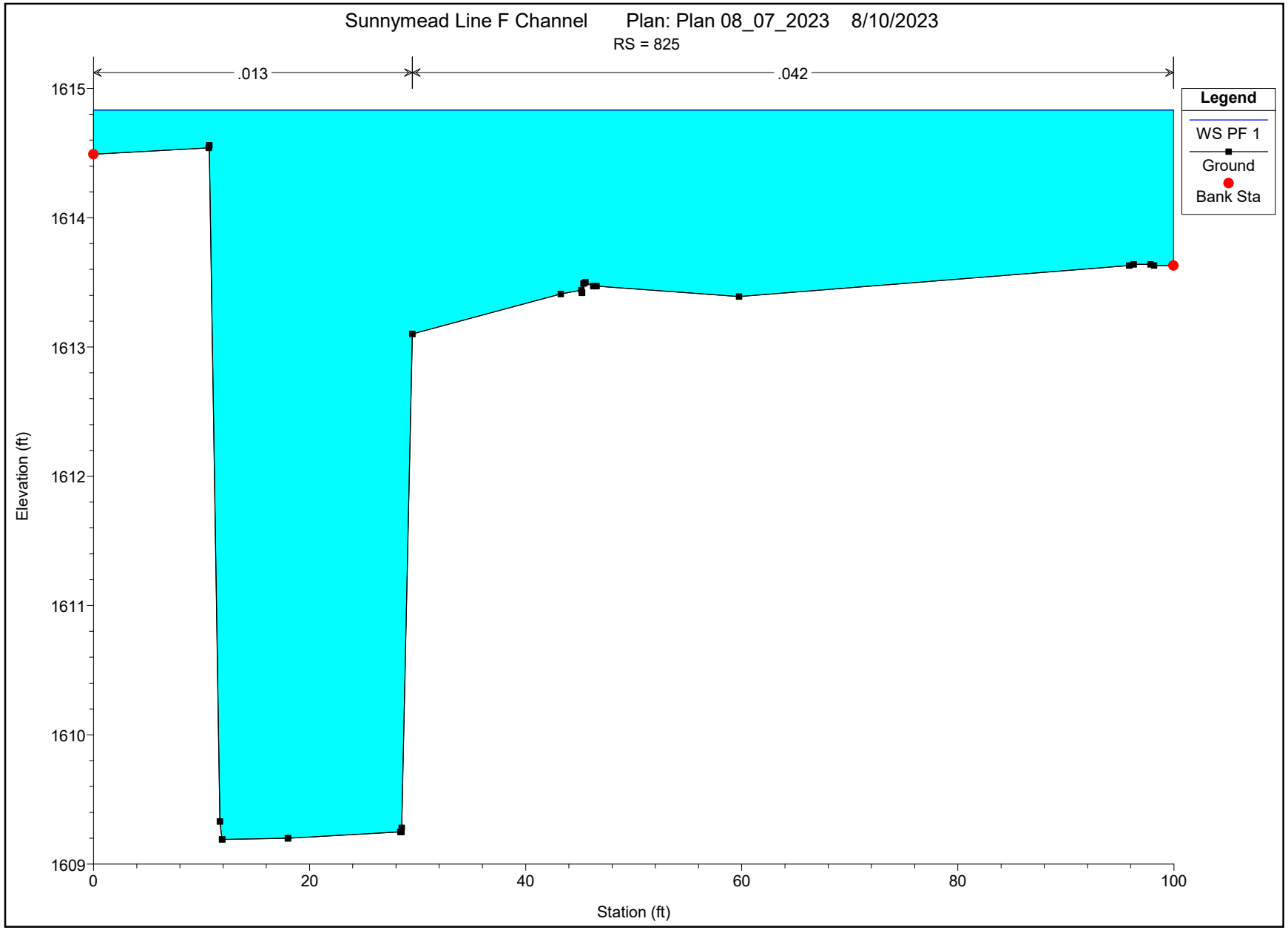

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 940
.042
.043
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1620
1619
1618
1617
1616
1615
1614
1613
0
50
100
150
200
Station (ft)

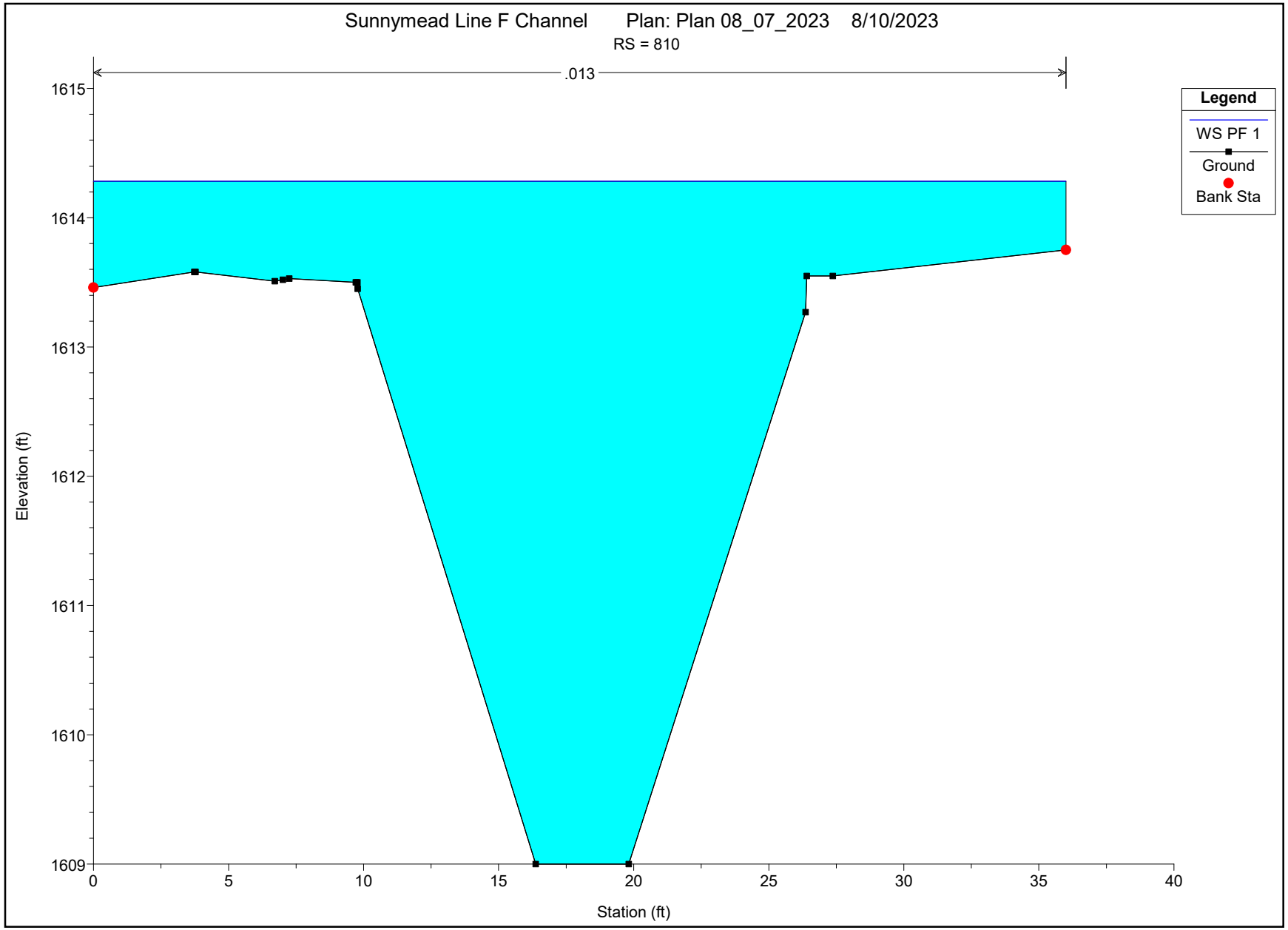

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 915
.042
.043
.013
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1620
1618
1616
1614
1612
1610
0
50
100
150
200
250
Station (ft)

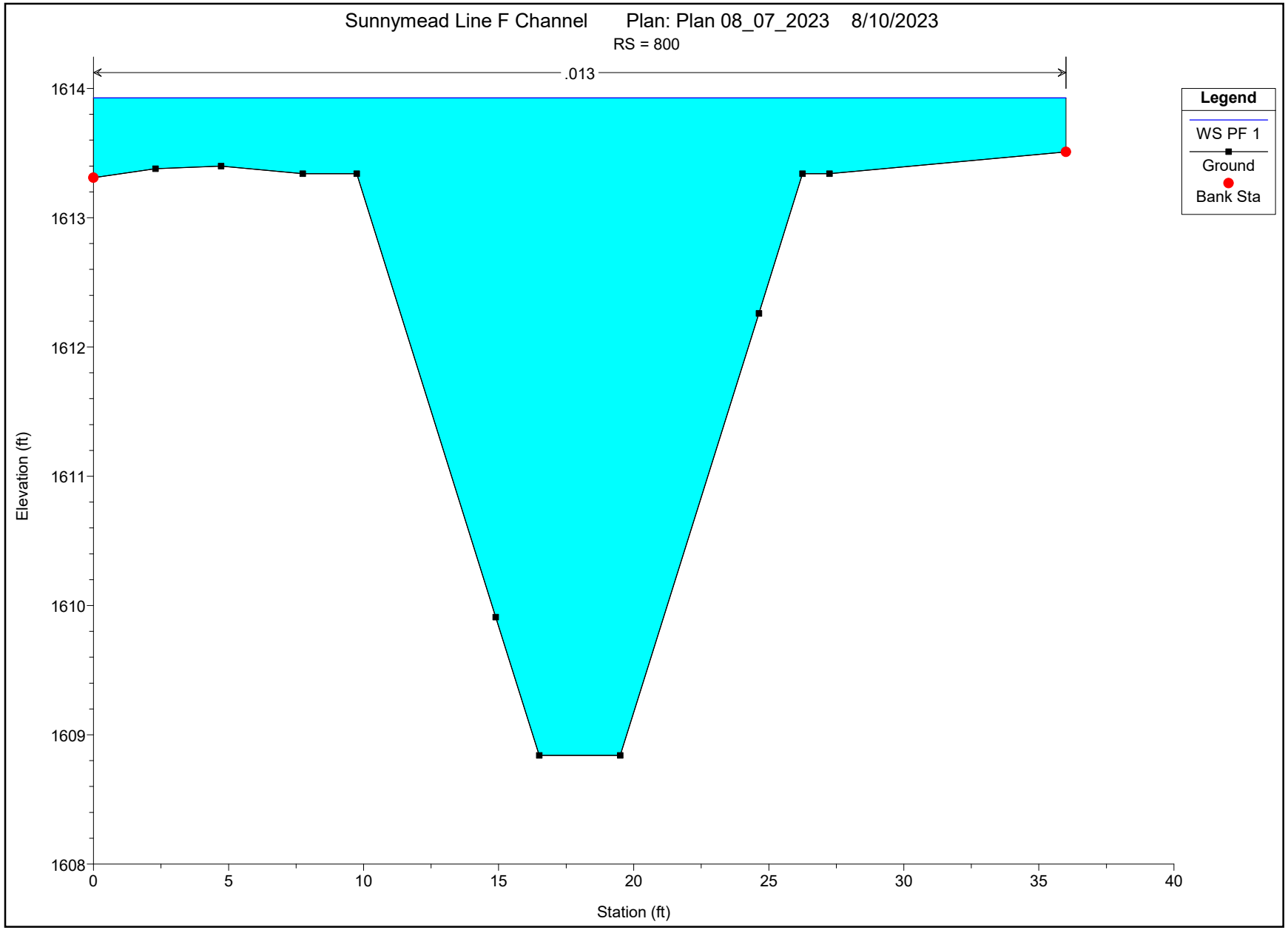

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 885.01
.013
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1617
1616
1615
1614
1613
1612
1611
1610
1609
0
50
100
150
200
Station (ft)

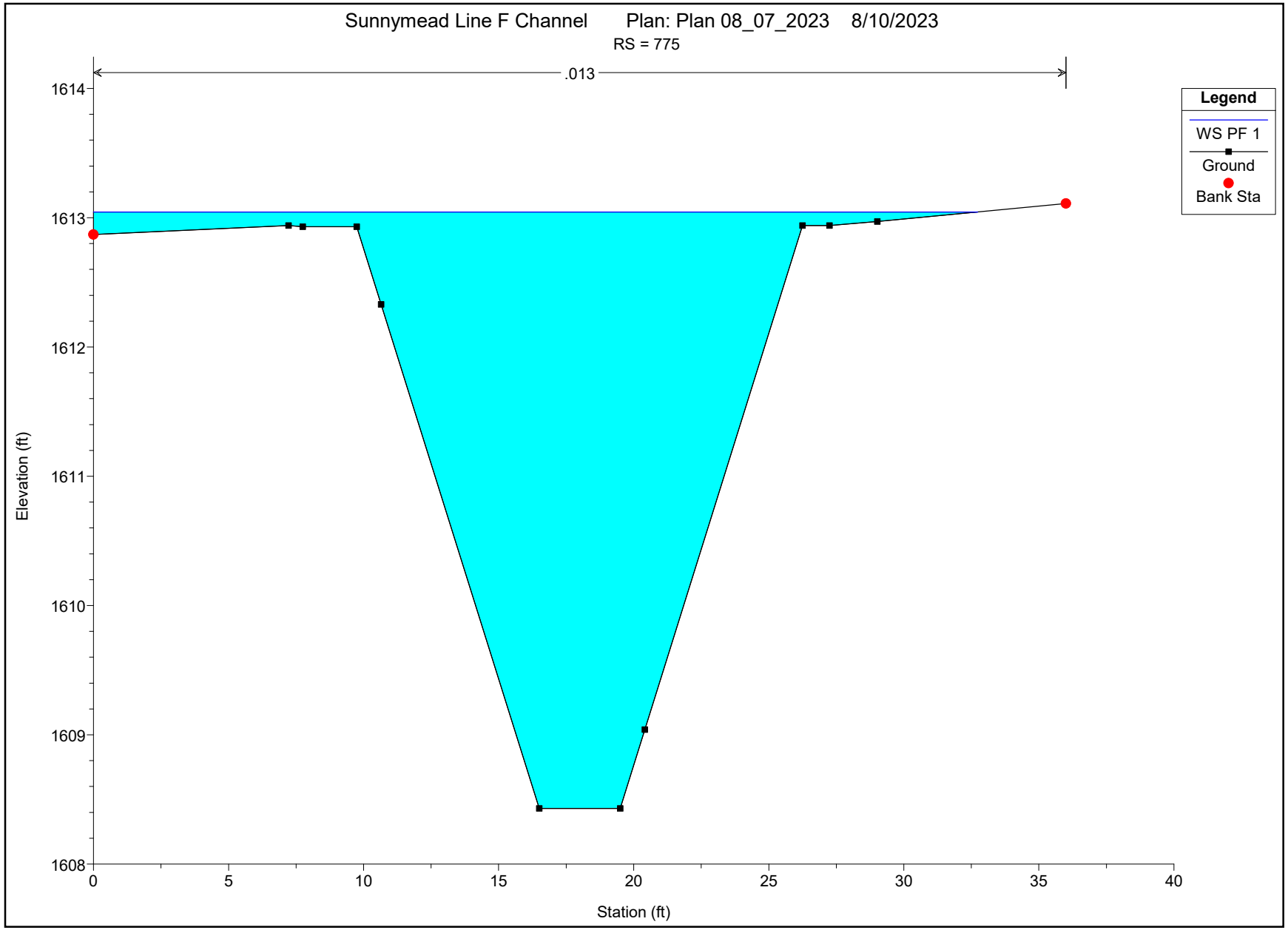

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 869
.013
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1617
1616
1615
1614
1613
1612
1611
1610
1609
0
50
100
150
200
Station (ft)

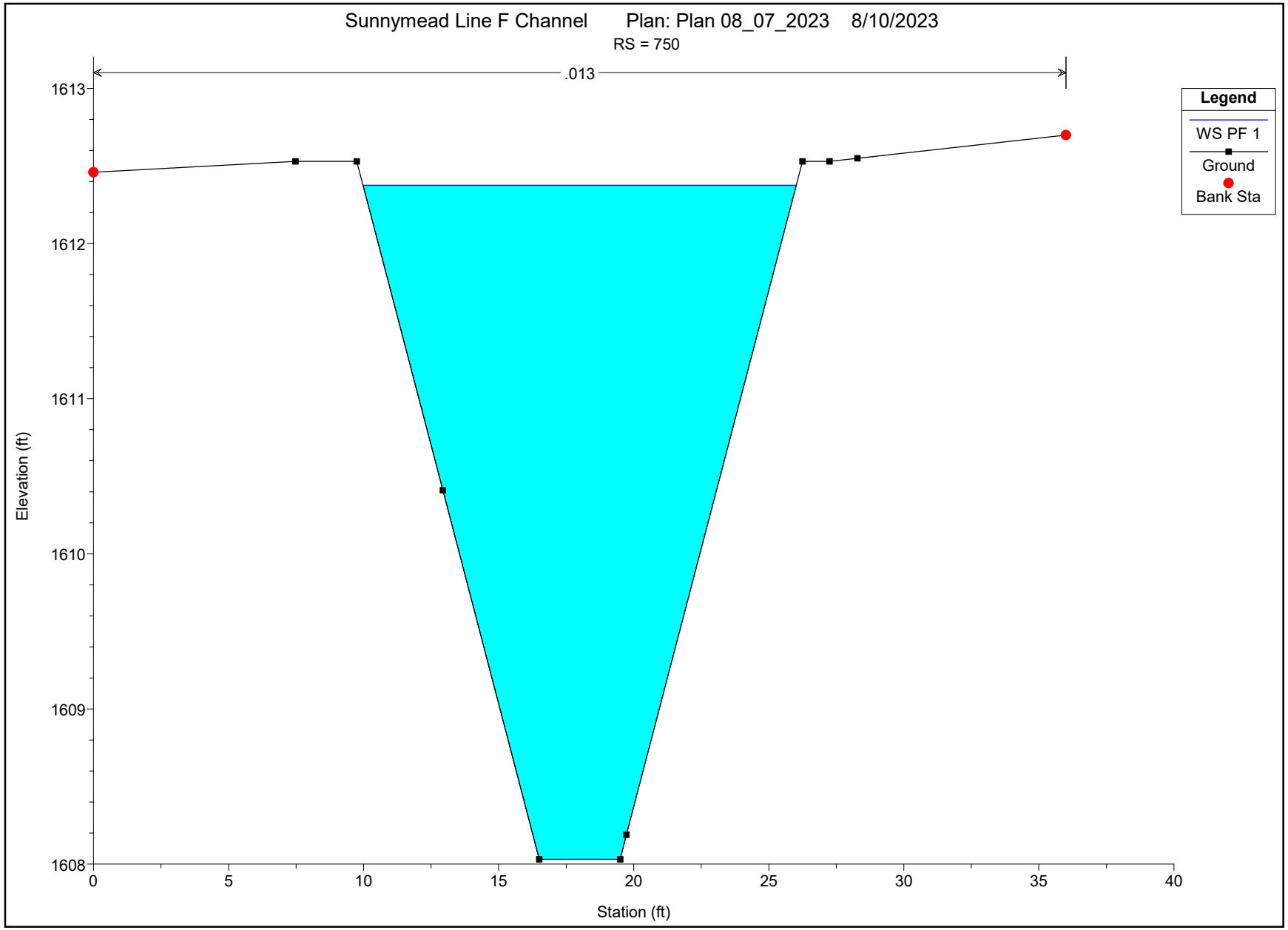

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 850
.013
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1616
1615
1614
1613
1612
1611
1610
1609
0
20
40
60
80
100
120
140
Station (ft)

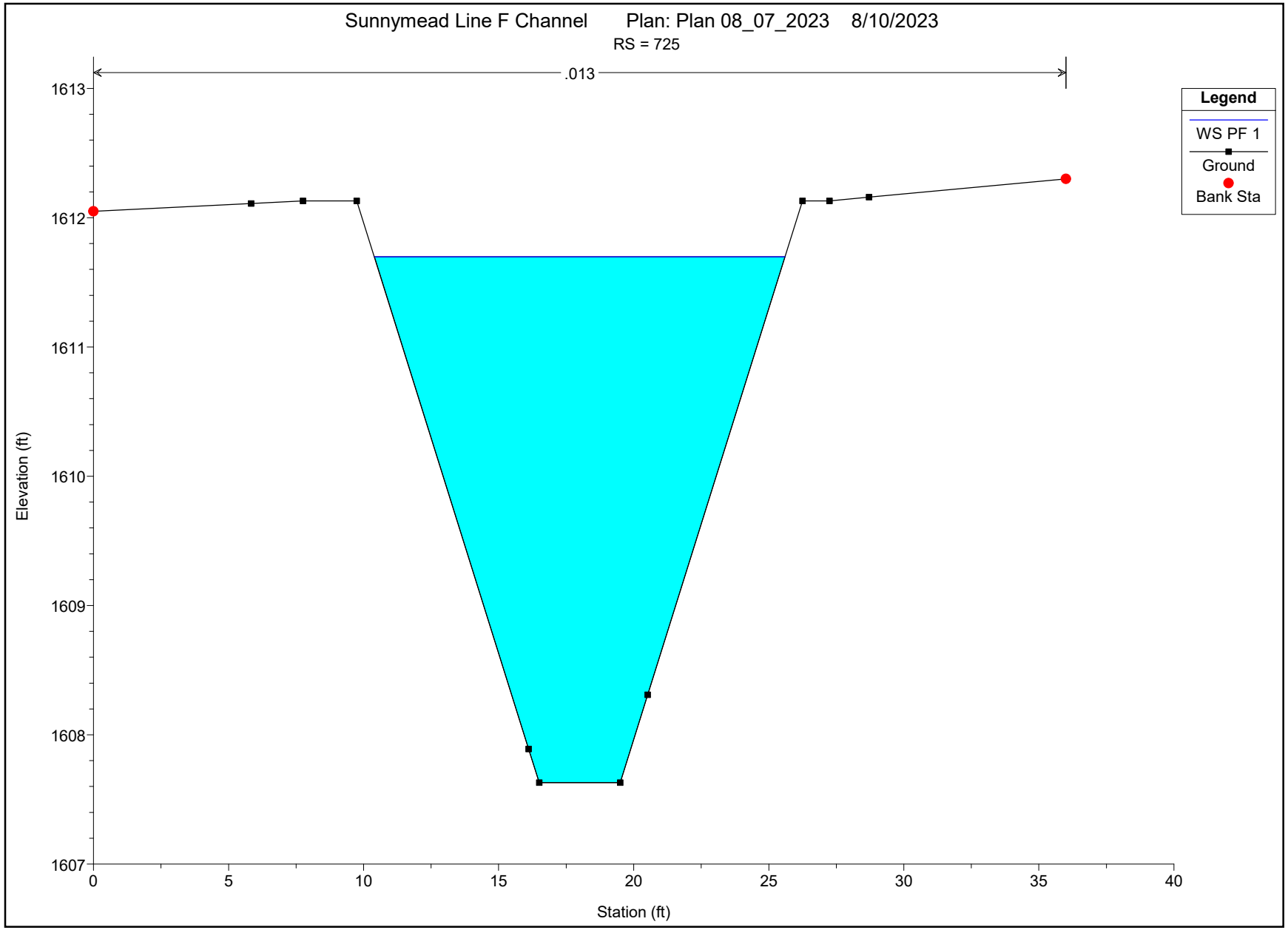

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 825
.013
.042
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1615
1614
1613
1612
1611
1610
1609
0
20
40
60
80
100
Station (ft)

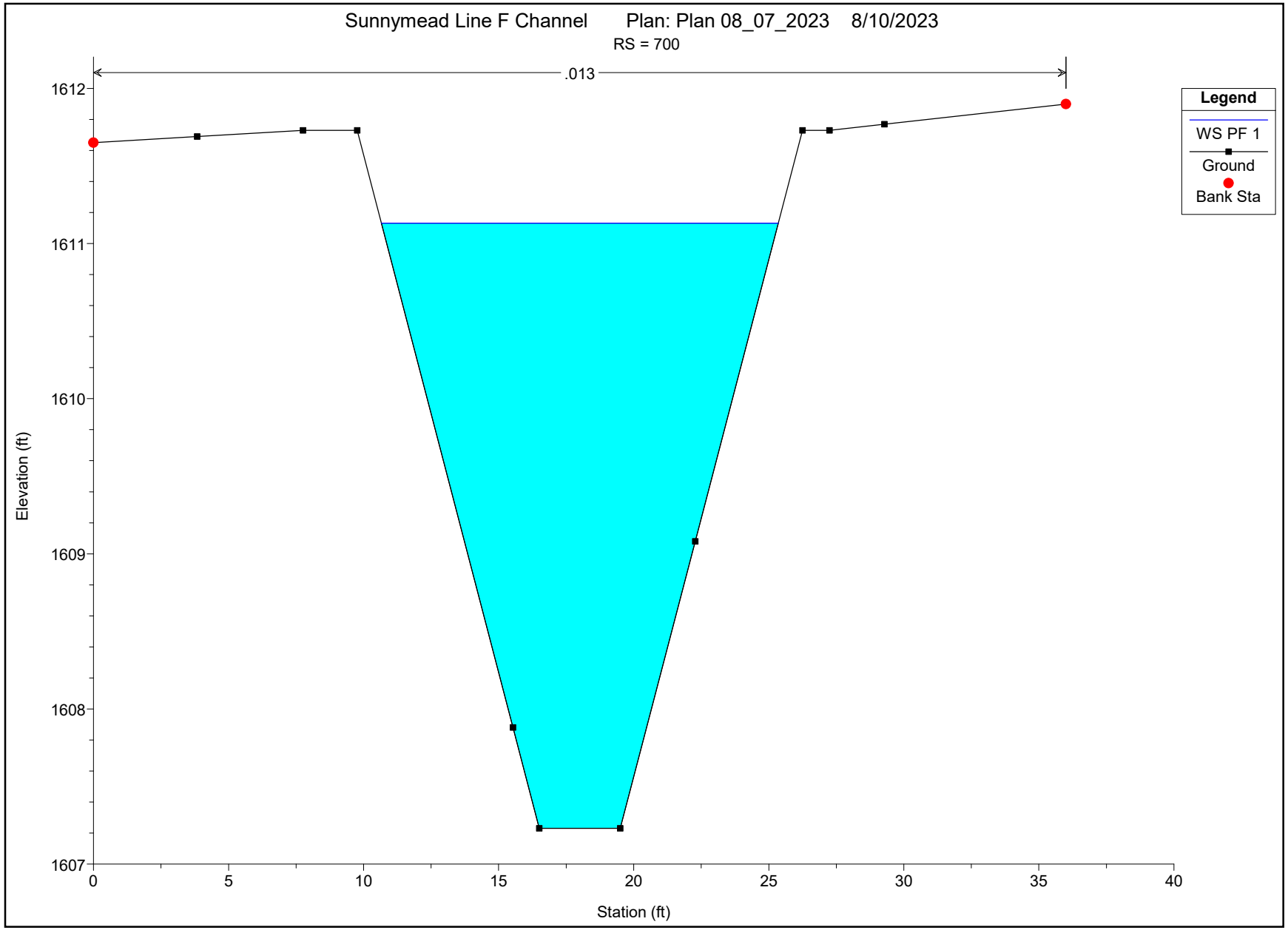

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 810
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1615
1614
1613
1612
1611
1610
1609
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 800
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1614
1613
1612
1611
1610
1609
1608
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 775
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1614
1613
1612
1611
1610
1609
1608
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 750
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1613
1612
1611
1610
1609
1608
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 725
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1613
1612
1611
1610
1609
1608
1607
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 700
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
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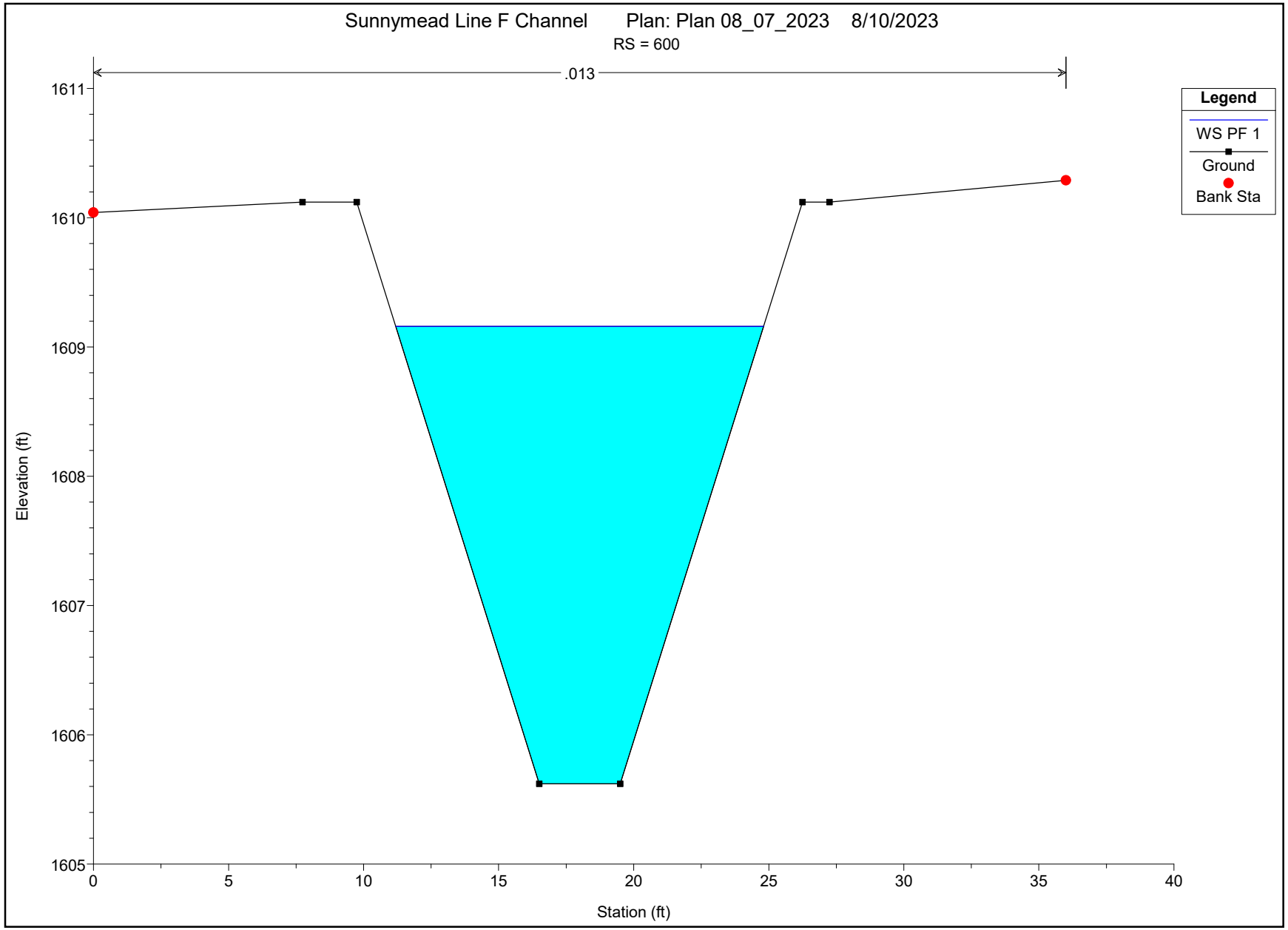
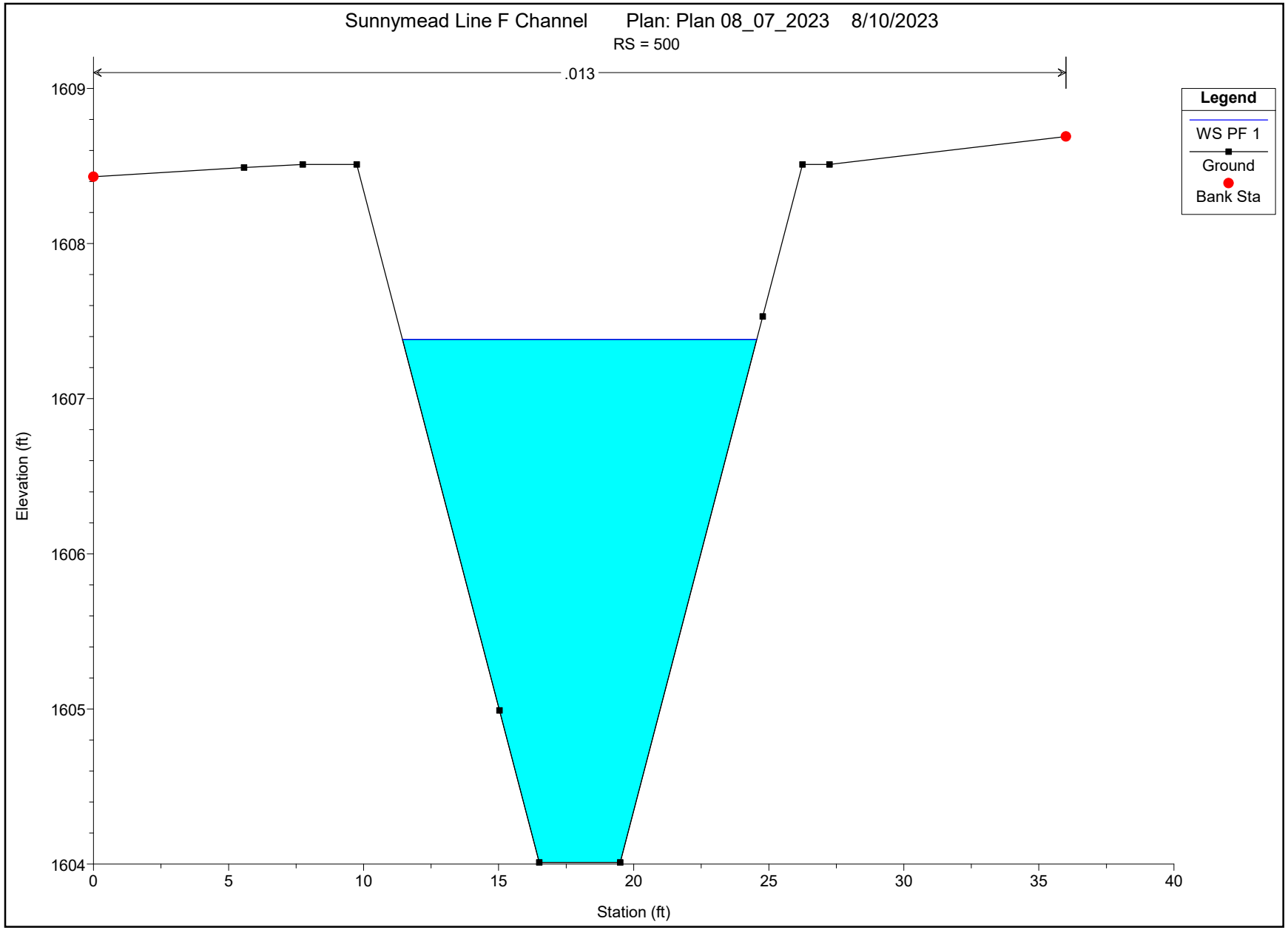
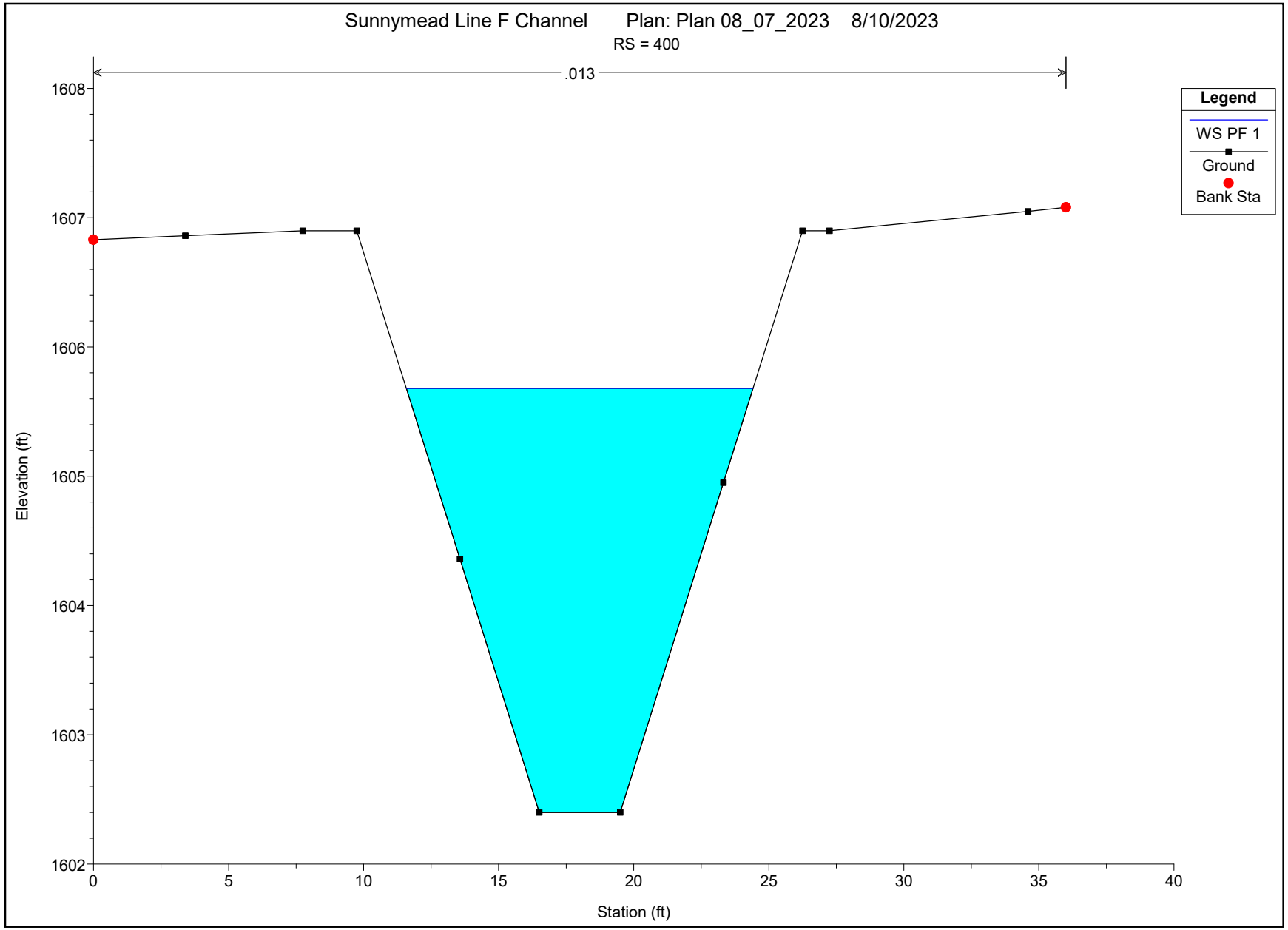
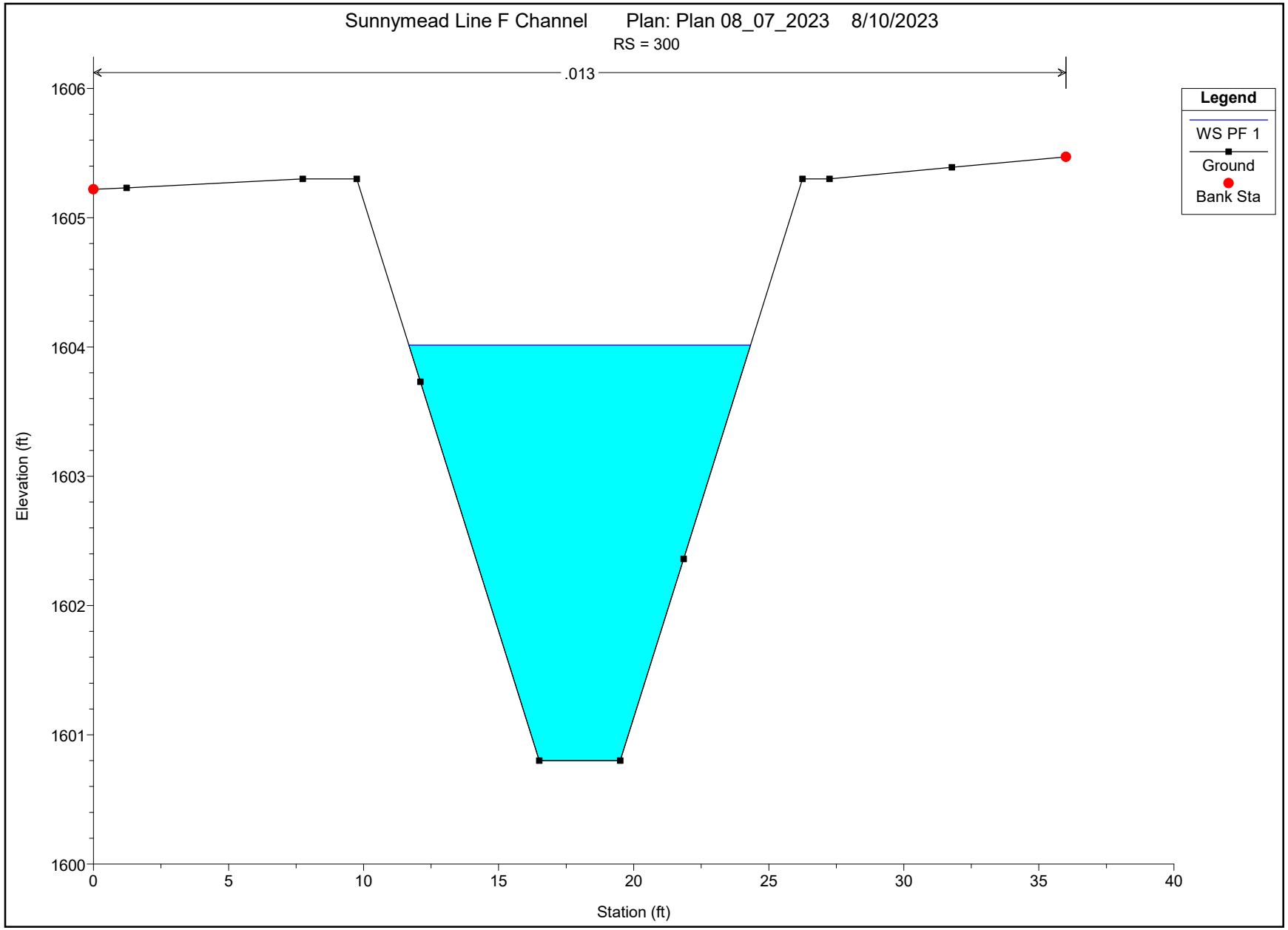
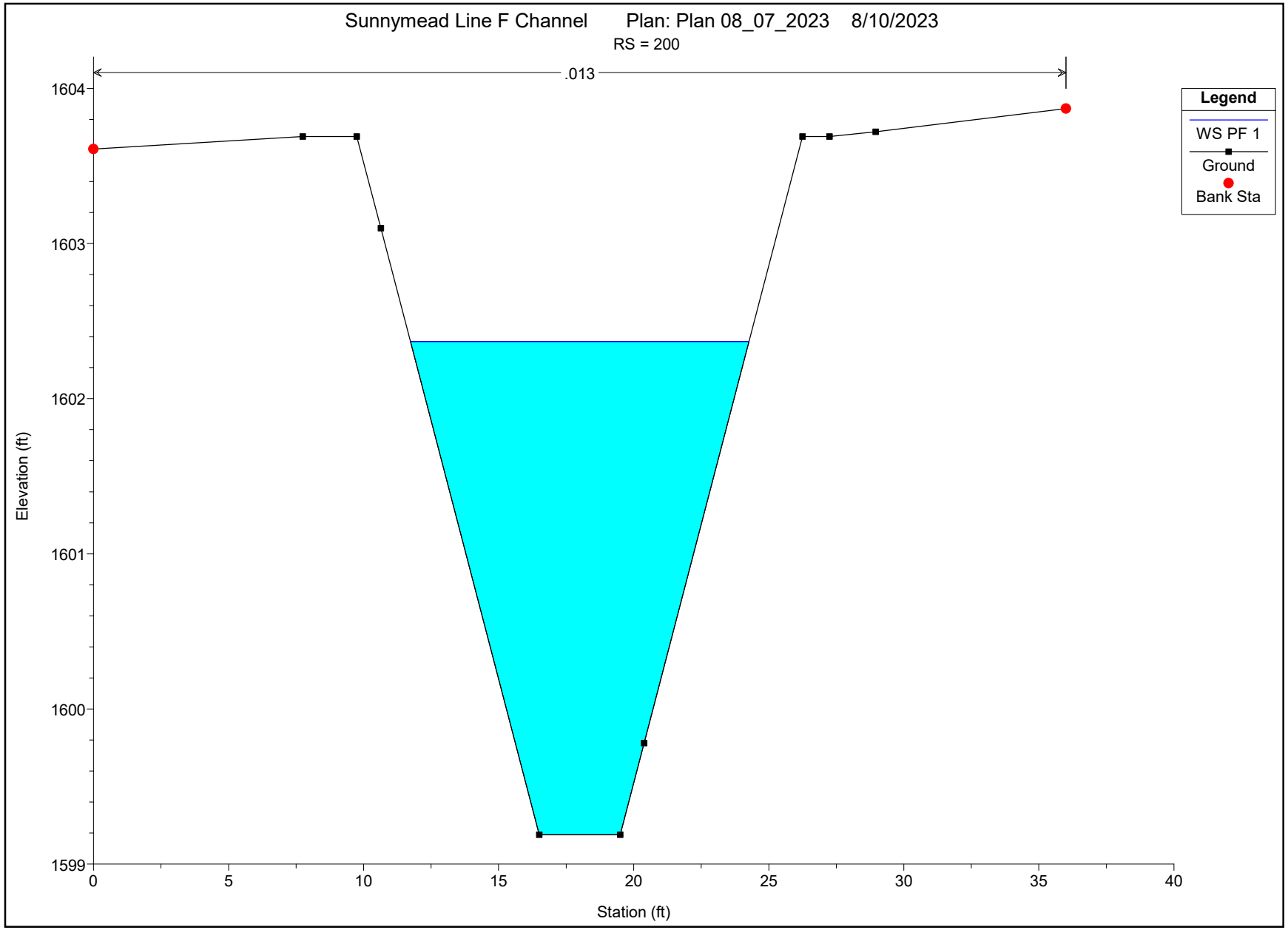
1611
1610
1609
1608
1607
0
5
10
15
20
25
30
35
40
Station (ft)

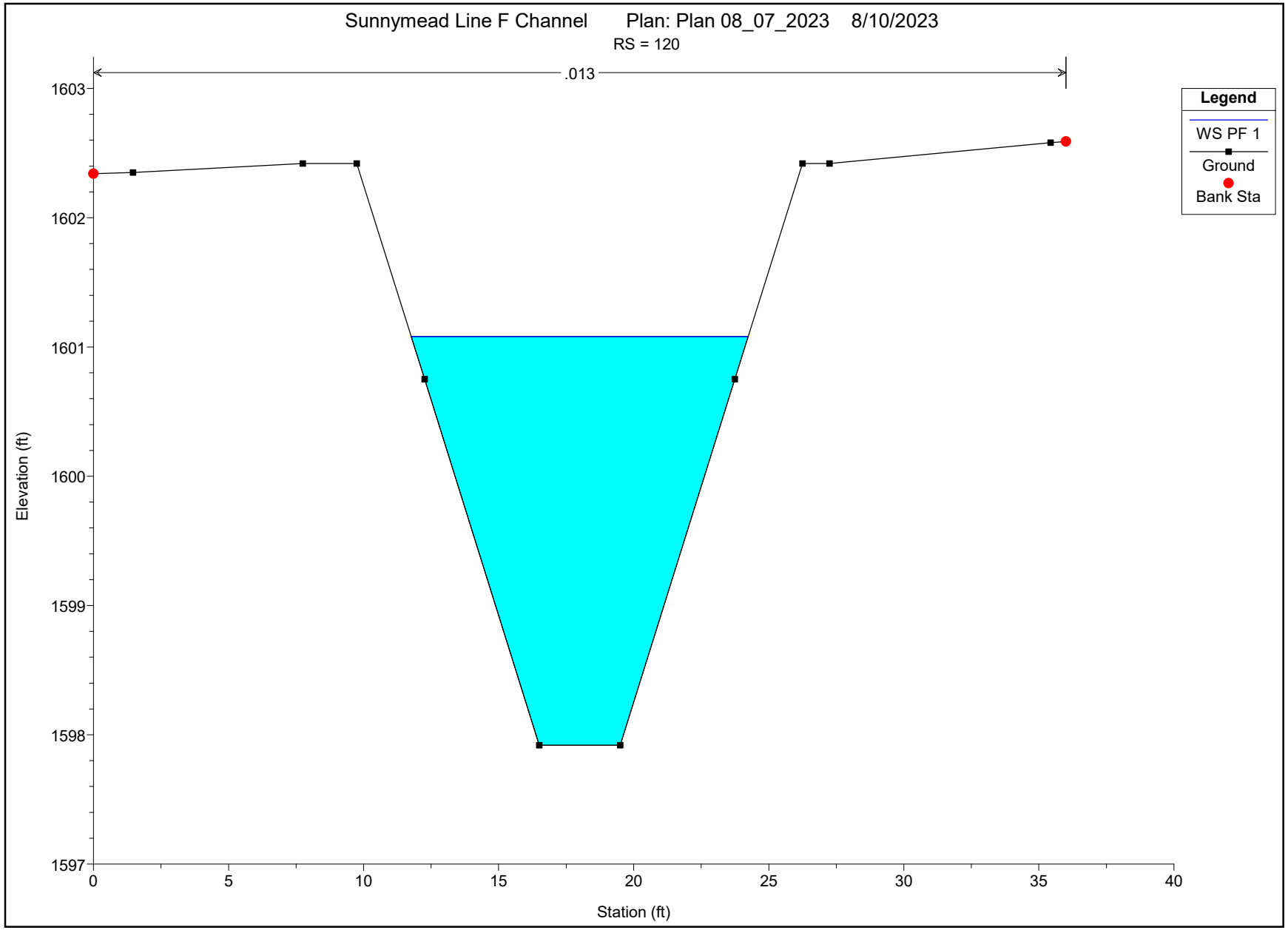

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 600
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1611
1610
1609
1608
1607
1606
1605
0
5
10
15
20
25
30
35
40
Station (ft)

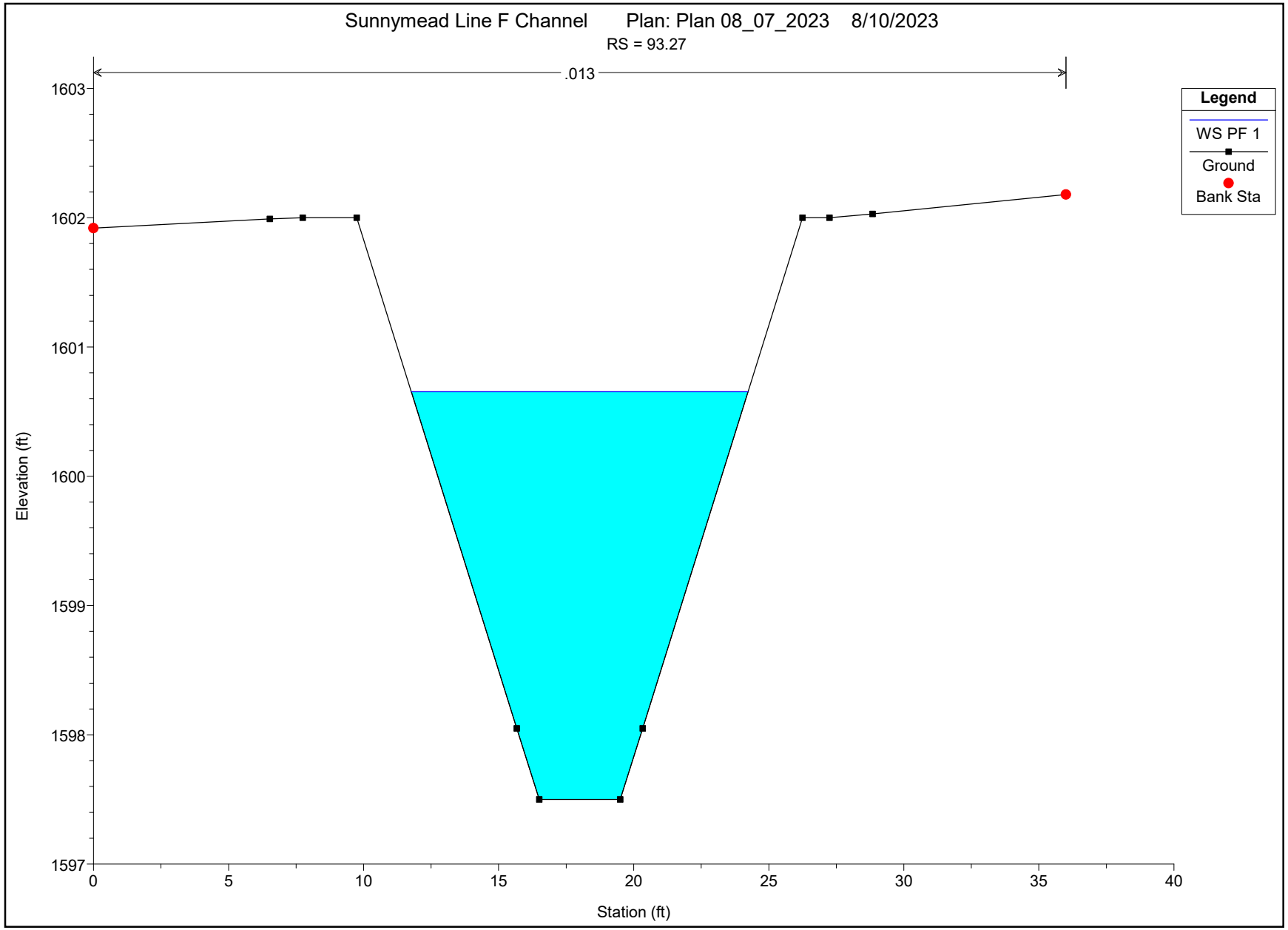

Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 500
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1609
1608
1607
1606
1605
1604
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 400
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1608
1607
1606
1605
1604
1603
1602
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 300
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1606
1605
1604
1603
1602
1601
1600
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 200
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1604
1603
1602
1601
1600
1599
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 120
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1603
1602
1601
1600
1599
1598
1597
0
5
10
15
20
25
30
35
40
Station (ft)


Sunnymead Line F Channel Plan: Plan 08_07_2023 8/10/2023
RS = 93.27
.013
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1603
1602
1601
1600
1599
1598
1597
0
5
10
15
20
25
30
35
40
Station (ft)

APPENDIX I

WSPG HYDRAULICS OUTPUT FILES

FILE: sunnymeadsouthreach.WSW W S P G W - EDIT LISTING - Version 14.11 Date: 8-10-2023 Time: 1:12:43

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	2	0	.000	4.000	10.000			.00										
CD	2	4	1		6.000														
CD	3	4	1		5.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
12804 Sunnymead MDP

HEADING LINE NO 2 IS -
South Reach Main Line

HEADING LINE NO 3 IS -
WSP USA

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	885.750	1609.930	1	1614.890

ELEMENT NO 2 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	901.290	1609.980	2	.013	.000	.000

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1029.770	1610.370	2	.013	.000	.000	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1255.930	1611.057	2	.013	398.353	-32.529	.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1410.000	1611.505	2	.013	.000	.000	.000	0

ELEMENT NO 6 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1425.000	1611.550	3	.013	.000	.000

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1835.240	1612.780	3	.013	.000	.000	.000	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1946.650	1613.120	3	.013	425.017	15.019	.000	0

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2114.640	1613.620	3	.013	.000	.000	.000	0

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2127.110	1613.660	3	.013	100.013	-7.144	.000	0

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H

	2365.950	1614.380	3	.013		.000	.000	.000	0

ELEMENT NO 12 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT		W S ELEV
	2365.950	1614.380	3		1628.130

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-10-2023 Time: 1:12:52

12804 Sunnymead MDP
South Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
885.750	1609.930	4.960	1614.890	295.34	5.95	.55	1615.44	.00	3.00	10.00	4.000	10.000	.00	0 .0
TRANS STR	.0032							4.96	.47		.013	.00	.00	RECTANG
901.290	1609.980	4.698	1614.678	295.34	12.43	2.40	1617.08	.00	4.70	4.95	6.000	.000	.00	1 .0
12.202	.0030					.0051	.06	4.70	1.00	6.00	.013	.00	.00	PIPE
913.492	1610.017	4.941	1614.958	295.34	11.86	2.18	1617.14	.00	4.70	4.57	6.000	.000	.00	1 .0
52.497	.0030					.0046	.24	4.94	.90	6.00	.013	.00	.00	PIPE
965.989	1610.176	5.223	1615.399	295.34	11.30	1.98	1617.38	.00	4.70	4.03	6.000	.000	.00	1 .0
63.781	.0030					.0044	.28	5.22	.78	6.00	.013	.00	.00	PIPE
1029.770	1610.370	5.413	1615.783	295.34	11.00	1.88	1617.66	.02	4.70	3.57	6.000	.000	.00	1 .0
226.160	.0030					.0043	.97	5.43	.71	6.00	.013	.00	.00	PIPE
1255.930	1611.057	5.864	1616.921	295.34	10.51	1.71	1618.64	.00	4.70	1.78	6.000	.000	.00	1 .0
72.265	.0029					.0045	.33	5.86	.47	6.00	.013	.00	.00	PIPE
1328.195	1611.267	6.000	1617.267	295.34	10.45	1.69	1618.96	.00	4.70	.00	6.000	.000	.00	1 .0
81.805	.0029					.0048	.39	6.00	.00	6.00	.013	.00	.00	PIPE
1410.000	1611.505	6.160	1617.665	295.34	10.45	1.69	1619.36	.00	4.70	.00	6.000	.000	.00	1 .0
TRANS STR	.0030							6.16	.00		.013	.00	.00	PIPE
1425.000	1611.550	4.652	1616.202	295.34	15.51	3.74	1619.94	.00	4.65	2.54	5.000	.000	.00	1 .0
14.100	.0030					.0117	.17	4.65	1.00	5.00	.013	.00	.00	PIPE

12804 Sunnymead MDP
South Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1439.100	1611.592	5.000	1616.592	295.34	15.04	3.51	1620.11	.00	4.65	.00	5.000	.000	.00	1 .0
396.140	.0030					.0126	5.00	5.00	.00	5.00	.013	.00	.00	PIPE
1835.240	1612.780	8.907	1621.687	295.34	15.04	3.51	1625.20	.00	4.65	.00	5.000	.000	.00	1 .0
111.410	.0031					.0129	1.43	.00	.00	5.00	.013	.00	.00	PIPE
1946.650	1613.120	10.286	1623.406	295.34	15.04	3.51	1626.92	.00	4.65	.00	5.000	.000	.00	1 .0
167.990	.0030					.0129	2.16	10.29	.00	5.00	.013	.00	.00	PIPE
2114.640	1613.620	11.947	1625.567	295.34	15.04	3.51	1629.08	.00	4.65	.00	5.000	.000	.00	1 .0
12.470	.0032					.0129	.16	.00	.00	5.00	.013	.00	.00	PIPE
2127.110	1613.660	12.265	1625.925	295.34	15.04	3.51	1629.44	.00	4.65	.00	5.000	.000	.00	1 .0
238.840	.0030					.0129	3.07	12.26	.00	5.00	.013	.00	.00	PIPE
2365.950	1614.380	14.616	1628.996	295.34	15.04	3.51	1632.51	.00	4.65	.00	5.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	8.000	10.000	.000	.000	.00										
CD	2	3	1	1.000	4.000	20.000	.000	.000	.00										
CD	3	4	1		4.000														
CD	4	4	1		6.000														
CD	5	4	1		5.000														
CD	6	4	1		2.000														
CD	7	3	0	.000	4.000	6.000	.000	.000	.00										

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
12804 Sunnymead MDP

HEADING LINE NO 2 IS -
North Reach Main Line

HEADING LINE NO 3 IS -
WSP USA

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	2714.280	1615.400	1	1628.130

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2769.230	1615.570	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2798.690	1615.661	1	.013	35.003	-48.222	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2894.120	1615.940	1	.013	.000	.000	.000	0

ELEMENT NO 5 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	2919.120	1616.000	2	.013	.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2948.210	1616.090	2	.013	80.000	20.834	.000	0

ELEMENT NO 7 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2952.210	1616.100	2	3	0	.013	49.119	.000	1616.100	.000	-30.000	.000

RADIUS	ANGLE
79.994	2.865

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2955.640	1616.110	2	.013	79.984	2.457	.000	0

ELEMENT NO 9 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4

```
                  2959.640 1616.122    2     3     0   .013    73.678      .000  1616.125      .000  30.000     .000
                                                                                  RADIUS    ANGLE
                                                                                  79.994   2.865
ELEMENT NO  10 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               2994.350 1616.226    2                .013                             80.001   24.859      .000     0
                                                        W S P G W                                                          PAGE NO   3
                        WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  11 IS A TRANSITION      *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS   ANGLE
                               3028.120 1616.350    4                .013                               .000     .000
ELEMENT NO  12 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               3103.040 1616.570    4                .013                             80.010  -53.651      .000     0
ELEMENT NO  13 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               3444.660 1617.590    4                .013                               .000     .000      .000     0
ELEMENT NO  14 IS A JUNCTION        *          *     *     *                  *                   *                *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                               3451.660 1617.620    4     0     0   .013      .000      .000      .000      .000    .000     .000
                                                                                                   RADIUS    ANGLE
                                                                                                     .000     .000
ELEMENT NO  15 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               3709.660 1618.390    4                .013                               .000     .000      .000     0
ELEMENT NO  16 IS A JUNCTION        *          *     *     *                  *                   *                *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                               3716.660 1618.530    4     0     0   .013      .000      .000      .000      .000    .000     .000
                                                                                                   RADIUS    ANGLE
                                                                                                     .000     .000
ELEMENT NO  17 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               3827.860 1620.550    4                .013                               .000     .000      .000     0
ELEMENT NO  18 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               3883.510 1621.561    4                .013                            100.000  -31.885      .000     0
ELEMENT NO  19 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               3905.490 1621.960    4                .013                               .000     .000      .000     0
ELEMENT NO  20 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               3960.320 1622.960    4                .013                            100.865   31.146      .000     0
                                                        W S P G W                                                          PAGE NO   4
                        WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  21 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               4093.750 1625.390    4                .013                               .000     .000      .000     0
ELEMENT NO  22 IS A REACH           *          *     *
                    U/S DATA   STATION    INVERT  SECT                N                                RADIUS    ANGLE     ANG PT  MAN H
                               4104.500 1625.586    4                .013                             49.998   12.319      .000     0
```

ELEMENT NO 23 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	4108.500	1625.658	4	3	0	.013	157.495	.000	1626.586	.000	-30.000	.000

RADIUS	ANGLE
49.996	4.584

ELEMENT NO 24 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4172.290	1626.820	4	.013	50.000	73.098	.000	0

ELEMENT NO 25 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4197.890	1627.290	4	.013	.000	.000	.000	0

ELEMENT NO 26 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	4208.730	1627.489	5	0	0	.013	.000	.000	.000	.000	.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 27 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4281.220	1628.760	5	.013	.000	.000	.000	0

ELEMENT NO 28 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	5115.270	1633.010	5	.013	.000	.000	.000	0

ELEMENT NO 29 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	5146.610	1633.170	5	.013	59.993	-29.931	.000	0

ELEMENT NO 30 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	5151.610	1633.200	5	.013	.000	.000	.000	0

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 31 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	5182.950	1633.360	5	.013	59.994	29.931	.000	0

ELEMENT NO 32 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	5188.410	1633.390	5	.013	.000	.000	.000	0

ELEMENT NO 33 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	5193.420	1633.418	5	6	0	.013	.254	.000	1635.010	.000	45.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 34 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	5210.240	1633.512	5	.013	.000	.000	.000	0

ELEMENT NO 35 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	5214.240	1633.534	5	6	0	.013	22.608	.000	1635.010	.000	-90.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 36 IS A REACH

```
                    U/S DATA   STATION    INVERT  SECT               N                         RADIUS    ANGLE     ANG PT  MAN H
                               5602.580 1635.500    5              .013                         .000     .000      .000     0
ELEMENT NO  37 IS A JUNCTION          *         *     *     *                  *                   *               *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                               5608.580 1635.536    5     7     0   .013    32.518      .000  1635.700      .000 -60.000     .000
                                                                                                   RADIUS    ANGLE
                                                                                                     .000    .000
ELEMENT NO  38 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                         RADIUS    ANGLE     ANG PT  MAN H
                               5660.400 1635.800    5              .013                         .000     .000      .000     0
```



```
ELEMENT NO  39 IS A JUNCTION          *         *     *     *                  *                   *               *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                               5664.400 1635.820    5     3     0   .013     1.871      .000  1636.140      .000  60.000     .000
                                                                                                   RADIUS    ANGLE
                                                                                                     .000    .000
ELEMENT NO  40 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                         RADIUS    ANGLE     ANG PT  MAN H
                               5706.300 1636.030    5              .013                         .000     .000      .000     0
ELEMENT NO  41 IS A SYSTEM HEADWORKS                  *                      *
                    U/S DATA   STATION    INVERT  SECT                                    W S ELEV
                               5706.300 1636.030    5                                    1636.030
```

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time:11:41:38

12804 Sunnymead MDP
North Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2714.280	1615.400	12.730	1628.130	382.99	4.79	.36	1628.49	.00	3.57	10.00	8.000	10.000	.00	0 .0
54.950	.0031					.0006	.03	12.73	.30	3.66	.013	.00	.00	BOX
2769.230	1615.570	12.593	1628.163	382.99	4.79	.36	1628.52	.00	3.57	10.00	8.000	10.000	.00	0 .0
29.460	.0031					.0006	.02	.00	.30	3.66	.013	.00	.00	BOX
2798.690	1615.661	12.572	1628.233	382.99	4.79	.36	1628.59	.00	3.57	10.00	8.000	10.000	.00	0 .0
95.430	.0029					.0006	.06	12.57	.30	3.73	.013	.00	.00	BOX
2894.120	1615.940	12.351	1628.291	382.99	4.79	.36	1628.65	.00	3.57	10.00	8.000	10.000	.00	0 .0
TRANS STR	.0024					.0006	.02	12.35	.30		.013	.00	.00	BOX
2919.120	1616.000	12.294	1628.294	382.99	5.04	.39	1628.69	.00	2.33	20.00	4.000	20.000	.00	1 1.0
29.090	.0031					.0012	.04	.00	.46	2.35	.013	.00	.00	BOX
2948.210	1616.090	12.278	1628.368	382.99	5.04	.39	1628.76	.00	2.33	20.00	4.000	20.000	.00	1 1.0
JUNCT STR	.0025					.0009	.00	.00	.46		.013	.00	.00	BOX
2952.210	1616.100	12.394	1628.494	333.87	4.39	.30	1628.79	.00	2.12	20.00	4.000	20.000	.00	1 1.0
3.430	.0029					.0009	.00	.00	.40	2.18	.013	.00	.00	BOX
2955.640	1616.110	12.397	1628.507	333.87	4.39	.30	1628.81	.00	2.12	20.00	4.000	20.000	.00	1 1.0
JUNCT STR	.0030					.0006	.00	.00	.40		.013	.00	.00	BOX
2959.640	1616.122	12.470	1628.592	260.19	3.42	.18	1628.77	.00	1.80	20.00	4.000	20.000	.00	1 1.0
34.710	.0030					.0006	.02	.00	.31	1.82	.013	.00	.00	BOX

12804 Sunnymead MDP
North Reach Main Line
WSP USA

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/ Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
2994.350	1616.226	12.405	1628.631	260.19	3.42	.18	1628.81	.00	1.80	20.00	4.000	20.000	.00	1 1.0
TRANS STR	.0037				.0022	.07	12.41	.31		.013	.00	.00		BOX
3028.120	1616.350	11.788	1628.138	260.19	9.20	1.31	1629.45	.00	4.42	.00	6.000	.000	.00	1 .0
74.920	.0029				.0038	.28	.00	.00	6.00	.013	.00	.00		PIPE
3103.040	1616.570	12.054	1628.624	260.19	9.20	1.31	1629.94	.00	4.42	.00	6.000	.000	.00	1 .0
341.620	.0030				.0038	1.29	12.05	.00	6.00	.013	.00	.00		PIPE
3444.660	1617.590	12.324	1629.913	260.19	9.20	1.31	1631.23	.00	4.42	.00	6.000	.000	.00	1 .0
JUNCT STR	.0043				.0038	.03	12.32	.00		.013	.00	.00		PIPE
3451.660	1617.620	12.320	1629.940	260.19	9.20	1.31	1631.25	.00	4.42	.00	6.000	.000	.00	1 .0
258.000	.0030				.0038	.97	12.32	.00	6.00	.013	.00	.00		PIPE
3709.660	1618.390	12.524	1630.914	260.19	9.20	1.31	1632.23	.00	4.42	.00	6.000	.000	.00	1 .0
JUNCT STR	.0200				.0038	.03	12.52	.00		.013	.00	.00		PIPE
3716.660	1618.530	12.410	1630.940	260.19	9.20	1.31	1632.26	.00	4.42	.00	6.000	.000	.00	1 .0
111.200	.0182				.0038	.42	12.41	.00	2.84	.013	.00	.00		PIPE
3827.860	1620.550	10.810	1631.360	260.19	9.20	1.31	1632.67	.00	4.42	.00	6.000	.000	.00	1 .0
55.650	.0182				.0038	.21	.00	.00	2.84	.013	.00	.00		PIPE
3883.510	1621.561	10.165	1631.726	260.19	9.20	1.31	1633.04	.00	4.42	.00	6.000	.000	.00	1 .0
21.980	.0181				.0038	.08	10.17	.00	2.84	.013	.00	.00		PIPE

12804 Sunnymead MDP
North Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3905.490	1621.960	9.849	1631.809	260.19	9.20	1.31	1633.12	.00	4.42	.00	6.000	.000	.00	1 .0
54.830	.0182					.0038	.21	.00	.00	2.84	.013	.00	.00	PIPE
3960.320	1622.960	9.211	1632.171	260.19	9.20	1.31	1633.49	.00	4.42	.00	6.000	.000	.00	1 .0
133.430	.0182					.0038	.50	9.21	.00	2.84	.013	.00	.00	PIPE
4093.750	1625.390	7.285	1632.675	260.19	9.20	1.31	1633.99	.00	4.42	.00	6.000	.000	.00	1 .0
10.750	.0182					.0038	.04	.00	.00	2.84	.013	.00	.00	PIPE
4104.500	1625.586	7.227	1632.813	260.19	9.20	1.31	1634.13	.00	4.42	.00	6.000	.000	.00	1 .0
JUNCT STR	.0180					.0022	.01	.00	.00		.013	.00	.00	PIPE
4108.500	1625.658	8.274	1633.932	102.70	3.63	.20	1634.14	.00	2.73	.00	6.000	.000	.00	1 .0
63.790	.0182					.0006	.04	.00	.00	1.72	.013	.00	.00	PIPE
4172.290	1626.820	7.186	1634.006	102.70	3.63	.20	1634.21	.00	2.73	.00	6.000	.000	.00	1 .0
25.600	.0184					.0006	.02	7.19	.00	1.72	.013	.00	.00	PIPE
4197.890	1627.290	6.731	1634.021	102.70	3.63	.20	1634.23	.00	2.73	.00	6.000	.000	.00	1 .0
JUNCT STR	.0184					.0011	.01	6.73	.00		.013	.00	.00	PIPE
4208.730	1627.489	6.331	1633.820	102.70	5.23	.42	1634.24	.00	2.89	.00	5.000	.000	.00	1 .0
72.490	.0175					.0016	.11	6.33	.00	1.87	.013	.00	.00	PIPE
4281.220	1628.760	5.173	1633.932	102.70	5.23	.42	1634.36	.00	2.89	.00	5.000	.000	.00	1 .0
48.725	.0051					.0015	.08	5.17	.00	2.65	.013	.00	.00	PIPE

12804 Sunnymead MDP
North Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
4329.945	1629.008	5.000	1634.008	102.70	5.23	.42	1634.43	.00	2.89	.00	5.000	.000	.00	1 .0
115.266	.0051					.0014	.17	5.00	.00	2.65	.013	.00	.00	PIPE
4445.210	1629.596	4.536	1634.132	102.70	5.49	.47	1634.60	.00	2.89	2.90	5.000	.000	.00	1 .0
60.272	.0051					.0014	.08	4.54	.38	2.65	.013	.00	.00	PIPE
4505.483	1629.903	4.267	1634.170	102.70	5.75	.51	1634.68	.00	2.89	3.54	5.000	.000	.00	1 .0
47.764	.0051					.0015	.07	4.27	.45	2.65	.013	.00	.00	PIPE
4553.247	1630.146	4.045	1634.191	102.70	6.03	.57	1634.76	.00	2.89	3.93	5.000	.000	.00	1 .0
40.496	.0051					.0017	.07	4.05	.51	2.65	.013	.00	.00	PIPE
4593.743	1630.353	3.850	1634.203	102.70	6.33	.62	1634.82	.00	2.89	4.21	5.000	.000	.00	1 .0
34.869	.0051					.0019	.06	3.85	.57	2.65	.013	.00	.00	PIPE
4628.611	1630.530	3.675	1634.205	102.70	6.64	.68	1634.89	.00	2.89	4.41	5.000	.000	.00	1 .0
30.333	.0051					.0021	.06	3.68	.62	2.65	.013	.00	.00	PIPE
4658.945	1630.685	3.515	1634.200	102.70	6.96	.75	1634.95	.00	2.89	4.57	5.000	.000	.00	1 .0
26.269	.0051					.0023	.06	3.52	.68	2.65	.013	.00	.00	PIPE
4685.214	1630.819	3.367	1634.186	102.70	7.30	.83	1635.01	.00	2.89	4.69	5.000	.000	.00	1 .0
22.253	.0051					.0026	.06	3.37	.74	2.65	.013	.00	.00	PIPE
4707.467	1630.932	3.229	1634.161	102.70	7.66	.91	1635.07	.00	2.89	4.78	5.000	.000	.00	1 .0
13.933	.0051					.0029	.04	3.23	.81	2.65	.013	.00	.00	PIPE

12804 Sunnymead MDP
North Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
4721.400	1631.003	3.134	1634.137	102.70	7.93	.98	1635.11	.00	2.89	4.84	5.000	.000	.00	1 .0
HYDRAULIC JUMP														
4721.400	1631.003	2.653	1633.656	102.70	9.70	1.46	1635.12	.00	2.89	4.99	5.000	.000	.00	1 .0
276.202	.0051					.0051	1.41	2.65	1.17	2.65	.013	.00	.00	PIPE
4997.602	1632.410	2.653	1635.064	102.70	9.70	1.46	1636.53	.00	2.89	4.99	5.000	.000	.00	1 .0
117.668	.0051					.0051	.60	2.65	1.17	2.65	.013	.00	.00	PIPE
5115.270	1633.010	2.664	1635.674	102.70	9.65	1.45	1637.12	.24	2.89	4.99	5.000	.000	.00	1 .0
31.340	.0051					.0050	.16	2.90	1.17	2.65	.013	.00	.00	PIPE
5146.610	1633.170	2.674	1635.844	102.70	9.61	1.43	1637.28	.00	2.89	4.99	5.000	.000	.00	1 .0
5.000	.0060					.0049	.02	2.67	1.16	2.53	.013	.00	.00	PIPE
5151.610	1633.200	2.690	1635.890	102.70	9.54	1.41	1637.30	.23	2.89	4.99	5.000	.000	.00	1 .0
31.340	.0051					.0048	.15	2.92	1.14	2.65	.013	.00	.00	PIPE
5182.950	1633.360	2.730	1636.090	102.70	9.37	1.36	1637.45	.00	2.89	4.98	5.000	.000	.00	1 .0
5.460	.0055					.0046	.03	2.73	1.11	2.59	.013	.00	.00	PIPE
5188.410	1633.390	2.753	1636.143	102.70	9.27	1.33	1637.48	.00	2.89	4.97	5.000	.000	.00	1 .0
JUNCT STR	.0056					.0046	.02	2.75	1.09		.013	.00	.00	PIPE
5193.420	1633.418	2.715	1636.133	102.44	9.40	1.37	1637.51	.00	2.88	4.98	5.000	.000	.00	1 .0
11.241	.0056					.0045	.05	2.72	1.12	2.58	.013	.00	.00	PIPE

12804 Sunnymead MDP
North Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
5204.661	1633.481	2.771	1636.252	102.44	9.17	1.31	1637.56	.00	2.88	4.97	5.000	.000	.00	1 .0
5.579	.0056					.0041	.02	2.77	1.08	2.58	.013	.00	.00	PIPE
5210.240	1633.512	2.883	1636.395	102.44	8.74	1.19	1637.58	.00	2.88	4.94	5.000	.000	.00	1 .0
JUNCT STR	.0055					.0024	.01	2.88	1.00		.013	.00	.00	PIPE
5214.240	1633.534	3.994	1637.528	79.83	4.75	.35	1637.88	.00	2.53	4.01	5.000	.000	.00	1 .0
38.407	.0051					.0010	.04	3.99	.41	2.29	.013	.00	.00	PIPE
5252.647	1633.729	3.804	1637.533	79.83	4.98	.39	1637.92	.00	2.53	4.27	5.000	.000	.00	1 .0
33.914	.0051					.0012	.04	3.80	.45	2.29	.013	.00	.00	PIPE
5286.561	1633.900	3.633	1637.533	79.83	5.22	.42	1637.96	.00	2.53	4.46	5.000	.000	.00	1 .0
30.398	.0051					.0013	.04	3.63	.50	2.29	.013	.00	.00	PIPE
5316.959	1634.054	3.476	1637.530	79.83	5.48	.47	1638.00	.00	2.53	4.60	5.000	.000	.00	1 .0
27.225	.0051					.0014	.04	3.48	.54	2.29	.013	.00	.00	PIPE
5344.184	1634.192	3.331	1637.523	79.83	5.75	.51	1638.04	.00	2.53	4.72	5.000	.000	.00	1 .0
24.676	.0051					.0016	.04	3.33	.59	2.29	.013	.00	.00	PIPE
5368.860	1634.317	3.195	1637.512	79.83	6.03	.56	1638.08	.00	2.53	4.80	5.000	.000	.00	1 .0
22.187	.0051					.0018	.04	3.20	.64	2.29	.013	.00	.00	PIPE
5391.047	1634.429	3.067	1637.496	79.83	6.32	.62	1638.12	.00	2.53	4.87	5.000	.000	.00	1 .0
19.380	.0051					.0021	.04	3.07	.69	2.29	.013	.00	.00	PIPE

12804 Sunnymead MDP
North Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
5410.427	1634.527	2.947	1637.474	79.83	6.63	.68	1638.16	.00	2.53	4.92	5.000	.000	.00	1 .0
16.456	.0051					.0023	.04	2.95	.75	2.29	.013	.00	.00	PIPE
5426.883	1634.610	2.834	1637.445	79.83	6.95	.75	1638.19	.00	2.53	4.96	5.000	.000	.00	1 .0
7.039	.0051					.0026	.02	2.83	.80	2.29	.013	.00	.00	PIPE
5433.922	1634.646	2.783	1637.430	79.83	7.11	.78	1638.21	.00	2.53	4.97	5.000	.000	.00	1 .0
HYDRAULIC JUMP														
5433.922	1634.646	2.294	1636.940	79.83	9.09	1.28	1638.22	.00	2.53	4.98	5.000	.000	.00	1 .0
21.306	.0051					.0051	.11	2.29	1.21	2.29	.013	.00	.00	PIPE
5455.228	1634.754	2.294	1637.048	79.83	9.09	1.28	1638.33	.00	2.53	4.98	5.000	.000	.00	1 .0
110.809	.0051					.0049	.54	2.29	1.21	2.29	.013	.00	.00	PIPE
5566.036	1635.315	2.346	1637.661	79.83	8.82	1.21	1638.87	.00	2.53	4.99	5.000	.000	.00	1 .0
30.875	.0051					.0044	.14	2.35	1.15	2.29	.013	.00	.00	PIPE
5596.911	1635.471	2.435	1637.906	79.83	8.41	1.10	1639.00	.00	2.53	5.00	5.000	.000	.00	1 .0
5.669	.0051					.0039	.02	2.44	1.08	2.29	.013	.00	.00	PIPE
5602.580	1635.500	2.529	1638.029	79.83	8.01	1.00	1639.03	.00	2.53	5.00	5.000	.000	.00	1 .0
JUNCT STR	.0060					.0020	.01	2.53	1.00		.013	.00	.00	PIPE
5608.580	1635.536	3.643	1639.179	47.32	3.09	.15	1639.33	.00	1.93	4.45	5.000	.000	.00	1 .0
30.812	.0051					.0005	.01	3.64	.29	1.72	.013	.00	.00	PIPE

12804 Sunnymead MDP
North Reach Main Line
WSP USA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
5639.392	1635.693	3.485	1639.178	47.32	3.24	.16	1639.34	.00	1.93	4.60	5.000	.000	.00	1 .0
21.008	.0051					.0005	.01	3.49	.32	1.72	.013	.00	.00	PIPE
5660.400	1635.800	3.377	1639.177	47.32	3.35	.17	1639.35	.00	1.93	4.68	5.000	.000	.00	1 .0
JUNCT STR	.0050					.0005	.00	3.38	.34		.013	.00	.00	PIPE
5664.400	1635.820	3.386	1639.206	45.44	3.21	.16	1639.37	.00	1.89	4.68	5.000	.000	.00	1 .0
27.346	.0050					.0005	.01	3.39	.33	1.69	.013	.00	.00	PIPE
5691.746	1635.957	3.247	1639.204	45.44	3.37	.18	1639.38	.00	1.89	4.77	5.000	.000	.00	1 .0
14.554	.0050					.0006	.01	3.25	.35	1.69	.013	.00	.00	PIPE
5706.300	1636.030	3.172	1639.203	45.44	3.46	.19	1639.39	.00	1.89	4.82	5.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		4.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
Sunnymead Master Drainage Plan
HEADING LINE NO 2 IS -
12804
HEADING LINE NO 3 IS -
Lateral F-1A

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	1616.140	1	1628.507

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	109.580	1625.800	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	127.640	1626.160	1	.013	44.999	22.995	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	160.170	1626.810	1	.013	.000	.000	.000	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	160.170	1626.810	1	1626.810

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1: 1:37

Sunnymead Master Drainage Plan

12804

Lateral F-1A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	1616.140	12.367	1628.507	73.68	5.86	.53	1629.04	.00	2.60	.00	4.000	.000	.00	1 .0
8.203	1.0084					.0026	.02	12.37	.00	.61	.013	.00	.00	PIPE
108.203	1624.412	4.110	1628.521	73.68	5.86	.53	1629.06	.00	2.60	.00	4.000	.000	.00	1 .0
HYDRAULIC JUMP														
108.203	1624.412	1.564	1625.976	73.68	16.18	4.07	1630.04	.00	2.60	3.90	4.000	.000	.00	1 .0
.258	1.0084					.0240	.01	1.56	2.64	.61	.013	.00	.00	PIPE
108.461	1624.672	1.608	1626.280	73.68	15.59	3.77	1630.05	.00	2.60	3.92	4.000	.000	.00	1 .0
.288	1.0084					.0213	.01	1.61	2.50	.61	.013	.00	.00	PIPE
108.748	1624.962	1.667	1626.629	73.68	14.86	3.43	1630.06	.00	2.60	3.94	4.000	.000	.00	1 .0
.253	1.0084					.0187	.00	1.67	2.34	.61	.013	.00	.00	PIPE
109.002	1625.217	1.728	1626.945	73.68	14.17	3.12	1630.06	.00	2.60	3.96	4.000	.000	.00	1 .0
.221	1.0084					.0165	.00	1.73	2.18	.61	.013	.00	.00	PIPE
109.223	1625.440	1.792	1627.232	73.68	13.51	2.83	1630.07	.00	2.60	3.98	4.000	.000	.00	1 .0
.192	1.0084					.0145	.00	1.79	2.03	.61	.013	.00	.00	PIPE
109.415	1625.634	1.859	1627.493	73.68	12.88	2.58	1630.07	.00	2.60	3.99	4.000	.000	.00	1 .0
.165	1.0084					.0127	.00	1.86	1.90	.61	.013	.00	.00	PIPE
109.580	1625.800	1.929	1627.729	73.68	12.28	2.34	1630.07	.42	2.60	4.00	4.000	.000	.00	1 .0
2.898	.0199					.0118	.03	2.35	1.77	1.67	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1: 1:37

Sunnymead Master Drainage Plan

12804

Lateral F-1A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
112.478	1625.858	1.940	1627.798	73.68	12.19	2.31	1630.11	.41	2.60	4.00	4.000	.000	.00	1 .0
15.162	.0199					.0110	.17	2.35	1.75	1.67	.013	.00	.00	PIPE
127.640	1626.160	2.014	1628.174	73.68	11.62	2.10	1630.27	.00	2.60	4.00	4.000	.000	.00	1 .0
5.629	.0200					.0100	.06	2.01	1.63	1.67	.013	.00	.00	PIPE
133.269	1626.272	2.050	1628.323	73.68	11.36	2.01	1630.33	.00	2.60	4.00	4.000	.000	.00	1 .0
9.498	.0200					.0091	.09	2.05	1.57	1.67	.013	.00	.00	PIPE
142.766	1626.462	2.129	1628.591	73.68	10.84	1.82	1630.41	.00	2.60	3.99	4.000	.000	.00	1 .0
6.921	.0200					.0080	.06	2.13	1.46	1.67	.013	.00	.00	PIPE
149.687	1626.601	2.212	1628.813	73.68	10.33	1.66	1630.47	.00	2.60	3.98	4.000	.000	.00	1 .0
4.859	.0200					.0071	.03	2.21	1.36	1.67	.013	.00	.00	PIPE
154.547	1626.698	2.300	1628.998	73.68	9.85	1.51	1630.50	.00	2.60	3.95	4.000	.000	.00	1 .0
3.205	.0200					.0063	.02	2.30	1.26	1.67	.013	.00	.00	PIPE
157.752	1626.762	2.393	1629.155	73.68	9.39	1.37	1630.52	.00	2.60	3.92	4.000	.000	.00	1 .0
1.836	.0200					.0055	.01	2.39	1.17	1.67	.013	.00	.00	PIPE
159.588	1626.798	2.491	1629.290	73.68	8.95	1.25	1630.53	.00	2.60	3.88	4.000	.000	.00	1 .0
.582	.0200					.0049	.00	2.49	1.08	1.67	.013	.00	.00	PIPE
160.170	1626.810	2.597	1629.407	73.68	8.53	1.13	1630.54	.00	2.60	3.82	4.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		4.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
Sunnymead Master Drainage Plan
HEADING LINE NO 2 IS -
12804
HEADING LINE NO 3 IS -
Lateral F7-2A

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	1616.110	1	1628.368

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	117.880	1627.110	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	120.100	1627.340	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	120.100	1627.340	1	1627.340

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1: 4:13

Sunnymead Master Drainage Plan

12804

Lateral F7-2A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	1616.110	12.258	1628.368	49.12	3.91	.24	1628.61	.00	2.10	.00	4.000	.000	.00	1 .0
13.449	.6152					.0012	.02	12.26	.00	.57	.013	.00	.00	PIPE
113.449	1624.384	4.000	1628.384	49.12	3.91	.24	1628.62	.00	2.10	.00	4.000	.000	.00	1 .0
.564	.6152					.0011	.00	4.00	.00	.57	.013	.00	.00	PIPE
114.012	1624.731	3.629	1628.360	49.12	4.10	.26	1628.62	.00	2.10	2.32	4.000	.000	.00	1 .0
114.017	1624.734	3.629	1628.363	49.12	4.10	.26	1628.62	.00	2.10	2.32	4.000	.000	.00	1 .0
HYDRAULIC JUMP														
114.017	1624.734	1.138	1625.872	49.12	16.68	4.32	1630.19	.00	2.10	3.61	4.000	.000	.00	1 .0
.219	.6152					.0365	.01	1.14	3.25	.57	.013	.00	.00	PIPE
114.237	1624.868	1.153	1626.021	49.12	16.37	4.16	1630.18	.00	2.10	3.62	4.000	.000	.00	1 .0
.582	.6152					.0334	.02	1.15	3.17	.57	.013	.00	.00	PIPE
114.818	1625.226	1.193	1626.419	49.12	15.61	3.78	1630.20	.00	2.10	3.66	4.000	.000	.00	1 .0
.515	.6152					.0292	.02	1.19	2.97	.57	.013	.00	.00	PIPE
115.333	1625.543	1.235	1626.778	49.12	14.88	3.44	1630.22	.00	2.10	3.70	4.000	.000	.00	1 .0
.457	.6152					.0256	.01	1.24	2.78	.57	.013	.00	.00	PIPE
115.791	1625.825	1.278	1627.103	49.12	14.19	3.13	1630.23	.00	2.10	3.73	4.000	.000	.00	1 .0
.404	.6152					.0224	.01	1.28	2.60	.57	.013	.00	.00	PIPE
116.194	1626.073	1.323	1627.396	49.12	13.53	2.84	1630.24	.00	2.10	3.76	4.000	.000	.00	1 .0

.355	.6152			.0196	.01	1.32	2.43	.57	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1: 4:13

Sunnymead Master Drainage Plan

12804

Lateral F7-2A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
116.549	1626.291	1.370	1627.661	49.12	12.90	2.58	1630.25	.00	2.10	3.80	4.000	.000	.00	1 .0
.311	.6152				.0172	.01	1.37	2.27	.57	.013	.00	.00		PIPE
116.860	1626.483	1.419	1627.902	49.12	12.30	2.35	1630.25	.00	2.10	3.83	4.000	.000	.00	1 .0
.273	.6152				.0151	.00	1.42	2.12	.57	.013	.00	.00		PIPE
117.133	1626.650	1.469	1628.119	49.12	11.73	2.14	1630.26	.00	2.10	3.86	4.000	.000	.00	1 .0
.234	.6152				.0132	.00	1.47	1.98	.57	.013	.00	.00		PIPE
117.367	1626.795	1.522	1628.317	49.12	11.18	1.94	1630.26	.00	2.10	3.88	4.000	.000	.00	1 .0
.201	.6152				.0116	.00	1.52	1.85	.57	.013	.00	.00		PIPE
117.569	1626.918	1.577	1628.496	49.12	10.66	1.77	1630.26	.00	2.10	3.91	4.000	.000	.00	1 .0
.169	.6152				.0102	.00	1.58	1.73	.57	.013	.00	.00		PIPE
117.738	1627.023	1.635	1628.658	49.12	10.17	1.60	1630.26	.00	2.10	3.93	4.000	.000	.00	1 .0
.142	.6152				.0089	.00	1.64	1.62	.57	.013	.00	.00		PIPE
117.880	1627.110	1.695	1628.805	49.12	9.69	1.46	1630.26	.00	2.10	3.95	4.000	.000	.00	1 .0
.615	.1036				.0079	.00	1.69	1.51	.88	.013	.00	.00		PIPE
118.495	1627.174	1.745	1628.919	49.12	9.32	1.35	1630.27	.00	2.10	3.97	4.000	.000	.00	1 .0
.598	.1036				.0071	.00	1.75	1.43	.88	.013	.00	.00		PIPE
119.093	1627.236	1.810	1629.046	49.12	8.89	1.23	1630.27	.00	2.10	3.98	4.000	.000	.00	1 .0
.458	.1036				.0062	.00	1.81	1.33	.88	.013	.00	.00		PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1: 4:13

Sunnymead Master Drainage Plan

12804

Lateral F7-2A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
119.551	1627.283	1.877	1629.160	49.12	8.48	1.12	1630.28	.00	2.10	3.99	4.000	.000	.00	1 .0
.310	.1036					.0055	.00	1.88	1.24	.88	.013	.00	.00	PIPE
119.861	1627.315	1.948	1629.263	49.12	8.08	1.01	1630.28	.00	2.10	4.00	4.000	.000	.00	1 .0
.184	.1036					.0048	.00	1.95	1.16	.88	.013	.00	.00	PIPE
120.045	1627.334	2.022	1629.356	49.12	7.71	.92	1630.28	.00	2.10	4.00	4.000	.000	.00	1 .0
.055	.1036					.0042	.00	2.02	1.08	.88	.013	.00	.00	PIPE
120.100	1627.340	2.102	1629.442	49.12	7.34	.84	1630.28	.00	2.10	3.99	4.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		4.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
Sunnymead Master Drainage Plan
HEADING LINE NO 2 IS -
12804
HEADING LINE NO 3 IS -
Lateral F-3A

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	1625.650	1	1632.813

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	110.000	1625.840	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	145.460	1643.580	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	162.960	1643.820	1	.013	.000	.000	.000	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	162.960	1643.820	1	1643.820

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1: 8:35

Sunnymead Master Drainage Plan

12804

Lateral F-3A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	1625.650	1.997	1627.647	235.07	37.49	21.82	1649.47	.00	3.92	4.00	4.000	.000	.00	1 .0
10.000	.0190					.1109	1.11	2.00	5.28	4.00	.013	.00	.00	PIPE
110.000	1625.840	1.964	1627.804	235.07	38.30	22.78	1650.58	.00	3.92	4.00	4.000	.000	.00	1 .0
4.789	.5003					.1077	.52	1.96	5.45	1.31	.013	.00	.00	PIPE
114.789	1628.236	2.033	1630.269	235.07	36.64	20.85	1651.12	.00	3.92	4.00	4.000	.000	.00	1 .0
4.487	.5003					.0953	.43	2.03	5.10	1.31	.013	.00	.00	PIPE
119.277	1630.481	2.111	1632.592	235.07	34.94	18.95	1651.54	.00	3.92	3.99	4.000	.000	.00	1 .0
3.942	.5003					.0840	.33	2.11	4.74	1.31	.013	.00	.00	PIPE
123.219	1632.453	2.193	1634.646	235.07	33.31	17.23	1651.88	.00	3.92	3.98	4.000	.000	.00	1 .0
3.472	.5003					.0742	.26	2.19	4.41	1.31	.013	.00	.00	PIPE
126.690	1634.190	2.280	1636.470	235.07	31.76	15.66	1652.13	.00	3.92	3.96	4.000	.000	.00	1 .0
3.064	.5003					.0655	.20	2.28	4.09	1.31	.013	.00	.00	PIPE
129.754	1635.723	2.372	1638.095	235.07	30.28	14.24	1652.33	.00	3.92	3.93	4.000	.000	.00	1 .0
2.710	.5003					.0580	.16	2.37	3.80	1.31	.013	.00	.00	PIPE
132.464	1637.078	2.468	1639.547	235.07	28.87	12.94	1652.49	.00	3.92	3.89	4.000	.000	.00	1 .0
2.392	.5003					.0514	.12	2.47	3.52	1.31	.013	.00	.00	PIPE
134.856	1638.275	2.571	1640.846	235.07	27.53	11.77	1652.61	.00	3.92	3.83	4.000	.000	.00	1 .0
2.111	.5003					.0456	.10	2.57	3.25	1.31	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1: 8:35

Sunnymead Master Drainage Plan

12804

Lateral F-3A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
136.967	1639.331	2.681	1642.012	235.07	26.25	10.70	1652.71	.00	3.92	3.76	4.000	.000	.00	1 .0
1.859	.5003					.0406	.08	2.68	3.00	1.31	.013	.00	.00	PIPE
138.826	1640.261	2.799	1643.060	235.07	25.03	9.73	1652.79	.00	3.92	3.67	4.000	.000	.00	1 .0
1.631	.5003					.0362	.06	2.80	2.76	1.31	.013	.00	.00	PIPE
140.457	1641.077	2.926	1644.003	235.07	23.86	8.84	1652.84	.00	3.92	3.55	4.000	.000	.00	1 .0
1.423	.5003					.0324	.05	2.93	2.52	1.31	.013	.00	.00	PIPE
141.880	1641.789	3.064	1644.853	235.07	22.75	8.04	1652.89	.00	3.92	3.39	4.000	.000	.00	1 .0
1.224	.5003					.0292	.04	3.06	2.30	1.31	.013	.00	.00	PIPE
143.104	1642.401	3.218	1645.620	235.07	21.69	7.31	1652.93	.00	3.92	3.17	4.000	.000	.00	1 .0
1.033	.5003					.0265	.03	3.22	2.07	1.31	.013	.00	.00	PIPE
144.137	1642.918	3.393	1646.311	235.07	20.68	6.64	1652.95	.00	3.92	2.87	4.000	.000	.00	1 .0
.828	.5003					.0244	.02	3.39	1.83	1.31	.013	.00	.00	PIPE
144.965	1643.332	3.603	1646.935	235.07	19.72	6.04	1652.97	.00	3.92	2.39	4.000	.000	.00	1 .0
.495	.5003					.0238	.01	3.60	1.56	1.31	.013	.00	.00	PIPE
145.460	1643.580	3.917	1647.497	235.07	18.80	5.49	1652.99	.00	3.92	1.14	4.000	.000	.00	1 .0
2.507	.0137					.0248	.06	3.92	1.00	4.00	.013	.00	.00	PIPE
147.967	1643.614	4.000	1647.614	235.07	18.71	5.43	1653.05	.00	3.92	.00	4.000	.000	.00	1 .0
14.993	.0137					.0262	.39	4.00	.00	4.00	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1: 8:35

Sunnymead Master Drainage Plan

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Lateral F-3A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
162.960	1643.820	4.196	1648.016	235.07	18.71	5.43	1653.45	.00	3.92	.00	4.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		2.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
Sunnymead Master Drainage Plan
HEADING LINE NO 2 IS -
12804
HEADING LINE NO 3 IS -
Lateral F7-1

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	1635.010	1	1636.143

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	131.450	1643.370	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	134.040	1644.410	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	134.040	1644.410	1	1644.410

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1:13:17

Sunnymead Master Drainage Plan

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Lateral F7-1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
100.000	1635.010	1.133	1636.143	.25	.14	.00	1636.14	.00	.17	1.98	2.000	.000	.00	1 .0
.165	.2658					.0000	.00	1.13	.03	.07	.013	.00	.00	PIPE
100.165	1635.054	1.089	1636.143	.25	.15	.00	1636.14	.00	.17	1.99	2.000	.000	.00	1 .0
.150	.2658					.0000	.00	1.09	.03	.07	.013	.00	.00	PIPE
100.315	1635.094	1.049	1636.143	.25	.15	.00	1636.14	.00	.17	2.00	2.000	.000	.00	1 .0
.147	.2658					.0000	.00	1.05	.03	.07	.013	.00	.00	PIPE
100.462	1635.133	1.010	1636.143	.25	.16	.00	1636.14	.00	.17	2.00	2.000	.000	.00	1 .0
.139	.2658					.0000	.00	1.01	.03	.07	.013	.00	.00	PIPE
100.601	1635.170	.973	1636.143	.25	.17	.00	1636.14	.00	.17	2.00	2.000	.000	.00	1 .0
.135	.2658					.0000	.00	.97	.03	.07	.013	.00	.00	PIPE
100.736	1635.206	.937	1636.143	.25	.18	.00	1636.14	.00	.17	2.00	2.000	.000	.00	1 .0
.124	.2658					.0000	.00	.94	.04	.07	.013	.00	.00	PIPE
100.860	1635.239	.904	1636.143	.25	.18	.00	1636.14	.00	.17	1.99	2.000	.000	.00	1 .0
.124	.2658					.0000	.00	.90	.04	.07	.013	.00	.00	PIPE
100.984	1635.272	.871	1636.143	.25	.19	.00	1636.14	.00	.17	1.98	2.000	.000	.00	1 .0
.116	.2658					.0000	.00	.87	.04	.07	.013	.00	.00	PIPE
101.100	1635.302	.840	1636.143	.25	.20	.00	1636.14	.00	.17	1.97	2.000	.000	.00	1 .0
.109	.2658					.0000	.00	.84	.04	.07	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1:13:17

Sunnymead Master Drainage Plan

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Lateral F7-1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
101.209	1635.331	.811	1636.143	.25	.21	.00	1636.14	.00	.17	1.96	2.000	.000	.00	1 .0
.109	.2658					.0000	.00	.81	.05	.07	.013	.00	.00	PIPE
101.318	1635.360	.782	1636.142	.25	.22	.00	1636.14	.00	.17	1.95	2.000	.000	.00	1 .0
.101	.2658					.0000	.00	.78	.05	.07	.013	.00	.00	PIPE
101.419	1635.387	.755	1636.142	.25	.23	.00	1636.14	.00	.17	1.94	2.000	.000	.00	1 .0
.097	.2658					.0000	.00	.76	.06	.07	.013	.00	.00	PIPE
101.517	1635.413	.729	1636.142	.25	.25	.00	1636.14	.00	.17	1.93	2.000	.000	.00	1 .0
.094	.2658					.0000	.00	.73	.06	.07	.013	.00	.00	PIPE
101.611	1635.438	.704	1636.142	.25	.26	.00	1636.14	.00	.17	1.91	2.000	.000	.00	1 .0
.090	.2658					.0000	.00	.70	.06	.07	.013	.00	.00	PIPE
101.700	1635.462	.680	1636.142	.25	.27	.00	1636.14	.00	.17	1.89	2.000	.000	.00	1 .0
.090	.2658					.0000	.00	.68	.07	.07	.013	.00	.00	PIPE
101.790	1635.486	.656	1636.142	.25	.28	.00	1636.14	.00	.17	1.88	2.000	.000	.00	1 .0
.082	.2658					.0000	.00	.66	.07	.07	.013	.00	.00	PIPE
101.873	1635.508	.634	1636.142	.25	.30	.00	1636.14	.00	.17	1.86	2.000	.000	.00	1 .0
.078	.2658					.0000	.00	.63	.08	.07	.013	.00	.00	PIPE
101.951	1635.529	.613	1636.142	.25	.31	.00	1636.14	.00	.17	1.84	2.000	.000	.00	1 .0
.078	.2658					.0000	.00	.61	.08	.07	.013	.00	.00	PIPE

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Lateral F7-1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
102.030	1635.550	.592	1636.142	.25	.33	.00	1636.14	.00	.17	1.83	2.000	.000	.00	1 .0
.075	.2658					.0000	.00	.59	.09	.07	.013	.00	.00	PIPE
102.104	1635.569	.572	1636.142	.25	.34	.00	1636.14	.00	.17	1.81	2.000	.000	.00	1 .0
.071	.2658					.0000	.00	.57	.09	.07	.013	.00	.00	PIPE
102.175	1635.588	.553	1636.141	.25	.36	.00	1636.14	.00	.17	1.79	2.000	.000	.00	1 .0
.071	.2658					.0000	.00	.55	.10	.07	.013	.00	.00	PIPE
102.246	1635.607	.534	1636.141	.25	.38	.00	1636.14	.00	.17	1.77	2.000	.000	.00	1 .0
.067	.2658					.0001	.00	.53	.11	.07	.013	.00	.00	PIPE
102.313	1635.625	.516	1636.141	.25	.39	.00	1636.14	.00	.17	1.75	2.000	.000	.00	1 .0
.063	.2658					.0001	.00	.52	.11	.07	.013	.00	.00	PIPE
102.376	1635.642	.499	1636.141	.25	.41	.00	1636.14	.00	.17	1.73	2.000	.000	.00	1 .0
.059	.2658					.0001	.00	.50	.12	.07	.013	.00	.00	PIPE
102.435	1635.657	.483	1636.141	.25	.43	.00	1636.14	.00	.17	1.71	2.000	.000	.00	1 .0
.059	.2658					.0001	.00	.48	.13	.07	.013	.00	.00	PIPE
102.494	1635.673	.467	1636.140	.25	.46	.00	1636.14	.00	.17	1.69	2.000	.000	.00	1 .0
.059	.2658					.0001	.00	.47	.14	.07	.013	.00	.00	PIPE
102.553	1635.689	.451	1636.140	.25	.48	.00	1636.14	.00	.17	1.67	2.000	.000	.00	1 .0
.055	.2658					.0001	.00	.45	.15	.07	.013	.00	.00	PIPE

Sunnymead Master Drainage Plan
12804
Lateral F7-1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
102.608	1635.703	.436	1636.140	.25	.50	.00	1636.14	.00	.17	1.65	2.000	.000	.00	1 .0
.051	.2658					.0001	.00	.44	.16	.07	.013	.00	.00	PIPE
102.659	1635.717	.422	1636.139	.25	.53	.00	1636.14	.00	.17	1.63	2.000	.000	.00	1 .0
.051	.2658					.0001	.00	.42	.17	.07	.013	.00	.00	PIPE
102.710	1635.731	.408	1636.139	.25	.55	.00	1636.14	.00	.17	1.61	2.000	.000	.00	1 .0
.047	.2658					.0002	.00	.41	.18	.07	.013	.00	.00	PIPE
102.758	1635.743	.395	1636.138	.25	.58	.01	1636.14	.00	.17	1.59	2.000	.000	.00	1 .0
.047	.2658					.0002	.00	.40	.19	.07	.013	.00	.00	PIPE
102.805	1635.756	.382	1636.138	.25	.61	.01	1636.14	.00	.17	1.57	2.000	.000	.00	1 .0
.047	.2658					.0002	.00	.38	.21	.07	.013	.00	.00	PIPE
102.851	1635.768	.369	1636.137	.25	.64	.01	1636.14	.00	.17	1.55	2.000	.000	.00	1 .0
.043	.2658					.0002	.00	.37	.22	.07	.013	.00	.00	PIPE
102.894	1635.779	.357	1636.136	.25	.67	.01	1636.14	.00	.17	1.53	2.000	.000	.00	1 .0
102.899	1635.781	.346	1636.127	.25	.70	.01	1636.13	.00	.17	1.51	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
102.899	1635.781	.069	1635.850	.25	7.49	.87	1636.72	.00	.17	.73	2.000	.000	.00	1 .0
24.067	.2658					.2658	6.40	.07	6.13	.07	.013	.00	.00	PIPE
126.966	1642.178	.069	1642.247	.25	7.49	.87	1643.12	.00	.17	.73	2.000	.000	.00	1 .0

4.484	.2658			.2567	1.15	.07	6.13	.07	.013	.00	.00	PIPE

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Lateral F7-1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/ Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
131.450	1643.370	.070	1643.441	.25	7.31	.83	1644.27	.00	.17	.74	2.000	.000	.00	1 .0
.369	.4016				.2361	.09	.07	5.93	.06	.013	.00	.00		PIPE
131.819	1643.518	.071	1643.589	.25	7.08	.78	1644.37	.00	.17	.74	2.000	.000	.00	1 .0
.355	.4016				.2108	.07	.07	5.67	.06	.013	.00	.00		PIPE
132.174	1643.661	.074	1643.735	.25	6.75	.71	1644.44	.00	.17	.76	2.000	.000	.00	1 .0
.287	.4016				.1841	.05	.07	5.33	.06	.013	.00	.00		PIPE
132.461	1643.776	.076	1643.852	.25	6.44	.64	1644.50	.00	.17	.77	2.000	.000	.00	1 .0
.230	.4016				.1605	.04	.08	5.00	.06	.013	.00	.00		PIPE
132.691	1643.869	.079	1643.948	.25	6.14	.59	1644.53	.00	.17	.78	2.000	.000	.00	1 .0
.196	.4016				.1399	.03	.08	4.70	.06	.013	.00	.00		PIPE
132.887	1643.947	.081	1644.028	.25	5.85	.53	1644.56	.00	.17	.79	2.000	.000	.00	1 .0
.162	.4016				.1219	.02	.08	4.40	.06	.013	.00	.00		PIPE
133.049	1644.012	.084	1644.096	.25	5.58	.48	1644.58	.00	.17	.80	2.000	.000	.00	1 .0
.142	.4016				.1061	.02	.08	4.13	.06	.013	.00	.00		PIPE
133.191	1644.069	.086	1644.155	.25	5.32	.44	1644.60	.00	.17	.81	2.000	.000	.00	1 .0
.120	.4016				.0923	.01	.09	3.87	.06	.013	.00	.00		PIPE
133.311	1644.117	.089	1644.206	.25	5.07	.40	1644.61	.00	.17	.83	2.000	.000	.00	1 .0
.104	.4016				.0806	.01	.09	3.63	.06	.013	.00	.00		PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1:13:17

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Lateral F7-1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
133.414	1644.159	.092	1644.251	.25	4.84	.36	1644.61	.00	.17	.84	2.000	.000	.00	1 .0
.091	.4016				.0703	.01	.09	3.41	.06	.013	.00	.00		PIPE
133.505	1644.195	.095	1644.291	.25	4.61	.33	1644.62	.00	.17	.85	2.000	.000	.00	1 .0
.079	.4016				.0612	.00	.10	3.20	.06	.013	.00	.00		PIPE
133.584	1644.227	.098	1644.325	.25	4.40	.30	1644.63	.00	.17	.86	2.000	.000	.00	1 .0
.067	.4016				.0535	.00	.10	3.00	.06	.013	.00	.00		PIPE
133.651	1644.254	.102	1644.356	.25	4.19	.27	1644.63	.00	.17	.88	2.000	.000	.00	1 .0
.061	.4016				.0467	.00	.10	2.82	.06	.013	.00	.00		PIPE
133.713	1644.279	.105	1644.384	.25	4.00	.25	1644.63	.00	.17	.89	2.000	.000	.00	1 .0
.054	.4016				.0407	.00	.11	2.64	.06	.013	.00	.00		PIPE
133.767	1644.301	.108	1644.409	.25	3.81	.23	1644.63	.00	.17	.90	2.000	.000	.00	1 .0
.045	.4016				.0354	.00	.11	2.47	.06	.013	.00	.00		PIPE
133.812	1644.319	.112	1644.431	.25	3.63	.21	1644.64	.00	.17	.92	2.000	.000	.00	1 .0
.040	.4016				.0310	.00	.11	2.32	.06	.013	.00	.00		PIPE
133.852	1644.334	.116	1644.451	.25	3.47	.19	1644.64	.00	.17	.94	2.000	.000	.00	1 .0
.037	.4016				.0270	.00	.12	2.18	.06	.013	.00	.00		PIPE
133.889	1644.349	.119	1644.469	.25	3.30	.17	1644.64	.00	.17	.95	2.000	.000	.00	1 .0
.030	.4016				.0235	.00	.12	2.04	.06	.013	.00	.00		PIPE

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Sunnymead Master Drainage Plan

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Lateral F7-1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
133.919	1644.362	.123	1644.485	.25	3.15	.15	1644.64	.00	.17	.96	2.000	.000	.00	1 .0
.026	.4016					.0205	.00	.12	1.92	.06	.013	.00	.00	PIPE
133.945	1644.372	.127	1644.499	.25	3.00	.14	1644.64	.00	.17	.98	2.000	.000	.00	1 .0
.020	.4016					.0179	.00	.13	1.80	.06	.013	.00	.00	PIPE
133.965	1644.380	.132	1644.512	.25	2.86	.13	1644.64	.00	.17	.99	2.000	.000	.00	1 .0
.020	.4016					.0156	.00	.13	1.69	.06	.013	.00	.00	PIPE
133.985	1644.388	.136	1644.524	.25	2.73	.12	1644.64	.00	.17	1.01	2.000	.000	.00	1 .0
.017	.4016					.0136	.00	.14	1.58	.06	.013	.00	.00	PIPE
134.002	1644.395	.140	1644.535	.25	2.60	.11	1644.64	.00	.17	1.02	2.000	.000	.00	1 .0
.012	.4016					.0119	.00	.14	1.48	.06	.013	.00	.00	PIPE
134.014	1644.400	.145	1644.545	.25	2.48	.10	1644.64	.00	.17	1.04	2.000	.000	.00	1 .0
.009	.4016					.0104	.00	.15	1.39	.06	.013	.00	.00	PIPE
134.023	1644.403	.150	1644.553	.25	2.37	.09	1644.64	.00	.17	1.05	2.000	.000	.00	1 .0
.007	.4016					.0090	.00	.15	1.31	.06	.013	.00	.00	PIPE
134.030	1644.406	.155	1644.561	.25	2.26	.08	1644.64	.00	.17	1.07	2.000	.000	.00	1 .0
.006	.4016					.0079	.00	.16	1.23	.06	.013	.00	.00	PIPE
134.036	1644.408	.160	1644.569	.25	2.15	.07	1644.64	.00	.17	1.09	2.000	.000	.00	1 .0
.004	.4016					.0069	.00	.16	1.15	.06	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1:13:17

Sunnymead Master Drainage Plan

12804

Lateral F7-1

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
134.040	1644.410	.172	1644.582	.25	1.94	.06	1644.64	.00	.17	1.12	2.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	4.000	7.000	.000	.000	.00										

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
Sunnymead Master Drainage Plan
HEADING LINE NO 2 IS -
12804
HEADING LINE NO 3 IS -
Lateral F7-4

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	1635.700	1	1638.029

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	106.520	1635.850	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	141.200	1636.620	1	.013	45.002	-44.154	.000	0

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	141.200	1636.620	1	1636.620

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1:15: 6

Sunnymead Master Drainage Plan

12804

Lateral F7-4

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	1635.700	2.329	1638.029	39.34	2.41	.09	1638.12	.00	.99	7.00	4.000	7.000	.00	0 .0
4.376	.0230					.0003	.00	2.33	.28	.54	.013	.00	.00	BOX
104.376	1635.801	2.221	1638.021	39.34	2.53	.10	1638.12	.00	.99	7.00	4.000	7.000	.00	0 .0
2.144	.0230					.0003	.00	2.22	.30	.54	.013	.00	.00	BOX
106.520	1635.850	2.167	1638.017	39.34	2.59	.10	1638.12	.03	.99	7.00	4.000	7.000	.00	0 .0
4.142	.0222					.0004	.00	2.20	.31	.54	.013	.00	.00	BOX
110.662	1635.942	2.066	1638.008	39.34	2.72	.11	1638.12	.04	.99	7.00	4.000	7.000	.00	0 .0
3.889	.0222					.0004	.00	2.10	.33	.54	.013	.00	.00	BOX
114.551	1636.028	1.970	1637.998	39.34	2.85	.13	1638.12	.04	.99	7.00	4.000	7.000	.00	0 .0
3.641	.0222					.0005	.00	2.01	.36	.54	.013	.00	.00	BOX
118.191	1636.109	1.879	1637.988	39.34	2.99	.14	1638.13	.04	.99	7.00	4.000	7.000	.00	0 .0
3.397	.0222					.0006	.00	1.92	.38	.54	.013	.00	.00	BOX
121.589	1636.184	1.791	1637.976	39.34	3.14	.15	1638.13	.05	.99	7.00	4.000	7.000	.00	0 .0
3.157	.0222					.0006	.00	1.84	.41	.54	.013	.00	.00	BOX
124.746	1636.255	1.708	1637.962	39.34	3.29	.17	1638.13	.05	.99	7.00	4.000	7.000	.00	0 .0
2.919	.0222					.0007	.00	1.76	.44	.54	.013	.00	.00	BOX
127.665	1636.319	1.628	1637.948	39.34	3.45	.18	1638.13	.06	.99	7.00	4.000	7.000	.00	0 .0
2.682	.0222					.0009	.00	1.69	.48	.54	.013	.00	.00	BOX

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-28-2023 Time: 1:15: 6

Sunnymead Master Drainage Plan

12804

Lateral F7-4

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
130.348	1636.379	1.552	1637.931	39.34	3.62	.20	1638.13	.06	.99	7.00	4.000	7.000	.00	0 .0
2.445	.0222					.0010	.00	1.62	.51	.54	.013	.00	.00	BOX
132.793	1636.433	1.480	1637.913	39.34	3.80	.22	1638.14	.07	.99	7.00	4.000	7.000	.00	0 .0
2.206	.0222					.0011	.00	1.55	.55	.54	.013	.00	.00	BOX
134.999	1636.482	1.411	1637.894	39.34	3.98	.25	1638.14	.08	.99	7.00	4.000	7.000	.00	0 .0
1.964	.0222					.0013	.00	1.49	.59	.54	.013	.00	.00	BOX
136.963	1636.526	1.346	1637.871	39.34	4.18	.27	1638.14	.08	.99	7.00	4.000	7.000	.00	0 .0
1.716	.0222					.0015	.00	1.43	.63	.54	.013	.00	.00	BOX
138.679	1636.564	1.283	1637.847	39.34	4.38	.30	1638.14	.09	.99	7.00	4.000	7.000	.00	0 .0
1.461	.0222					.0017	.00	1.38	.68	.54	.013	.00	.00	BOX
140.140	1636.596	1.223	1637.820	39.34	4.59	.33	1638.15	.10	.99	7.00	4.000	7.000	.00	0 .0
1.060	.0222					.0020	.00	1.33	.73	.54	.013	.00	.00	BOX
141.200	1636.620	1.173	1637.793	39.34	4.79	.36	1638.15	.11	.99	7.00	4.000	7.000	.00	0 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		2.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
Sunnymead Master Drainage Plan
HEADING LINE NO 2 IS -
12804
HEADING LINE NO 3 IS -
Lateral F7-5

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	1636.140	1	1639.177

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	138.670	1644.740	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	140.890	1645.030	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	140.890	1645.030	1	1645.030

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WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11:13:59

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Lateral F7-5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	1636.140	3.037	1639.177	1.87	.60	.01	1639.18	.00	.47	.00	2.000	.000	.00	1 .0
4.664	.2224					.0001	.00	3.04	.00	.18	.013	.00	.00	PIPE
104.664	1637.177	2.000	1639.177	1.87	.60	.01	1639.18	.00	.47	.00	2.000	.000	.00	1 .0
.829	.2224					.0001	.00	2.00	.00	.18	.013	.00	.00	PIPE
105.493	1637.362	1.814	1639.176	1.87	.62	.01	1639.18	.00	.47	1.16	2.000	.000	.00	1 .0
.483	.2224					.0001	.00	1.81	.07	.18	.013	.00	.00	PIPE
105.976	1637.469	1.706	1639.175	1.87	.66	.01	1639.18	.00	.47	1.42	2.000	.000	.00	1 .0
.393	.2224					.0001	.00	1.71	.08	.18	.013	.00	.00	PIPE
106.369	1637.557	1.618	1639.175	1.87	.69	.01	1639.18	.00	.47	1.57	2.000	.000	.00	1 .0
.348	.2224					.0001	.00	1.62	.09	.18	.013	.00	.00	PIPE
106.717	1637.634	1.540	1639.174	1.87	.72	.01	1639.18	.00	.47	1.68	2.000	.000	.00	1 .0
.311	.2224					.0001	.00	1.54	.10	.18	.013	.00	.00	PIPE
107.028	1637.703	1.470	1639.173	1.87	.76	.01	1639.18	.00	.47	1.77	2.000	.000	.00	1 .0
.284	.2224					.0001	.00	1.47	.11	.18	.013	.00	.00	PIPE
107.312	1637.766	1.406	1639.172	1.87	.79	.01	1639.18	.00	.47	1.83	2.000	.000	.00	1 .0
.266	.2224					.0001	.00	1.41	.12	.18	.013	.00	.00	PIPE
107.578	1637.825	1.346	1639.171	1.87	.83	.01	1639.18	.00	.47	1.88	2.000	.000	.00	1 .0
.243	.2224					.0001	.00	1.35	.13	.18	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11:13:59

Sunnymead Master Drainage Plan

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Lateral F7-5

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
107.820	1637.879	1.291	1639.170	1.87	.87	.01	1639.18	.00	.47	1.91	2.000	.000	.00	1 .0
.229	.2224					.0001	.00	1.29	.15	.18	.013	.00	.00	PIPE
108.049	1637.930	1.239	1639.169	1.87	.91	.01	1639.18	.00	.47	1.94	2.000	.000	.00	1 .0
.210	.2224					.0001	.00	1.24	.16	.18	.013	.00	.00	PIPE
108.259	1637.977	1.191	1639.168	1.87	.96	.01	1639.18	.00	.47	1.96	2.000	.000	.00	1 .0
.201	.2224					.0002	.00	1.19	.17	.18	.013	.00	.00	PIPE
108.459	1638.021	1.145	1639.167	1.87	1.01	.02	1639.18	.00	.47	1.98	2.000	.000	.00	1 .0
.191	.2224					.0002	.00	1.15	.18	.18	.013	.00	.00	PIPE
108.650	1638.064	1.101	1639.165	1.87	1.06	.02	1639.18	.00	.47	1.99	2.000	.000	.00	1 .0
.177	.2224					.0002	.00	1.10	.20	.18	.013	.00	.00	PIPE
108.827	1638.103	1.060	1639.163	1.87	1.11	.02	1639.18	.00	.47	2.00	2.000	.000	.00	1 .0
.171	.2224					.0002	.00	1.06	.21	.18	.013	.00	.00	PIPE
108.999	1638.141	1.020	1639.161	1.87	1.16	.02	1639.18	.00	.47	2.00	2.000	.000	.00	1 .0
.036	.2224					.0003	.00	1.02	.23	.18	.013	.00	.00	PIPE
109.035	1638.149	.983	1639.133	1.87	1.22	.02	1639.16	.00	.47	2.00	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
109.035	1638.149	.184	1638.333	1.87	12.93	2.60	1640.93	.00	.47	1.16	2.000	.000	.00	1 .0
8.224	.2224					.2138	1.76	.18	6.44	.18	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11:13:59

Sunnymead Master Drainage Plan

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Lateral F7-5

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/ Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
117.259	1639.978	.187	1640.165	1.87	12.57	2.45	1642.62	.00	.47	1.16	2.000	.000	.00	1 .0
7.071	.2224				.1917	1.36	.19	6.20	.18	.013	.00	.00		PIPE
124.330	1641.551	.193	1641.744	1.87	11.98	2.23	1643.97	.00	.47	1.18	2.000	.000	.00	1 .0
3.557	.2224				.1674	.60	.19	5.81	.18	.013	.00	.00		PIPE
127.886	1642.342	.200	1642.542	1.87	11.43	2.03	1644.57	.00	.47	1.20	2.000	.000	.00	1 .0
2.335	.2224				.1461	.34	.20	5.45	.18	.013	.00	.00		PIPE
130.222	1642.861	.206	1643.067	1.87	10.89	1.84	1644.91	.00	.47	1.22	2.000	.000	.00	1 .0
1.689	.2224				.1273	.22	.21	5.11	.18	.013	.00	.00		PIPE
131.910	1643.237	.213	1643.450	1.87	10.39	1.68	1645.13	.00	.47	1.23	2.000	.000	.00	1 .0
1.306	.2224				.1111	.15	.21	4.79	.18	.013	.00	.00		PIPE
133.216	1643.527	.220	1643.747	1.87	9.90	1.52	1645.27	.00	.47	1.25	2.000	.000	.00	1 .0
1.041	.2224				.0971	.10	.22	4.49	.18	.013	.00	.00		PIPE
134.257	1643.759	.228	1643.987	1.87	9.44	1.38	1645.37	.00	.47	1.27	2.000	.000	.00	1 .0
.863	.2224				.0847	.07	.23	4.22	.18	.013	.00	.00		PIPE
135.120	1643.951	.235	1644.186	1.87	9.00	1.26	1645.44	.00	.47	1.29	2.000	.000	.00	1 .0
.717	.2224				.0739	.05	.24	3.95	.18	.013	.00	.00		PIPE
135.837	1644.110	.243	1644.353	1.87	8.58	1.14	1645.50	.00	.47	1.31	2.000	.000	.00	1 .0
.608	.2224				.0645	.04	.24	3.70	.18	.013	.00	.00		PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11:13:59

Sunnymead Master Drainage Plan

12804

Lateral F7-5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
136.445	1644.245	.251	1644.496	1.87	8.18	1.04	1645.54	.00	.47	1.33	2.000	.000	.00	1 .0
.521	.2224					.0563	.03	.25	3.47	.18	.013	.00	.00	PIPE
136.966	1644.361	.259	1644.620	1.87	7.80	.95	1645.57	.00	.47	1.34	2.000	.000	.00	1 .0
.444	.2224					.0491	.02	.26	3.25	.18	.013	.00	.00	PIPE
137.410	1644.460	.268	1644.728	1.87	7.44	.86	1645.59	.00	.47	1.36	2.000	.000	.00	1 .0
.385	.2224					.0429	.02	.27	3.05	.18	.013	.00	.00	PIPE
137.796	1644.546	.277	1644.823	1.87	7.09	.78	1645.60	.00	.47	1.38	2.000	.000	.00	1 .0
.335	.2224					.0374	.01	.28	2.86	.18	.013	.00	.00	PIPE
138.131	1644.620	.286	1644.906	1.87	6.76	.71	1645.62	.00	.47	1.40	2.000	.000	.00	1 .0
.288	.2224					.0327	.01	.29	2.68	.18	.013	.00	.00	PIPE
138.419	1644.684	.296	1644.980	1.87	6.45	.65	1645.63	.00	.47	1.42	2.000	.000	.00	1 .0
.251	.2224					.0286	.01	.30	2.51	.18	.013	.00	.00	PIPE
138.670	1644.740	.306	1645.046	1.87	6.15	.59	1645.63	.00	.47	1.44	2.000	.000	.00	1 .0
.048	.1306					.0265	.00	.31	2.36	.21	.013	.00	.00	PIPE
138.718	1644.746	.307	1645.053	1.87	6.12	.58	1645.64	.00	.47	1.44	2.000	.000	.00	1 .0
.405	.1306					.0246	.01	.31	2.34	.21	.013	.00	.00	PIPE
139.122	1644.799	.317	1645.116	1.87	5.84	.53	1645.65	.00	.47	1.46	2.000	.000	.00	1 .0
.349	.1306					.0215	.01	.32	2.20	.21	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11:13:59

Sunnymead Master Drainage Plan

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Lateral F7-5

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
139.471	1644.845	.327	1645.172	1.87	5.56	.48	1645.65	.00	.47	1.48	2.000	.000	.00	1 .0
.283	.1306				.0188	.01	.33	2.06	.21	.013	.00	.00		PIPE
139.754	1644.882	.339	1645.221	1.87	5.31	.44	1645.66	.00	.47	1.50	2.000	.000	.00	1 .0
.252	.1306				.0164	.00	.34	1.93	.21	.013	.00	.00		PIPE
140.006	1644.915	.350	1645.265	1.87	5.06	.40	1645.66	.00	.47	1.52	2.000	.000	.00	1 .0
.207	.1306				.0143	.00	.35	1.81	.21	.013	.00	.00		PIPE
140.213	1644.942	.362	1645.304	1.87	4.82	.36	1645.67	.00	.47	1.54	2.000	.000	.00	1 .0
.176	.1306				.0125	.00	.36	1.69	.21	.013	.00	.00		PIPE
140.390	1644.965	.374	1645.339	1.87	4.60	.33	1645.67	.00	.47	1.56	2.000	.000	.00	1 .0
.141	.1306				.0109	.00	.37	1.59	.21	.013	.00	.00		PIPE
140.531	1644.983	.387	1645.370	1.87	4.38	.30	1645.67	.00	.47	1.58	2.000	.000	.00	1 .0
.117	.1306				.0096	.00	.39	1.49	.21	.013	.00	.00		PIPE
140.647	1644.998	.400	1645.399	1.87	4.18	.27	1645.67	.00	.47	1.60	2.000	.000	.00	1 .0
.095	.1306				.0083	.00	.40	1.39	.21	.013	.00	.00		PIPE
140.743	1645.011	.413	1645.424	1.87	3.99	.25	1645.67	.00	.47	1.62	2.000	.000	.00	1 .0
.068	.1306				.0073	.00	.41	1.30	.21	.013	.00	.00		PIPE
140.811	1645.020	.427	1645.447	1.87	3.80	.22	1645.67	.00	.47	1.64	2.000	.000	.00	1 .0
.043	.1306				.0064	.00	.43	1.22	.21	.013	.00	.00		PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11:13:59

Sunnymead Master Drainage Plan

12804

Lateral F7-5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
140.855	1645.025	.442	1645.468	1.87	3.62	.20	1645.67	.00	.47	1.66	2.000	.000	.00	1 .0
.028	.1306					.0056	.00	.44	1.15	.21	.013	.00	.00	PIPE
140.883	1645.029	.457	1645.486	1.87	3.46	.19	1645.67	.00	.47	1.68	2.000	.000	.00	1 .0
.007	.1306					.0049	.00	.46	1.07	.21	.013	.00	.00	PIPE
140.890	1645.030	.474	1645.504	1.87	3.28	.17	1645.67	.00	.47	1.70	2.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		2.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
Sunnymead Master Drainage Plan
HEADING LINE NO 2 IS -
12804
HEADING LINE NO 3 IS -
Lateral F7-7

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	1637.000	1	1637.793

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	127.540	1645.020	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	130.250	1645.250	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	130.250	1645.250	1	1645.250

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11: 7:20

Sunnymead Master Drainage Plan

12804

Lateral F7-7

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	1637.000	.737	1637.737	24.10	22.93	8.17	1645.90	.00	1.74	1.93	2.000	.000	.00	1 .0
.771	.2912					.1337	.10	.74	5.48	.60	.013	.00	.00	PIPE
100.771	1637.224	.741	1637.966	24.10	22.73	8.02	1645.99	.00	1.74	1.93	2.000	.000	.00	1 .0
4.199	.2912					.1239	.52	.74	5.41	.60	.013	.00	.00	PIPE
104.970	1638.447	.768	1639.215	24.10	21.67	7.29	1646.51	.00	1.74	1.95	2.000	.000	.00	1 .0
3.481	.2912					.1087	.38	.77	5.05	.60	.013	.00	.00	PIPE
108.450	1639.461	.796	1640.257	24.10	20.67	6.63	1646.89	.00	1.74	1.96	2.000	.000	.00	1 .0
2.931	.2912					.0954	.28	.80	4.72	.60	.013	.00	.00	PIPE
111.382	1640.314	.825	1641.139	24.10	19.70	6.03	1647.17	.00	1.74	1.97	2.000	.000	.00	1 .0
2.497	.2912					.0838	.21	.83	4.41	.60	.013	.00	.00	PIPE
113.879	1641.042	.855	1641.897	24.10	18.79	5.48	1647.38	.00	1.74	1.98	2.000	.000	.00	1 .0
2.142	.2912					.0736	.16	.86	4.11	.60	.013	.00	.00	PIPE
116.021	1641.666	.887	1642.553	24.10	17.91	4.98	1647.53	.00	1.74	1.99	2.000	.000	.00	1 .0
1.858	.2912					.0647	.12	.89	3.84	.60	.013	.00	.00	PIPE
117.879	1642.207	.919	1643.126	24.10	17.08	4.53	1647.65	.00	1.74	1.99	2.000	.000	.00	1 .0
1.608	.2912					.0569	.09	.92	3.58	.60	.013	.00	.00	PIPE
119.487	1642.675	.954	1643.629	24.10	16.28	4.12	1647.75	.00	1.74	2.00	2.000	.000	.00	1 .0
1.403	.2912					.0500	.07	.95	3.33	.60	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11: 7:20

Sunnymead Master Drainage Plan

12804

Lateral F7-7

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
120.890	1643.083	.990	1644.073	24.10	15.53	3.74	1647.82	.00	1.74	2.00	2.000	.000	.00	1 .0
1.223	.2912					.0441	.05	.99	3.11	.60	.013	.00	.00	PIPE
122.113	1643.439	1.028	1644.468	24.10	14.80	3.40	1647.87	.00	1.74	2.00	2.000	.000	.00	1 .0
1.067	.2912					.0388	.04	1.03	2.89	.60	.013	.00	.00	PIPE
123.180	1643.750	1.068	1644.818	24.10	14.11	3.09	1647.91	.00	1.74	2.00	2.000	.000	.00	1 .0
.931	.2912					.0342	.03	1.07	2.69	.60	.013	.00	.00	PIPE
124.111	1644.021	1.110	1645.131	24.10	13.46	2.81	1647.94	.00	1.74	1.99	2.000	.000	.00	1 .0
.811	.2912					.0302	.02	1.11	2.50	.60	.013	.00	.00	PIPE
124.922	1644.258	1.154	1645.412	24.10	12.83	2.56	1647.97	.00	1.74	1.98	2.000	.000	.00	1 .0
.705	.2912					.0267	.02	1.15	2.32	.60	.013	.00	.00	PIPE
125.627	1644.463	1.200	1645.663	24.10	12.23	2.32	1647.99	.00	1.74	1.96	2.000	.000	.00	1 .0
.603	.2912					.0236	.01	1.20	2.15	.60	.013	.00	.00	PIPE
126.230	1644.638	1.250	1645.888	24.10	11.66	2.11	1648.00	.00	1.74	1.94	2.000	.000	.00	1 .0
.518	.2912					.0210	.01	1.25	1.99	.60	.013	.00	.00	PIPE
126.748	1644.789	1.302	1646.091	24.10	11.12	1.92	1648.01	.00	1.74	1.91	2.000	.000	.00	1 .0
.435	.2912					.0186	.01	1.30	1.84	.60	.013	.00	.00	PIPE
127.183	1644.916	1.358	1646.274	24.10	10.60	1.75	1648.02	.00	1.74	1.87	2.000	.000	.00	1 .0
.357	.2912					.0166	.01	1.36	1.69	.60	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11: 7:20

Sunnymead Master Drainage Plan

12804

Lateral F7-7

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
127.540	1645.020	1.419	1646.439	24.10	10.11	1.59	1648.03	.00	1.74	1.82	2.000	.000	.00	1 .0
.109	.0849					.0155	.00	1.42	1.56	.84	.013	.00	.00	PIPE
127.649	1645.029	1.424	1646.453	24.10	10.06	1.57	1648.03	.00	1.74	1.81	2.000	.000	.00	1 .0
1.096	.0849					.0146	.02	1.42	1.54	.84	.013	.00	.00	PIPE
128.746	1645.122	1.490	1646.612	24.10	9.60	1.43	1648.04	.00	1.74	1.74	2.000	.000	.00	1 .0
.808	.0849					.0131	.01	1.49	1.41	.84	.013	.00	.00	PIPE
129.554	1645.191	1.562	1646.753	24.10	9.15	1.30	1648.05	.00	1.74	1.65	2.000	.000	.00	1 .0
.509	.0849					.0119	.01	1.56	1.28	.84	.013	.00	.00	PIPE
130.063	1645.234	1.643	1646.877	24.10	8.72	1.18	1648.06	.00	1.74	1.53	2.000	.000	.00	1 .0
.187	.0849					.0108	.00	1.64	1.14	.84	.013	.00	.00	PIPE
130.250	1645.250	1.738	1646.988	24.10	8.31	1.07	1648.06	.00	1.74	1.35	2.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		2.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
Sunnymead Master Drainage Plan
HEADING LINE NO 2 IS -
12804
HEADING LINE NO 3 IS -
Lateral F7-8

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	1637.000	1	1637.793

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	123.850	1643.000	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	125.460	1643.170	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	125.460	1643.170	1	1643.170

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11: 9:24

Sunnymead Master Drainage Plan

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Lateral F7-8

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
100.000	1637.000	.593	1637.593	15.24	19.55	5.93	1643.53	.00	1.41	1.83	2.000	.000	.00	1 .0
3.444	.2516					.1170	.40	.59	5.27	.50	.013	.00	.00	PIPE
103.444	1637.866	.611	1638.477	15.24	18.73	5.45	1643.92	.00	1.41	1.84	2.000	.000	.00	1 .0
3.193	.2516					.1031	.33	.61	4.97	.50	.013	.00	.00	PIPE
106.637	1638.670	.632	1639.302	15.24	17.86	4.95	1644.25	.00	1.41	1.86	2.000	.000	.00	1 .0
2.648	.2516					.0903	.24	.63	4.64	.50	.013	.00	.00	PIPE
109.285	1639.336	.655	1639.991	15.24	17.03	4.50	1644.49	.00	1.41	1.88	2.000	.000	.00	1 .0
2.239	.2516					.0791	.18	.66	4.34	.50	.013	.00	.00	PIPE
111.524	1639.899	.678	1640.577	15.24	16.23	4.09	1644.67	.00	1.41	1.89	2.000	.000	.00	1 .0
1.909	.2516					.0693	.13	.68	4.06	.50	.013	.00	.00	PIPE
113.434	1640.379	.702	1641.082	15.24	15.48	3.72	1644.80	.00	1.41	1.91	2.000	.000	.00	1 .0
1.641	.2516					.0607	.10	.70	3.80	.50	.013	.00	.00	PIPE
115.075	1640.792	.727	1641.519	15.24	14.76	3.38	1644.90	.00	1.41	1.92	2.000	.000	.00	1 .0
1.419	.2516					.0533	.08	.73	3.55	.50	.013	.00	.00	PIPE
116.494	1641.149	.753	1641.902	15.24	14.07	3.07	1644.98	.00	1.41	1.94	2.000	.000	.00	1 .0
1.232	.2516					.0467	.06	.75	3.32	.50	.013	.00	.00	PIPE
117.727	1641.459	.780	1642.240	15.24	13.42	2.79	1645.03	.00	1.41	1.95	2.000	.000	.00	1 .0
1.069	.2516					.0410	.04	.78	3.10	.50	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11: 9:24

Sunnymead Master Drainage Plan

12804

Lateral F7-8

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
118.795	1641.728	.809	1642.537	15.24	12.79	2.54	1645.08	.00	1.41	1.96	2.000	.000	.00	1 .0
.937	.2516					.0360	.03	.81	2.89	.50	.013	.00	.00	PIPE
119.732	1641.964	.838	1642.802	15.24	12.20	2.31	1645.11	.00	1.41	1.97	2.000	.000	.00	1 .0
.814	.2516					.0316	.03	.84	2.70	.50	.013	.00	.00	PIPE
120.546	1642.169	.869	1643.038	15.24	11.63	2.10	1645.14	.00	1.41	1.98	2.000	.000	.00	1 .0
.710	.2516					.0278	.02	.87	2.52	.50	.013	.00	.00	PIPE
121.256	1642.347	.901	1643.248	15.24	11.09	1.91	1645.16	.00	1.41	1.99	2.000	.000	.00	1 .0
.614	.2516					.0244	.01	.90	2.35	.50	.013	.00	.00	PIPE
121.870	1642.502	.935	1643.437	15.24	10.57	1.74	1645.17	.00	1.41	2.00	2.000	.000	.00	1 .0
.534	.2516					.0215	.01	.94	2.19	.50	.013	.00	.00	PIPE
122.404	1642.636	.970	1643.606	15.24	10.08	1.58	1645.18	.00	1.41	2.00	2.000	.000	.00	1 .0
.457	.2516					.0189	.01	.97	2.04	.50	.013	.00	.00	PIPE
122.861	1642.751	1.007	1643.758	15.24	9.61	1.43	1645.19	.00	1.41	2.00	2.000	.000	.00	1 .0
.389	.2516					.0166	.01	1.01	1.90	.50	.013	.00	.00	PIPE
123.250	1642.849	1.046	1643.895	15.24	9.16	1.30	1645.20	.00	1.41	2.00	2.000	.000	.00	1 .0
.331	.2516					.0147	.00	1.05	1.77	.50	.013	.00	.00	PIPE
123.582	1642.932	1.086	1644.019	15.24	8.74	1.19	1645.20	.00	1.41	1.99	2.000	.000	.00	1 .0
.268	.2516					.0129	.00	1.09	1.65	.50	.013	.00	.00	PIPE

Program Package Serial Number: 7324

WATER SURFACE PROFILE LISTING Date: 8-11-2023 Time:11: 9:24

Sunnymead Master Drainage Plan

12804

Lateral F7-8

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
123.850	1643.000	1.130	1644.130	15.24	8.33	1.08	1645.21	.00	1.41	1.98	2.000	.000	.00	1 .0
.215	.1056					.0119	.00	1.13	1.53	.62	.013	.00	.00	PIPE
124.065	1643.023	1.145	1644.168	15.24	8.19	1.04	1645.21	.00	1.41	1.98	2.000	.000	.00	1 .0
.515	.1056					.0110	.01	1.15	1.49	.62	.013	.00	.00	PIPE
124.580	1643.077	1.191	1644.268	15.24	7.81	.95	1645.22	.00	1.41	1.96	2.000	.000	.00	1 .0
.398	.1056					.0097	.00	1.19	1.38	.62	.013	.00	.00	PIPE
124.978	1643.119	1.239	1644.358	15.24	7.45	.86	1645.22	.00	1.41	1.94	2.000	.000	.00	1 .0
.271	.1056					.0086	.00	1.24	1.28	.62	.013	.00	.00	PIPE
125.250	1643.148	1.291	1644.439	15.24	7.10	.78	1645.22	.00	1.41	1.91	2.000	.000	.00	1 .0
.155	.1056					.0076	.00	1.29	1.18	.62	.013	.00	.00	PIPE
125.405	1643.164	1.347	1644.511	15.24	6.77	.71	1645.22	.00	1.41	1.88	2.000	.000	.00	1 .0
.055	.1056					.0068	.00	1.35	1.09	.62	.013	.00	.00	PIPE
125.460	1643.170	1.407	1644.577	15.24	6.45	.65	1645.22	.00	1.41	1.83	2.000	.000	.00	1 .0

APPENDIX J

FLOWMASTER HYDRAULICS OUTPUT FILES

Culvert Calculator Report
Ex. 48" CMP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	1,635.50	ft	Headwater Depth/Height	1.34	
Computed Headwater Eleva	1,635.50	ft	Discharge	102.28	cfs
Inlet Control HW Elev.	1,635.38	ft	Tailwater Elevation	1,628.11	ft
Outlet Control HW Elev.	1,635.50	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,630.15	ft	Downstream Invert	1,628.11	ft
Length	97.00	ft	Constructed Slope	0.021031	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.98	ft
Slope Type	Steep		Normal Depth	2.98	ft
Flow Regime	Supercritical		Critical Depth	3.06	ft
Velocity Downstream	10.17	ft/s	Critical Slope	0.019817	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,635.50	ft	Upstream Velocity Head	1.52	ft
Ke	0.50		Entrance Loss	0.76	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,635.38	ft	Flow Control	Submerged	
Inlet Type	Headwall		Area Full	12.6	ft²
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Worksheet for CB 7-1

Project Description	
Solve For	Spread

Input Data	
Discharge	0.25 cfs
Gutter Width	2.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Local Depression	1.0 in
Local Depression Width	48.0 in
Grate Width	2.00 ft
Grate Length	7.0 ft
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %
Curb Opening Length	7.0 ft
Opening Height	0.5 ft
Curb Throat Type	Inclined
Throat Incline Angle	22.00 degrees

Options	
Calculation Option	Use Both

Results	
Spread	2.6 ft
Depth	0.3 in
Gutter Depression	0.0 in
Total Depression	1.0 in
Open Grate Area	6.3 ft²
Active Grate Weir Length	9.0 ft

Worksheet for CB 7-2

Project Description	
Solve For	Spread

Input Data	
Discharge	32.21 cfs
Gutter Width	2.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Local Depression	2.0 in
Local Depression Width	48.0 in
Grate Width	2.00 ft
Grate Length	17.0 ft
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %
Curb Opening Length	17.0 ft
Opening Height	0.5 ft
Curb Throat Type	Inclined
Throat Incline Angle	22.00 degrees

Options	
Calculation Option	Use Both

Results	
Spread	23.1 ft
Depth	5.5 in
Gutter Depression	0.0 in
Total Depression	2.0 in
Open Grate Area	15.3 ft²
Active Grate Weir Length	19.0 ft

Worksheet for CB 7-3

Project Description	
Solve For	Spread

Input Data	
Discharge	8.46 cfs
Gutter Width	2.00 ft
Gutter Cross Slope	0.031 ft/ft
Road Cross Slope	0.031 ft/ft
Local Depression	1.0 in
Local Depression Width	48.0 in
Grate Width	2.00 ft
Grate Length	7.0 ft
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %
Curb Opening Length	7.0 ft
Opening Height	0.5 ft
Curb Throat Type	Inclined
Throat Incline Angle	22.00 degrees

Options	
Calculation Option	Use Both

Results	
Spread	11.4 ft
Depth	4.2 in
Gutter Depression	0.0 in
Total Depression	1.0 in
Open Grate Area	6.3 ft²
Active Grate Weir Length	9.0 ft

Worksheet for CB 7-5

Project Description	
Solve For	Efficiency

Input Data	
Discharge	1.87 cfs
Slope	0.002 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.063 ft/ft
Road Cross Slope	0.032 ft/ft
Roughness Coefficient	0.015
Curb Opening Length	14.0 ft
Local Depression	6.0 in
Local Depression Width	24.0 in

Results	
Efficiency	100.00 %
Intercepted Flow	1.87 cfs
Bypass Flow	0.00 cfs
Spread	8.6 ft
Depth	4.0 in
Flow Area	1.3 ft²
Gutter Depression	0.7 in
Total Depression	6.7 in
Velocity	1.49 ft/s
Equivalent Cross Slope	0.188 ft/ft
Length Factor	3.412
Total Interception Length	4.1 ft

Worksheet for CB 7-6

Project Description	
Solve For	Efficiency

Input Data	
Discharge	45.45 cfs
Slope	0.009 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.037 ft/ft
Road Cross Slope	0.037 ft/ft
Roughness Coefficient	0.015
Local Depression	1.0 in
Local Depression Width	24.0 in
Grate Width	2.00 ft
Grate Length	21.0 ft
Grate Type	P-50 mm (P-1 -7/8")
Clogging	33.0 %
Curb Opening Length	21.0 ft

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results	
Efficiency	90.47 %
Intercepted Flow	41.11 cfs
Bypass Flow	4.33 cfs
Spread	20.7 ft
Depth	9.2 in
Flow Area	7.9 ft²
Gutter Depression	0.0 in
Total Depression	1.0 in
Velocity	5.75 ft/s
Splash Over Velocity	85.27 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.822
Grate Flow Ratio	0.237
Equivalent Cross Slope	0.047 ft/ft
Active Grate Length	14.1 ft
Length Factor	0.124
Total Interception Length	55.7 ft

Worksheet for CB 7-7

Project Description	
Solve For	Efficiency

Input Data	
Discharge	24.10 cfs
Slope	0.013 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.026 ft/ft
Road Cross Slope	0.026 ft/ft
Roughness Coefficient	0.015
Local Depression	1.0 in
Local Depression Width	48.0 in
Grate Width	2.00 ft
Grate Length	21.0 ft
Grate Type	P-50 mm (P-1 -7/8")
Clogging	33.0 %
Curb Opening Length	21.0 ft

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results	
Efficiency	88.71 %
Intercepted Flow	21.38 cfs
Bypass Flow	2.72 cfs
Spread	18.7 ft
Depth	5.8 in
Flow Area	4.5 ft²
Gutter Depression	0.0 in
Total Depression	1.0 in
Velocity	5.30 ft/s
Splash Over Velocity	85.27 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.790
Grate Flow Ratio	0.261
Equivalent Cross Slope	0.031 ft/ft
Active Grate Length	14.1 ft
Length Factor	0.112
Total Interception Length	61.8 ft

Worksheet for CB 7-8

Project Description	
Solve For	Efficiency

Input Data	
Discharge	15.24 cfs
Slope	0.013 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.023 ft/ft
Road Cross Slope	0.023 ft/ft
Roughness Coefficient	0.015
Local Depression	1.0 in
Local Depression Width	48.0 in
Grate Width	2.00 ft
Grate Length	21.0 ft
Grate Type	P-50 mm (P-1 -7/8")
Clogging	33.0 %
Curb Opening Length	21.0 ft

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results	
Efficiency	90.77 %
Intercepted Flow	13.84 cfs
Bypass Flow	1.41 cfs
Spread	17.0 ft
Depth	4.7 in
Flow Area	3.3 ft²
Gutter Depression	0.0 in
Total Depression	1.0 in
Velocity	4.59 ft/s
Splash Over Velocity	85.27 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.812
Grate Flow Ratio	0.284
Equivalent Cross Slope	0.029 ft/ft
Active Grate Length	14.1 ft
Length Factor	0.129
Total Interception Length	53.6 ft

Worksheet for F-1A and F-2A

Project Description	
Solve For	Spread

Input Data	
Discharge	24.56 cfs
Left Side Slope	0.010 H:V
Right Side Slope	0.010 H:V
Bottom Width	50.00 ft
Grate Width	4.00 ft
Grate Length	26.0 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	50.0 ft
Depth	3.3 in
Wetted Perimeter	50.6 ft
Top Width	50.01 ft
Open Grate Area	46.8 ft²
Active Grate Weir Length	56.0 ft